

- 14b. Corolla blue or purple; leaf blade over 2×1 mm but usually much larger; corolla lobes valvate in bud at least toward base 20. *Jaeschkea*
- 12b. Stamens inserted on corolla tube distinctly below sinuses.
- 15a. Nectaries on gynophore; corolla over 5 cm, 5-lobed 11. *Megacodon*
- 15b. Nectaries on corolla; corolla less than 5 cm or if longer then 4-lobed.
- 16a. Nectaries surrounded by fringed or tubular appendages.
- 17a. Nectaries on corolla lobes; stigma elevated above ovary, not decurrent 14. *Swertia*
- 17b. Nectaries on corolla tube near base; stigma decurrent on ovary.
- 18a. Corolla lobe with 2 nectaries each in a conspicuous pit; corolla tissue associated with nectary and pit sometimes basally connate, apically lobulate or lamellate 15. *Lomatogonium*
- 18b. Corolla lobe with 1 nectary not in a conspicuous pit; corolla tissue associated with nectaries lamellate or galeate appendaged, margin entire or erose 16. *Lomatogoniopsis*
- 16b. Nectaries not surrounded by fringes or appendages.
- 19a. Flowers 4-merous; 2 outer calyx lobes narrower than and basally overlapping 2 inner lobes; discontinuous intracalycular membranes present 17. *Gentianopsis*
- 19b. Flowers 4- or 5-merous; calyx lobes equal or nearly so, not overlapping nor in 2 distinct pairs; intracalycular membranes absent.
- 20a. Corolla lobes less than $5 \times$ as long as tube.
- 21a. Corolla with 1 or 2 nonvascularized fringed scales at base of each lobe 18. *Comastoma*
- 21b. Corolla either without appendages or with a single vascularized fringed scale at base of each lobe 19. *Gentianella*
- 20b. Corolla lobes at least $5 \times$ as long as tube.
- 22a. Nectaries on corolla lobes; stigma elevated above ovary, not decurrent 14. *Swertia*
- 22b. Nectaries on corolla tube near base; stigma decurrent on ovary.
- 23a. Corolla lobe with 2 nectaries each in a conspicuous pit; corolla tissue associated with nectary and pit sometimes basally connate, apically lobulate or lamellate 15. *Lomatogonium*
- 23b. Corolla lobe with 1 nectary not in a conspicuous pit; corolla tissue associated with nectaries lamellate or galeate appendaged, margin entire or erose 16. *Lomatogoniopsis*

1. EXACUM Linnaeus, Sp. Pl. 1: 112. 1753.

藻百年属 zao bai nian shu

Annuals. Stems branched, glabrous. Leaves opposite. Cymes axillary or terminal, paniculate. Flowers 4- or 5-merous. Calyx lobed nearly to base. Corolla rotate, lobes longer than tube. Stamens inserted at throat of corolla tube just below sinus between corolla lobes; anthers cylindric, 2-locular, dehiscing by apical pores. Ovary 2-locular. Capsules 2-valved, many seeded. Seed coat warty.

About 40 species: tropical Africa, tropical and subtropical Asia, Madagascar; two species in China.

- 1a. Stems narrowly winged; calyx 5–6 mm; corolla mauve-blue to lilac; anthers 5.5–6.5 mm 1. *E. tetragonum*
- 1b. Stems terete; calyx 7–10 mm; corolla bright blue drying purplish pink; anthers (6.5–)8–10 mm 2. *E. teres*

1. *Exacum tetragonum* Roxburgh, Fl. Ind. ed. 1832, 1: 398. 1832.

藻百年 zao bai nian

Plants 20–100 cm tall. Stems erect, apically branched, 4-angled. Leaves sessile, ovate-lanceolate to ovate, 1–5 × 0.8–2.5 cm, base rounded, nearly clasping, and decurrent into narrow wings on stem, apex acute; veins 3–5, abaxially prominent. Pedicel 3–10 mm. Calyx 5–6 mm; lobes ovate, margin broadly membranous, apex caudate, midvein keeled. Corolla mauve-blue to lilac, 1.5–2.5 cm; tube cylindric, 4–6 mm; lobes elliptic, 1.1–1.7 cm, margin entire, apex short acuminate. Filaments linear, 1.5–2 mm; anthers 5.5–6.5 mm. Style linear, 1–1.2 cm; stigma lobes orbicular. Capsules subglobose, 4–5 mm in diam. Seeds ellipsoid, 0.7–1 mm. Fl. and fr. Jul-Sep.

Roadsides, meadows; 200–1500 m. Guangdong, Guangxi, Guizhou, Jiangxi, Yunnan [Cambodia, India, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sikkim, Vietnam; Australia].

2. *Exacum teres* Wallich in Roxburgh, Fl. Ind. 1: 414. 1820.

云南藻百年 yun nan zao bai nian

Plants (15–)30–100 cm tall. Stems erect or ascending, little branched, terete. Leaves sessile, narrowly ovate to lanceolate, 4–10 × 0.8–2.5(–3) cm, base cuneate, apex mostly acute but sometimes blunt on basal leaves; veins 3, prominent. Cymes mostly 3-flowered in a narrow racemelike inflorescence; peduncle to 1.5 cm, flattened, to 3 cm in fruit; bracts mostly linear, sometimes leaflike. Pedicel 0.5–2(–3) mm. Calyx 7–10 mm; lobes ovate, apex acuminate, midvein raised into a narrow wing. Corolla bright blue fading to purple and drying to purplish pink, 2.5–3 cm in diam.; tube ca. 0.7 cm; lobes 1.2–1.6 cm. × 6–7 mm, apex short acuminate. Filaments 2–3 mm; anthers (6.5–)8–10 mm. Style ca. 1.5 cm. Capsules ellipsoid, 7–12 × 5–8 mm. Seeds polygonal to brick-shaped, with a prominent, pale brown, spongy, loose outer coat opening to reveal dark brown, ellipsoid seed ca. 0.8 mm.

Disturbed sites, often along roadsides, on scree slopes or river beds; below 1500 m. Yunnan (Taying Jiang valley) [Bangladesh, Bhutan, India, Myanmar, Nepal, Sikkim].

Exacum teres is known in China from a single George Forrest collection.

2. COTYLANTHERA Blume, Bijdr. 707. 1826.

杯药草属 bei yao cao shu

Herbs saprophytic. Leaves opposite; leaf blade scalelike, membranous. Flower solitary, 4-merous. Calyx membranous, lobed nearly to base. Corolla rotate, lobed nearly to base. Stamens inserted at throat of corolla tube just below sinus between corolla lobes; anthers incompletely 2-locular, dehiscing by apical pores. Ovary 2-locular. Style elongate; stigma lobes orbicular. Capsules 2-valved, many seeded.

Four species: Bhutan, China, NE India, Indonesia, Myanmar, Nepal, Philippines, Thailand; one species in China.

1. *Cotylanthera paucisquama* C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 94. 1883.

杯药草 bei yao cao

Cotylanthera yunnanensis W. W. Smith.

Plants 5–10 cm tall. Stems erect, simple, terete. Leaves 3–6 pairs; leaf blade 1.5–2.5 × 0.7–1 mm, apex acute. Flower

terminal. Pedicel terete, 6–10 mm, glabrous. Calyx 4–6 mm; lobes triangular, apex obtuse, midvein distinct. Corolla white, pale blue, or blue, 1–1.2 cm; lobes narrowly oblong, margin entire, apex obtuse. Filaments linear, 2.8–4 mm; anthers sagittate, 2.5–4 mm, slightly curved. Ovary ovoid-ellipsoid, 1.8–2 mm. Style linear, 5.5–8 mm. Capsules subglobose.

Forests; 1700–2400 m. Sichuan, Xizang, Yunnan [Sikkim].

3. SEBAEA Solander ex R. Brown, Prodr. 451. 1810.

小黄管属 xiao huang guan shu

Annuals. Leaves opposite; leaf blade scalelike to lanceolate. Cymes terminal. Flowers 5-merous. Calyx lobed nearly to base. Corolla lobes shorter than tube. Stamens inserted at throat of corolla tube just below sinus between corolla lobes; anthers dehiscing longitudinally. Ovary 2-locular. Capsules 2-valved, many seeded. Seed coat alveolate.

About 100 species: temperate Africa, Bhutan, China, India, Madagascar, Nepal, Sri Lanka; one species in China.

1. *Sebaea microphylla* (Edgeworth) Knoblauch, Bot. Centralbl. 60: 324. 1894.

小黄管 xiao huang guan

Cicendia microphylla Edgeworth, Trans. Linn. Soc. London 20: 83. 1846; *Sebaea khasiana* C. B. Clarke.

Plants 5–10 cm tall, glabrous. Stems erect, simple, terete.

Leaves sessile, 1–2.5 × 0.5–0.8 mm, base obtuse, margin membranous, apex acuminate. Flowers 1–3. Pedicel 0.7–1.7 cm, slender. Calyx 4–5 mm; lobes spreading, lanceolate, 3.5–4.5 mm, margin broadly membranous, apex acuminate, midvein keeled. Corolla yellow, tubular, 8–10 mm; lobes elliptic, 4–5 mm, margin entire, apex obtuse. Filaments linear, 1.8–2 mm; anthers ellipsoid, 0.8–1 mm. Style linear, 3.5–4

mm; stigma lobes orbicular. Capsules ellipsoid to subglobose, 2.5–3 mm. Seeds dark brown, ellipsoid to globose, 0.2–0.3

mm. Fl. and fr. Oct.

Forests; ca. 2300 m. Yunnan [Bhutan, India, Nepal].

4. CENTAURIUM Hill, Brit. Herb. 62. 1756.

白金花属 bai jin hua shu

Erythraea Borkhausen.

Annuals. Stems erect, obscurely 4-angled. Leaves opposite. Cymes pseudodichotomous, sometimes spicate. Flowers [4- or] 5-merous. Calyx lobed nearly to base. Corolla salverform, lobes shorter than tube. Stamens inserted at throat of corolla tube; filaments filiform, erect at first, helically coiled later; anthers dehiscing longitudinally. Ovary partly 2-locular. Style linear; stigma lobes orbicular. Capsules 2-valved, many seeded. Seed coat alveolate.

40–50 species: worldwide except subsaharan Africa; two species in China.

1a. Inflorescences spicate cymes; flowers sessile; calyx lobes 6–8 mm, apex obtuse 1. *C. japonicum*

1b. Inflorescences dichotomous or racemoid; flowers pedicellate; calyx lobes 2.5–3 mm, apex acuminate 2. *C. pulchellum*

1. Centaurium japonicum (Maximowicz) Druce, Bot. Soc. Exch. Club Brit. Isles 4: 613. 1917.

日本白金花 ri ben bai jin hua

Erythraea japonica Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg, sér. 3, 31: 67. 1886.

Plants 5–30 cm tall, glabrous. Stems much branched. Basal leaves short petiolate; leaf blade spatulate, 1–2 cm × 8–10 mm including petiole, base narrowed, apex rounded, veins 1–3 and abaxially prominent. Stem leaves sessile, oblong, elliptic, or ovate-elliptic, 0.8–2.2 cm × 3–12 mm, base rounded and nearly clasping, apex obtuse to rounded; veins 1–3, prominent. Cymes spicate. Flowers sessile. Calyx tubular, 3–4 mm; lobes linear to narrowly elliptic, 6–8 mm, apex obtuse, midvein prominent. Corolla white outside, pink inside, 1–1.3 cm, tube narrowly tubular; lobes narrowly oblong, 3–5 mm, margin entire or serrulate, apex obtuse. Filaments 1.5–2 mm; anthers ellipsoid, 0.5–0.7 mm. Style 3–3.5 mm. Capsules narrowly ellipsoid, 8–10 mm. Seeds dark brown, globose, 0.3–0.5 mm in diam. Fl. and fr. May-Jul.

Weed in cultivated land. Taiwan [Japan].

2. Centaurium pulchellum (Swartz) Druce, Fl. Berkshire 342. 1897.

美丽白金花 mei li bai jin hua

Plants 4–10(–25) cm tall, glabrous. Stems simple to much branched, obscurely 4-angled. Leaves sessile; lower leaves elliptic to ovate-elliptic, 0.6–1.7 cm × 3–6 mm, base rounded, apex obtuse, veins 1–3 and abaxially distinct; upper leaves elliptic-lanceolate, 0.6–2 cm × 2–7 mm, base rounded and nearly clasping, apex acuminate, acute, or mucronate, veins 1–3. Cymes laxly dichotomous or racemose. Pedicel 3–5 mm, slender, 4-angled. Calyx lobes subulate or linear-lanceolate, 2.5–3 mm, apex acuminate, midvein distinct or strongly crested. Corolla white, pink, or purple, 1.3–1.5 cm; lobes narrowly oblong, 2.7–3.2 mm, margin entire, apex

obtuse. Filaments 1.5–2 mm; anthers ellipsoid, 0.5–0.7 mm. Style 2–2.5 mm. Capsules ellipsoid, 7.5–9 mm. Seeds blackish, globose, 0.2–0.3 mm in diam. Fl. and fr. May-Jul.

100–2200 m. Fujian, Gansu, Guangdong, Guangxi, Hainan, Hebei, Heilongjiang, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Taiwan, Xinjiang, Zhejiang [India, Russia; N Africa, C and W Asia, Europe].

1a. Calyx lobes linear-lanceolate; corolla purple 2a. var. *pulchellum*

1b. Calyx lobes subulate; corolla white or pink 2b. var. *altaicum*

2a. Centaurium pulchellum var. *pulchellum*

美丽白金花 (原变种) mei li bai jin hua (yuan bian zhong)

Gentiana pulchella Swartz, Kongl. Vetensk. Acad. Nya Handl. 3: 85. 1783.

Calyx lobes linear-lanceolate, midvein distinct. Corolla purple.

Along streams, wastelands, wet places. Xinjiang [India; N Africa, C and W Asia, Europe].

2b. Centaurium pulchellum var. *altaicum* (Grisebach) Kitagawa & H. Hara, J. Jap. Bot. 13: 26. 1937.

白金花 bai jin hua

Erythraea ramosissima Persoon var. *altaica* Grisebach in A. de Candolle, Prodr. 9: 57. 1845; *E. meyeri* Bunge; *E. ramosissima* var. *albiflora* Boissier.

Calyx lobes subulate, midvein strongly crested. Corolla white or pink.

Wet cultivated land, grasslands, along streams, sandy places especially near shores; below 100–2200 m. Fujian, Gansu, Guangdong, Guangxi, Hainan, Hebei, Heilongjiang, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Taiwan, Xinjiang, Zhejiang [India, Russia; C Asia].

5. CANSCORA Lamarck, Encycl. 1: 601. 1785.

穿心草属 chuan xin cao shu

Euphorbiopsis H. Léveillé & Vaniot.

Annuals or perennials. Leaves opposite, sessile, petiolate, or perfoliate. Cymes pseudodichotomous or complex. Flowers 4- or 5-merous. Calyx tubular. Corolla usually tubular, salverform, or campanulate. Stamens inserted at apical part of corolla tube, 1 or 2 (or 3) with fertile anthers, 2 or 3 with sterile nonfunctional anthers. Ovary 1-locular. Stigma lobes oblong or capitate. Capsules 2-valved, many seeded. Seeds suborbicular, compressed; seed coat reticulate.

About 30 species: tropical and subtropical Africa, Asia, and Australia; three species in S China.

- 1a. Leaf pairs completely joined into single, orbicular, perfoliate blade; flowers 5-merous; corolla campanulate; stamens subequal; plants apparently perennial 3. *C. lucidissima*
- 1b. Leaves free, not perfoliate; flowers 4-merous; corolla tubular or salverform; stamens clearly unequal; plants annual.
 - 2a. Apical leaf blades narrowly ovate; calyx tube 9–11 mm, prominently 8-veined; corolla tubular; fertile stamen 1 1. *C. andrographioides*
 - 2b. Apical leaf blades cordate; calyx tube 4–5 mm, obscurely 4-veined; corolla salverform; fertile stamens 2 or 3 2. *C. diffusa*

1. *Canscora andrographioides* Griffith ex C. B. Clarke, J. Linn. Soc., Bot. 14: 431. 1875.

罗星草 luo xin cao

Canscora melastomacea Handel-Mazzetti.

Annuals, 20–40 cm tall, glabrous. Stems erect, much branched, obscurely 4-angled. Leaves sessile, ovate-lanceolate to ovate, 1–5 × 0.5–2.5 cm, base cuneate to rounded, apex acute; veins 3–5, slender. Cymes pseudodichotomous. Flowers 4-merous. Calyx tubular; tube 0.9–1.1 cm, membranous; lobes narrowly triangular, 3–4 mm, apex acute, veins 3 and prominent. Corolla white to purple, tubular, 1.4–1.8 cm; lobes elliptic to oblong-spatulate, 4.5–5 mm, margin entire, apex obtuse. Fertile stamens 1; filaments filiform, 2–2.5 mm; anthers ellipsoid, 1–1.2 mm. Sterile stamens 3; filaments 0.4–0.5 mm; anthers small. Style filiform, 8.5–10 mm; stigma lobes oblong. Capsules ellipsoid, 7–8 mm. Seeds 0.5–0.6 mm. Fl. and fr. Sep-Oct.

Weed in cultivated land, valleys, forests; 200–1400 m. Guangdong, Guangxi, S and SW Yunnan [Cambodia, India (Assam), Laos, Malaysia, Thailand, Vietnam].

2. *Canscora diffusa* (Vahl) R. Brown ex Roemer & Schultes, Syst. Veg. 3: 301. 1818.

铺地穿心草 pu di chuan xin cao

Gentiana diffusa Vahl, Symb. Bot. 3: 47. 1794; *Canscora rubiflora* X. X. Chen; *Striga esquirolii* H. Léveillé.

Annuals, to 30 cm tall, glabrous throughout. Stems branched from base, lower internodes winged, upper subterete. Leaves sessile; basal leaves ovate to broadly lanceolate, 1.8–2.4 × 0.8–1.8 cm, base truncate to cuneate, apex acute; veins 3–5, slender. Cymes lax, spreading; bracts to 2 × 0.5 mm. Pedicel to 1 mm, narrowly winged. Calyx to 5 mm; tube narrowly cylindrical, to 3.5 mm; lobes linear-lanceolate, to 1.5 mm, apex acuminate. Corolla pale purple to

pink, salverform, tube to 8 mm; lobes oblong, 2.5–5 mm. Fertile stamens 2 or 3, shorter than corolla tube. Sterile stamens 1 or 2, ca. as long as tube. Capsules linear-ovoid, 4–6 mm.

Weed in moist cultivated land. Guangxi, Guizhou, Yunnan [Bangladesh, Bhutan, India, Indonesia, Laos, Malaysia, Nepal, Philippines, Sri Lanka, Thailand, Vietnam; tropical Africa, tropical Australia].

3. *Canscora lucidissima* (H. Léveillé & Vaniot) Handel-Mazzetti, Symb. Sin. 7: 234. 1931.

穿心草 chuan xin cao

Euphorbia lucidissima H. Léveillé & Vaniot, Bull. Herb. Boissier, sér. 2, 6: 763. 1906; *Euphorbiopsis lucidissima* (H. Léveillé & Vaniot) H. Léveillé.

Plants 10–30 cm tall, glabrous, from woody rootstock, apparently perennial. Stems woody at base, erect, much branched, obscurely 4-angled. Basal leaves short petiolate; leaf blade ovate; middle to upper stem leaves with paired blades orbicular, perfoliate, 0.7–2 cm in diam., reticulate veins prominent. Cymes pseudodichotomous, many flowered; bracts foliose. Flowers 5-merous. Calyx campanulate, 5–6 mm, tube membranous; lobes triangular, 1–1.5 mm, apex acute. Corolla white or pale yellow, campanulate, 6–8 mm; lobes oblong-spatulate, 2–2.5 mm, margin entire, apex obtuse. Stamens subequal; filaments filiform, 1.5–2 mm; anthers ellipsoid, 0.7–1 mm. Style filiform, 2–2.5 mm; stigma lobes orbicular. Capsules broadly ellipsoid, 4–5 mm. Seeds light brown, 0.4–0.5 mm. Fl. and fr. Aug.

- Limestone slopes. Guangxi, Guizhou.

The relationship of *Canscora lucidissima* to the other species of *Canscora* needs further investigation. The superficial similarity to some species of *Euphorbia* sect. *Esula* is quite striking.

6. PTERYGOCALYX Maximowicz, Mém. Acad. Imp. Sci.

St.-Pétersbourg Divers Savans 9: 198. 1859.

翼萼蔓属 yi e man shu

Perennials. Stems twining. Leaves opposite. Flowers 4-merous. Calyx campanulate, tube strongly 4-winged. Corolla tubular, plicae between lobes absent. Stamens inserted on corolla tube. Nectaries at base of ovary, sometimes absent. Capsules 2-valved, many seeded. Seed coat alveolate.

One species: China, Japan, Korea, Russia.

1. *Pterygocalyx volubilis* Maximowicz, Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 198. 1859.

翼萼蔓 yi e man

Crawfordia pterygocalyx Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 123. 1890.

Stem slender, internodes 5–10 cm. Petiole flattened, 2–4 × 1–1.5 mm; leaf blade lanceolate to ovate-lanceolate, 3–7 × 0.5–1.5 cm, base narrowed, margin scabrous, veins 1–3. Inflorescences axillary or terminal, 1-flowered or in cymes; bractlets sometimes present, lanceolate. Pedicel 0.3–5 cm,

slender. Calyx membranous; tube ca. 1 cm, wings 1–2 mm wide; lobes lanceolate, 4–7 × ca. 1 mm. Corolla blue, tube 1.1–1.5 cm; lobes oblong, ca. 8 × 3 mm, apex rounded. Stamens inserted at middle of corolla tube; filaments filiform, ca. 5 mm; anthers ovoid, ca. 2 mm. Style cylindrical, ca. 2 mm; stigma lobes suborbicular. Fruiting pedicel ca. 5 mm; capsules ellipsoid, ca. 1.5 cm. Seeds brown, ellipsoid, ca. 1 × 0.7 mm; wings discoid, irregular. Fl. and fr. Aug-Sep.

Forests, forest margins; 1100–2800 m. Hebei, Heilongjiang, Henan, Hubei, Jilin, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, SE Xizang, Yunnan [Japan, Korea, Russia].

7. *TRIPTEROSPERMUM* Blume, Bijdr. 849. 1826.

双蝴蝶属 shuang hu die shu

Perennials. Stems elongated and twining or prostrate and creeping, rarely erect in some individuals. Leaves opposite. Inflorescences axillary and terminal, 1-flowered or in cymes. Flowers 5-merous. Calyx tube usually with 5 keeled ridges. Corolla tubular or broadly tubular, plicae present. Stamens inserted at basal part of corolla tube, unequal, apically recurved. Nectaries conspicuously developed, forming a collarlike disc surrounding base of ovary. Ovary 1-locular; ovules many. Style slender, slightly recurved; stigma linear, recurved at anthesis. Fruit a capsule or berry, many seeded. Seeds triquetrous to compressed, winged or wingless.

About 25 species: E and S Asia; 19 species in China.

Some species of *Tripterospermum* are very similar in flower, and fruit with seeds may be necessary for positive identification.

- 1a. Gynophore somewhat shorter to almost as long as ovary at anthesis, distinctly elongated in fruit; corolla persistent in fruit.
 - 2a. Fruit a capsule.
 - 3a. Calyx lobes 2–4 mm, tube wingless or narrowly winged; petiole 3–10 mm; leaf blade membranous 2. *T. discoideum*
 - 3b. Calyx lobes 6–9 mm, tube with 5 keeled ridges; leaves sessile or subsessile; leaf blade herbaceous 3. *T. chinense*
 - 2b. Fruit a berry.
 - 4a. Corolla white; seeds distinctly winged 6. *T. volubile*
 - 4b. Corolla pale yellow, pink, blue, violet, or purple (occasionally white in *T. lanceolatum*); seeds obscurely winged or wingless (unknown in *T. filicaule*).
 - 5a. Anthers ca. 1.5 mm; leaf blade usually ovate 7. *T. filicaule*
 - 5b. Anthers 1–1.2 mm; leaf blade usually lanceolate, occasionally narrowly ovate.
 - 6a. Calyx tube narrowly winged; fruit exerted from corolla 5. *T. lanceolatum*
 - 6b. Calyx tube wingless; fruit included in corolla 8. *T. pingbianense*
 - 1b. Gynophore distinctly shorter than ovary at anthesis and in fruit; corolla not persistent or at least withered in fruit.
 - 7a. Stems trailing and rooting at nodes, not twining; leaf blade ovate to cordate (usually lanceolate to ovate in *T. microphyllum*).
 - 8a. Leaf blade base rounded to truncate; corolla less than 3.5 cm 9. *T. microphyllum*
 - 8b. Leaf blade base of larger leaves cordate; corolla over 3.5 cm.
 - 9a. Calyx lobes linear to oblanceolate; gynophore of mature fruit 4–7 mm; pistil exerted from corolla 10. *T. cordifolium*
 - 9b. Calyx lobes linear-subulate to lanceolate; fruit scarcely stipitate; pistil included in corolla 11. *T. cordifolioides*

- 7b. Stems twining; leaf blade lanceolate to ovate.
- 10a. Fruit a capsule 1. *T. coeruleum*
- 10b. Fruit a berry.
- 11a. Calyx tube cylindrical, with puberulent and/or scabrous-ciliate ridges; lobes shorter than tube 16. *T. hirticalyx*
- 11b. Calyx tube campanulate, smooth or with nonciliate ridges; lobes usually longer than tube.
- 12a. Corolla white, greenish white, or pale yellow, at most tinged with purple.
- 13a. Bracts ovate to triangular; ovary distinctly longer than calyx tube 14. *T. taiwanense*
- 13b. Bracts lanceolate; ovary as long as calyx tube.
- 14a. Calyx lobes linear to linear-lanceolate; corolla plicae semiorbicular; seeds narrowly winged 12. *T. pallidum*
- 14b. Calyx lobes lanceolate; corolla plicae ovate to triangular; seeds wingless 15. *T. alutaceifolium*
- 12b. Corolla distinctly rose-violet, blue, or purple.
- 15a. Fruit subglobose; corolla 1.8–3.2 cm 4. *T. luzonense*
- 15b. Fruit ellipsoid; corolla 3.3–5 cm.
- 16a. Ovary about as long as calyx tube.
- 17a. Peduncle with scalelike or subulate bracts; calyx lobes arcuate spreading 13. *T. australe*
- 17b. Peduncle with leafy bracts; calyx lobes ascending or recurved only near tip 17. *T. cordatum*
- 16b. Ovary distinctly longer than calyx tube.
- 18a. Corolla dark violet-blue; leaves thicker than membranous 18. *T. nienkui*
- 18b. Corolla rose-violet; leaf blade membranous 19. *T. membranaceum*

1. *Tripterospermum coeruleum* (Handel-Mazzetti) Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 246. 1965.

盐源双蝴蝶 yan yuan shuang hu die

Crawfordia coerulea Handel-Mazzetti, Symb. Sin. 7: 950. 1936; *Gentiana cyanea* C. Marquand.

Stems twining, terete, 2–3 mm in diam. Petiole 5–10 mm, slender; leaf blade lanceolate to ovate-lanceolate, 6–7 × 1–2.5 cm, base rounded, margin entire or sometimes slightly revolute, apex acuminate to sometimes caudate, veins 3. Inflorescences 1–3-flowered cymes; bracts 1–3 pairs, ovate, to 1 cm. Pedicel 3–10 mm. Calyx campanulate; tube 1–1.4 cm, broadly winged; lobes linear-lanceolate, 5–6 mm. Corolla blue, narrowly campanulate, 3.5–4 cm; lobes ovate-triangular, 5–6 mm, apex acuminate and caudate; plicae semiorbicular, 1.5–2 mm, margin entire or crenulate. Filaments linear, 1.8–2 cm; anthers ellipsoid, ca. 1.5 mm. Disc ca. 1 mm. Style 8–10 mm. Capsules ellipsoid to obovoid-ellipsoid, ca. 3 mm, included in persistent corolla; gynophore less than 5 mm. Seeds light brown, discoid to compressed triquetrous, 2–2.5 mm, broadly winged along ridges. Fl. and fr. Sep–Oct.

• Scrub, bamboo thickets; 2500–3100 m. SW Sichuan.

2. *Tripterospermum discoideum* (C. Marquand) Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 244. 1965.

湖北双蝴蝶 hu bei shuang hu die

Gentiana discoidea C. Marquand, Bull. Misc. Inform. Kew 1931: 72. 1931; *G. caudata* C. Marquand.

Stems terete, 1–3 mm in diam. Petiole 3–10 mm; leaf blade lanceolate to ovate-lanceolate, 3–10 × 1.5–5.5 cm, membranous, base rounded to subcordate, margin entire and

sometimes slightly revolute, apex ± short acuminate to acuminate-caudate, veins 3–5. Inflorescences 1–5-flowered cymes; bracts 1–5 pairs, lanceolate to triangular, 2–6(–10) mm. Pedicel 3–10 mm. Calyx campanulate; tube 1–1.4 cm, wingless or narrowly winged; lobes linear-subulate to linear-lanceolate, 2–4 mm. Corolla pale blue, blue, blue-purple, or purple, narrowly campanulate to campanulate, 3–5 cm; lobes ovate-triangular, 6–9 mm, apex acuminate; plicae semiorbicular, 1.5–3 mm, margin entire or crenate. Filaments linear to linear-subulate, 1.3–2.2 cm; anthers ellipsoid to ovoid, ca. 1.5 mm. Disc 1–5 mm. Style 8–11 mm. Capsules ellipsoid, 2–2.5 cm × 7–8 mm, partially exerted from persistent corolla; gynophore 1–1.5 cm. Seeds light brown, orbicular, compressed, 2–2.5 × 0.7–0.8 mm; wings discoid. Fl. and fr. Aug–Dec.

• Grassland slopes; 600–2000 m. W Hubei, S Shaanxi, E Sichuan.

3. *Tripterospermum chinense* (Migo) Harry Smith in S. Nilsson, Grana Palynol. 7(1): 144. 1967.

双蝴蝶 shuang hu die

Crawfordia chinensis Migo, J. Shanghai Sci. Inst. 3: 154. 1939; *Tripterospermum carlesii* Harry Smith.

Stems terete, to 1.5 m, 2–3 mm in diam. Basal leaves 2 pairs, prostrate, sessile, elliptic, broadly oblong, or obovate-oblong, 3–6.5 × 1.5–5.5 cm, base rounded, margin entire, apex acuminate and mucronate; stem leaves sessile to subsessile with petiole 0.2–0.3 mm; leaf blade ovate-lanceolate to lanceolate, 5–10 × 2–3.5 cm, herbaceous, base rounded, truncate, or cordate, margin entire, apex ± short acuminate to acuminate-attenuate; veins 3, prominent. Inflorescences 1–4-flowered cymes. Pedicel 5–10 mm;

bractlets 1–3 pairs, small. Calyx 1.6–2 cm; lobes linear-lanceolate, 6–9 mm. Corolla blue-purple to pale purple, narrowly campanulate, 4–4.5 cm; lobes ovate-triangular, 5–6 mm, apex acuminate to acute; plicae semiorbicular, 2.5–3 mm, margin crenate. Filaments linear, 1.3–2 cm; anthers ovoid, ca. 1.5 mm. Disc ca. 1.5 mm. Style linear, 8–11 mm. Capsules ellipsoid, 2–2.5 cm × 7–8 mm; gynophore 1–1.5 cm. Seeds light brown, orbicular, compressed, ca. 2 mm in diam.; wings discoid. Fl. and fr. Oct-Dec.

• Grasslands, scrub, forest margins, forests; 300–1100 m. Anhui, Fujian, Guangxi, Jiangsu, Jiangxi, Zhejiang.

4. *Tripterospermum luzonense* (Vidal) J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 14: 305. 1989.

高山双蝴蝶 gao shan shuang hu die

Crawfordia luzonensis Vidal, Revis. Pl. Vasc. Filip. 191. 1886; *Tripterospermum taiwanense* (Masamune) Satake var. *alpinum* Satake.

Plant size variable, generally smaller at higher elevations. Stems slender, spirally twisted, twining, terete. Petiole to 1.7 cm; leaf blade lanceolate to triangular-ovate, occasionally linear-lanceolate, 1.5–7 × 0.3–2.3 cm, base rounded to shallowly cordate, margin crenulate, apex long acuminate and caudate, veins 3. Flowers 1 or 2, axillary and terminal on an axillary peduncle; peduncle 0.5–2 cm; bracts leafy, triangular-ovate or scaly. Flowers sessile or pedicel to 3 mm. Calyx campanulate; tube 3–7 mm, wingless, expanded in fruit; lobes ascending, linear, 1–7 mm. Corolla light pink-purple, longitudinally purple striped outside, narrowly campanulate, 1.8–3.2 cm; lobes triangular, 2–3 mm; plicae suborbicular, 1–1.5 mm. Filaments 1.2–2 cm; anthers ellipsoid, ca. 0.8 mm. Disc 1–1.5 mm. Ovary 6–12 mm; gynophore 2–4 mm. Style 1–1.2 cm. Berries red-purple, subglobose, 0.7–1.6 × 0.7–1.2 cm. Seeds brown, triquetrous, wingless. Fl. and fr. Sep-Mar.

Forest margins, roadside scrub; (1500–)2000–3000 m. Taiwan [Indonesia, Philippines].

The Taiwanese material of *Tripterospermum luzonense* has often been incorrectly reported as *T. japonicum* (Siebold & Zuccarini) Maximowicz, which occurs in Japan and Korea.

5. *Tripterospermum lanceolatum* (Hayata) H. Hara ex Satake, J. Jap. Bot. 26: 108. 1951.

玉山双蝴蝶 yu shan shuang hu die

Crawfordia lanceolata Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 201. 1911.

Stems spirally twisted, twining, slender, terete, striate. Petiole 0.5–1.5 cm, slender; leaf blade lanceolate, occasionally narrowly ovate, 3–8.5 × 0.6–3 cm, base rounded to subcordate, margin entire or crenulate, apex acuminate; veins 3. Inflorescences 1-flowered or cymes; bracts usually 1(–4) pairs, to 1 cm. Pedicel 0.2–1.5 cm. Calyx campanulate; tube (5–)7–12 mm, narrowly winged; lobes linear to linear-lanceolate, 5–14 mm, apex acuminate. Corolla white, pale yellow, pink, blue, or dark purple, narrowly campanulate, (2.5–)3–5 cm; lobes triangular, 4–5 mm, apex acuminate to acute; plicae semiorbicular, 1.5–2 mm, margin crenulate

to erose. Filaments linear-subulate to linear, 1.5–2.2 cm; anthers ellipsoid, ca. 1 mm. Disc 1–1.2 mm. Ovary 0.8–1.5 cm; gynophore (0.3–)0.5–1.5 cm. Style 1–1.5 cm. Berries fusiform to ellipsoid, exerted from corolla. Fl. and fr. Aug-Dec.

• Scattered scrub, roadside slopes; 1500–3000 m. Taiwan.

6. *Tripterospermum volubile* (D. Don) H. Hara, J. Jap. Bot. 40: 21. 1965.

尼泊尔双蝴蝶 ni bo er shuang hu die

Gentiana volubilis D. Don, Prodr. Fl. Nepal. 126. 1825.

Stems spirally twisted, twining, slender, terete, striate. Petiole 0.5–1.5 cm, slender; leaf blade ovate-lanceolate, 6–9 × 2–2.5 cm, base rounded to subcordate, margin subentire to sometimes crenulate, apex acuminate and caudate, veins 3–5. Inflorescences 1- or 2-flowered; bracts sometimes present, lanceolate, 1–2 cm. Pedicel 5–8 mm. Calyx campanulate; tube 6–9(–11) mm, broadly winged; lobes lanceolate, 0.7–1.3 cm, apex acuminate. Corolla white, narrowly campanulate, 2.5–3 cm; lobes ovate-triangular, ca. 4 mm, apex acute; plicae semiorbicular, ca. 2 mm, margin crenulate. Filaments linear, 1.2–1.5 cm; anthers ellipsoid, ca. 1 mm. Disc ca. 1 mm. Ovary 7–12 mm; gynophore ca. 6–10 mm at anthesis. Style linear, 6–9 mm. Berries red to dark purple, narrowly ellipsoid, (1.5–)2–4 cm; gynophore 1–2 cm. Seeds dark purple, elliptic, triquetrous, compressed, ca. 2 mm, distinctly winged. Fl. and fr. Aug-Sep.

Forests; 2300–3100 m. Xizang [Bhutan, India, Nepal, Sikkim].

7. *Tripterospermum filicaule* (Hemsley) Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 238. 1965.

新疆双蝴蝶 xin jiang shuang hu die

Gentiana filicaule Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 127. 1890.

Stems spirally twisted, twining, slender, terete, striate. Basal leaves caespitose; petiole ca. 1 cm, slender; leaf blade ovate, (2–)3–5 × 1–2 cm, base truncate, margin crenulate, apex acuminate to acute, veins 3 and distinct. Stem leaves with petiole (0.5–)1–2 cm, slender; leaf blade lanceolate, ovate-lanceolate, or ovate, (3–)4–11 × 1.5–3(–4.5) cm, base rounded, subcordate, or truncate, margin crenulate, apex acuminate, veins 3–5. Inflorescences 1-flowered; bracts 1–4 pairs, linear to lanceolate. Pedicel 3–11 mm. Calyx campanulate; tube 6–12 mm, narrowly winged; lobes linear to linear-lanceolate, 5–12 mm, apex acuminate. Corolla pink, blue, or violet, narrowly campanulate, 4–5 cm; lobes ovate-triangular, 5–7 mm, apex acute; plicae triangular to semiorbicular, 1.5–2 mm, margin crenulate. Filaments linear, 1.6–2.2 cm; anthers ellipsoid, ca. 1.5 mm. Disc ca. 1 mm. Style linear, 1.2–1.5 cm. Mature fruit unknown. Fl. and fr. Sep-Jan.

• Forests; ca. 3000 m. W Hubei.

8. *Tripterospermum pingbianense* C. Y. Wu & C. J. Wu, Bull. Bot. Res., Harbin 4(3): 131. 1984.

屏边双蝴蝶 ping bian shuang hu die

Stems spirally twisted, twining, terete, striate. Petiole 0.5–1 cm, slender; leaf blade lanceolate, 3–8 × 0.7–3 cm, base rounded to truncate and slightly oblique, margin crenulate, apex acuminate, veins 3. Inflorescences 1-flowered or cymes. Pedicel 0.5–1.5 cm; bractlets lanceolate. Calyx narrowly campanulate; tube 1–1.2 cm, wingless; lobes linear, 1–1.4 cm, apex acuminate. Corolla purple, narrowly campanulate, ca. 4 cm; lobes triangular, 4–5 mm, apex acute; plicae semiorbicular, 1.5–2 mm, margin erose. Filaments linear-subulate, 1.5–2.2 cm; anthers ellipsoid, ca. 1.2 mm. Disc ca. 1 mm. Style linear, ca. 1.5 cm; stigma lobes linear. Berries ellipsoid, ca. 2 cm, included in corolla; gynophore ca. 1.5 cm. Seeds dark purple, ellipsoid to ovoid, ca. 3 mm, triquetrous, narrowly winged. Fl. and fr. Sep–Dec.

- Scattered forests, valleys; 1400–2700 m. SE Yunnan.

The spelling of this species in the original protologue is *pinbianense*, but this spelling is an orthographic error as the species is named for its occurrence in Pingbian, Yunnan.

9. *Tripterospermum microphyllum* Harry Smith in S. Nilsson, Grana Palynol. 7(1): 144. 1967.

小叶双蝴蝶 xiao ye shuang hu die

Gentiana parvifolia Hayata.

Stems slender, terete, long creeping on ground, producing rootlets from nodes. Petiole 2–5 mm, slender; leaf blade lanceolate to ovate, 1–2(–3) cm × 3–5(–7) mm, base rounded to truncate, margin crenulate and slightly revolute, apex acuminate, veins 1–3. Flowers solitary; bracts ovate, ca. 1 cm. Pedicel 3–7 mm. Calyx campanulate; tube 5–7 mm, winged, papillate or pubescent along ridges; lobes linear, as long as or longer than tube. Corolla blue, campanulate, ca. 2.5 cm; lobes ovate-triangular, 3.5–4.5 mm, apex acute; plicae semiorbicular, 1–1.5 mm, margin crenulate. Filaments linear-subulate, 2–2.2 cm; anthers ovoid, ca. 1 mm. Disc ca. 0.5 mm. Ovary fusiform, 1–1.2 cm; gynophore ca. 2 mm. Style linear, 1.2–1.7 cm. Fl. Jul–Sep.

- Subalpine coniferous forests and margins of forests. Taiwan.

10. *Tripterospermum cordifolium* (Yamamoto) Satake, J. Jap. Bot. 26: 108. 1951.

高山肺形草 gao shan fei xing cao

Crawfordia cordifolia Yamamoto, Trans. Nat. Hist. Soc. Taiwan 19: 104. 1929.

Stems slender, terete, long creeping on ground, producing rootlets from nodes. Petiole 0.5–1.5 cm, slender; leaf blade ovate to cordate, 0.7–1.7 × 0.6–1.6 cm, base rounded to cordate, somewhat decurrent, margin entire, apex acute, veins 3–5. Flowers solitary; bracts 1–3 pairs, ovate, ca. 5 mm. Pedicel 2–3 mm. Calyx campanulate; tube 6–7 mm, winged; lobes linear to oblanceolate, (5–)7–8 mm, base contracted, apex acuminate. Corolla purple, campanulate, ca.

3.5 cm; lobes ovate-triangular, ca. 5 mm, apex acute; plicae semiorbicular, ca. 2 mm, margin crenulate. Filaments linear, 1.5–2 cm; anthers ellipsoid, ca. 1 mm. Disc ca. 1 mm. Ovary narrowly ellipsoid, ca. 8 mm. Style ca. 1.8 cm, exerted from corolla. Berries spindle-shaped, subsessile to gynophore 4–7 mm. Fl. Oct.

- Wet subalpine coniferous forest bed; 2300–2700 m. Taiwan.

11. *Tripterospermum cordifolioides* J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 14: 299. 1989.

心叶双蝴蝶 xin ye shuang hu die

Stems scarcely twisted, long creeping, producing rootlets from nodes. Petiole slightly shorter than blade; leaf blade deltate-ovate to ovate, to 6 × 4 cm, herbaceous, base rounded to cordate, apex acuminate. Flowers axillary, usually 1 per node; bracts 0–3, scalelike. Calyx tube campanulate, 7–10 mm, slightly keeled; lobes 5, linear-subulate to lanceolate, nearly as long as tube. Corolla whitish to pale blue, narrowly campanulate, 3.5–4 cm, deciduous before fruit maturity. Style 1–1.3 cm, included in corolla tube. Ovary subsessile, 0.8–1.2 cm. Fruit fusiform, subsessile. Seeds black, triquetrous, wingless.

- Wet dark forest floor; 600–4000 m. Guizhou, Hubei, Sichuan, NE Yunnan.

12. *Tripterospermum pallidum* Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 247. 1965.

白花双蝴蝶 bai hua shuang hu die

Stems spirally twisted, twining, terete, striate. Petiole 1.5–2 cm, slender; leaf blade ovate-lanceolate to ovate, 4–6 × 3–4 cm, base cordate, margin crenulate, apex acuminate, veins 3. Flowers solitary; bracts 1–3 pairs, lanceolate, ca. 5 mm. Pedicel 2–3 mm. Calyx subcampanulate; tube 6–8 mm, winged; lobes linear to linear-lanceolate, 5–9 mm, apex acuminate. Corolla white, narrowly campanulate, 3.5–4 cm; lobes ovate-triangular, 4.5–5 mm, apex acute; plicae semiorbicular, 1–1.5 mm, margin erose. Filaments linear, 1.2–1.6 cm; anthers ellipsoid, 1.5–2 mm. Disc ca. 1.5 mm. Ovary subsessile, 7–10 mm. Style linear, 2–2.5 cm. Berries ovoid. Seeds compressed, discoid, narrowly winged. Fl. Sep.

- Forests; 500–1300 m. Sichuan, Yunnan.

13. *Tripterospermum australe* J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 14: 300. 1989.

南方双蝴蝶 nan fang shuang hu die

Stems spirally twisted and twining, nearly 4-angled. Petiole 0.5–1.5 cm; leaf blade lanceolate to ovate, 4–9 × 1.5–4 cm, base rounded to shallowly cordate, margin not revolute, apex acuminate to acute; veins 3–5, abaxially distinct. Inflorescences clusters of 2–5 flowers; bracts scalelike or subulate. Pedicel 0–5 mm; bractlets 1 pair per flower, oblanceolate, 2–6 mm. Calyx narrowly campanulate; tube 0.7–1.3 cm, winged; lobes linear-subulate, arcuate spreading, 0.6–2 cm, apex acuminate to attenuate. Corolla greenish blue to pale purple, narrowly campanulate, 3.3–5 cm; lobes ovate-

triangular, 7–9 mm, apex acuminate; plicae semiorbicular or triangular, 1–3 mm, margin entire or occasionally few toothed. Filaments 2–2.5 cm; anthers ellipsoid, 1.5–2 mm. Disc 1.5–3 mm. Ovary subsessile, 7–10 mm. Style 1.7–2 cm. Berries ellipsoid, 1.8–2.2 cm × 8–10 mm.

1300–1900 m. Fujian, Guangdong, Guangxi, Guizhou [Vietnam].

14. *Tripterospermum taiwanense* (Masamune) Satake, J. Jap. Bot. 26: 108. 1951.

台湾双蝴蝶 tai wan shuang hu die

Crawfordia japonica Siebold & Zuccarini var. *taiwanense* Masamune, Trans. Nat. Hist. Soc. Taiwan 28: 144. 1938.

Stems spirally twisted, twining, terete. Petiole 1–3 cm; leaf blade lanceolate, ovate-lanceolate, or ovate, 4–7 × 2–3.5 cm, base rounded to truncate, margin crenulate, apex acuminate, veins 3. Inflorescences 1-flowered or cymes; bracts 1–4 pairs, usually leafy, ovate to triangular. Pedicel 2–3 mm. Calyx campanulate; tube 7–9 mm, winged; lobes subulate to linear, 0.9–1.5 cm, apex acuminate. Corolla white, occasionally tinged purple outside, narrowly campanulate, 4–4.2 cm; lobes triangular, 4–5 mm, apex acuminate; plicae obliquely triangular, 1–2.5 mm, margin crenulate. Filaments linear, 1–2 cm; anthers ellipsoid, 1–2 mm. Disc 1–1.5 mm. Ovary 1–1.5 cm; gynophore 2–3 mm. Style linear, 1.5–2.5 cm. Berries dark purple, ellipsoid, 2–3.5 cm × 4–7 mm; gynophore 1–3 mm. Seeds dark purple, ellipsoid to ovoid, triquetrous, 1.5–2 mm, wingless.

• Forest margins; 500–2300 m. C and S Taiwan.

15. *Tripterospermum alutaceifolium* (Liu & Kuo) J. Murata, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 14: 301. 1989.

台北双蝴蝶 tai bei shuang hu die

Tripterospermum taiwanense (Masamune) Satake var. *alutaceifolium* Liu & Kuo, Fl. Taiwan 4: 198. 1978.

Stems spirally twisted, twining, terete. Petiole 2–3 cm; leaf blade lanceolate, ovate-lanceolate, or ovate, 6–11 × 2.5–3.5 cm, base rounded to shallowly cordate, margin crenulate, apex acuminate, veins 3. Inflorescences 1-flowered or cymes; bracts 1–4 pairs, scalelike, narrowly lanceolate. Pedicel 2–3 mm. Calyx campanulate; tube 7–9 mm, winged; lobes lanceolate, 0.9–1.5 cm, widely keeled, apex acute to acuminate. Corolla yellowish white, narrowly campanulate, 3.5–4 cm; lobes triangular, 4–5 mm, apex acuminate; plicae obliquely triangular, 1–2.5 mm, margin crenulate. Filaments linear, 1–2 cm; anthers ellipsoid, 1–2 mm. Disc 1–1.5 mm. Ovary 7–9 mm; gynophore 2–3 mm. Style linear, 1.5–2.5 cm. Berries red-purple, subglobose, 1–1.8 × 0.8–1.1 cm, included in corolla; gynophore 1–3 mm. Seeds dark purple, ellipsoid to ovoid, discoid, 1.5–2 mm, wingless.

• Forests; 300–1700 m. N Taiwan.

16. *Tripterospermum hirticalyx* C. Y. Wu ex C. J. Wu, Bull. Bot. Res., Harbin 4(3): 129. 1984.

毛萼双蝴蝶 mao e shuang hu die

Stems spirally twisted, twining, terete, striate, glabrous or sometimes hirsute along striae. Petiole 0.5–1.5(–2) cm, slender, scabrous; leaf blade lanceolate, ovate-lanceolate, or ovate, 4–9 × 1–2.5(–3) cm, base rounded to cordate, margin crenulate, apex acuminate and sometimes caudate, veins 3–5. Inflorescences 1–6-flowered cymes; bracts 1–3 pairs, lanceolate to ovate, 0.5–2 cm. Pedicel 2–5 mm, hirsute. Calyx cylindrical; tube 1–1.4 cm, wingless or narrowly winged, with puberulent and/or scabrous-ciliate ridges; lobes linear-lanceolate, 3–5(–9) mm, apex acuminate. Corolla pale purple to blue, campanulate, 4–5 cm; lobes ovate-triangular, 5–6 mm, apex acuminate; plicae semiorbicular, 1.5–2 mm, margin crenulate. Filaments linear, 1.8–2 cm; anthers ellipsoid, 2–3 mm. Disc ca. 1.5 mm. Ovary subsessile, ca. 1.3 cm. Style linear, 1.8–2 cm. Berries purple, subsessile, fusiform, 1.4–2 cm, included in withered corolla. Seeds ellipsoid, discoid, wingless. Fl. and fr. Aug–Nov.

Forests, scrub, roadsides in forests, grassland slopes; 1400–2100 m. N Guizhou, W Hubei, S Sichuan, SE Yunnan [Vietnam].

17. *Tripterospermum cordatum* (C. Marquand) Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 244. 1965.

峨眉双蝴蝶 e mei shuang hu die

Gentiana cordata C. Marquand, Bull. Misc. Inform. Kew 1931: 77. 1931.

Stems weakly twisted, twining, terete. Petiole 1–3(–4.5) cm; leaf blade ovate-lanceolate, ovate, or cordate, (1.5–)3.5–12 × (1–)2–5 cm, leathery, abaxially sometimes purple, base rounded to cordate, margin entire, apex acuminate and usually caudate; veins 3–5, indistinct. Inflorescences 1-flowered or cymes; bracts 1–4 pairs, leafy, lanceolate, 3–10 mm. Pedicel 0.5–1.5 cm. Calyx campanulate; tube (0.5–)1–1.3 cm, winged; lobes ascending or recurved only near tip, linear-lanceolate, 0.7–1.6 cm, apex acuminate. Corolla purple, campanulate, 3.5–4 cm; lobes ovate-triangular, 4–6 mm, apex acute; plicae broadly triangular, 1.5–2 mm, margin crenulate. Filaments linear-subulate, 1.5–1.8 cm; anthers ellipsoid, 1–2 mm. Disc 1–2 mm. Style linear, 1.5–2 cm. Berries dark purple, narrowly ellipsoid, 2–3 cm × 7–8 mm; gynophore less than 5 mm. Seeds dark purple, ellipsoid to ovoid, discoid, 2–2.5 mm, wingless. Fl. and fr. Aug–Dec.

• Forests, scrub, forest margins, river valleys; 700–3200 m. Guizhou, Hubei, Hunan, Shaanxi, Sichuan, Yunnan.

Murata (J. Fac. Sci. Univ. Tokyo III, 14: 302. 1989) adopts more strict morphological criteria and gives a narrower distribution of *Tripterospermum cordatum* to include only Hubei and Sichuan. This difference may be due to problems in interpreting *T. cordatum* and the close relatives *T. cordifolioides*, *T. lanceolatum*, and *T. pallidum*.

18. *Tripterospermum nienkui* (C. Marquand) C. J. Wu, Bull. Bot. Res., Harbin 4(3): 132. 1984.

香港双蝴蝶 xiang gang shuang hu die

Gentiana nienkui C. Marquand, Bull. Misc. Inform. Kew 1931: 76. 1931.

Stems sometimes dark purple, spirally twisted, twining, terete, striate. Basal leaves cespitose; leaf blade ovate, 3–6 ×

1.5–3 cm, abaxially sometimes purple, base rounded, apex acuminate. Stem leaves with petiole 1–1.5 cm, slender; leaf blade ovate-lanceolate to ovate, 5–9 × 2–4 cm, base rounded to subcordate, margin crenulate, apex acuminate and sometimes caudate, veins 3–5. Inflorescences 1-flowered or cymes; bracts 1–4 pairs, lanceolate to ovate, 3–10 mm. Pedicel less than 1 cm. Calyx campanulate; tube 0.8–1.2 cm, winged; lobes linear-lanceolate, 7–10 mm, apex acuminate. Corolla dark violet-blue, sometimes with green spots, narrowly campanulate, 4–5 cm; lobes ovate-triangular, 4–5(–7) mm, apex acute; plicae ovate, 2–3 mm, margin crenulate to erose. Filaments linear, 1.5–2 cm; anthers ellipsoid, 1.2–2 mm. Disc ca. 2 mm. Style linear, 1.6–2 cm. Berries dark purple, ellipsoid, 2.5–4 cm × 6–8 mm, included in corolla; gynophore 1–3 mm. Seeds dark purple, ellipsoid to ovoid, triquetrous, 1.5–2 mm, wingless. Fl. and fr. Sep-Jan.

Forests; 500–1800 m. S Fujian, Guangdong, N Guangxi, S Hunan, S Zhejiang [Vietnam].

19. *Tripterospermum membranaceum* (C. Marquand) Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 244. 1965.

膜叶双蝴蝶 mo ye shuang hu die

Gentiana membranacea C. Marquand, Bull. Misc. Inform. Kew 1931: 75. 1931.

Stems spirally twisted, twining, terete. Petiole 0.8–1.2 cm; leaf blade membranous, oblong-lanceolate to lanceolate, 4–9 × 1–2 cm, base rounded to cordate, margin crenulate, apex long acuminate, veins 3. Flowers 1 (or 2), usually terminal on an axillary peduncle 0.5–1.5 cm; bracts leafy, ovate to triangular, occasionally scaly. Pedicel 3–5 mm. Calyx campanulate; tube 7–10 mm, weakly winged; lobes straight, ascending in fruit, linear-lanceolate to lanceolate, 8–11 mm. Corolla rose-violet, narrowly campanulate, 3.6–4.2 cm; lobes widely triangular, ca. 3 mm; plicae semiorbicular, 1–1.5 mm, margin crenulate. Filaments 2–2.5 cm; anthers ellipsoid, ca. 1.5 mm. Disc 1.5–2 mm. Ovary subsessile, 1.8–2.5 cm. Style 1.2–1.7 cm. Berries red, subsessile, narrowly ellipsoid, 3–4.5 cm × ca. 7 mm. Seeds black, compressed, wingless. Fl. and fr. Aug-Jan.

Forests, forest margins; 2000–3700 m. Xizang, Yunnan [India, Myanmar].

8. CRAWFURDIA Wallich, Tent. Fl. Nepal. 63. 1826.

蔓龙胆属 man long dan shu

Gentiana sect. *Protocrawfordia* Harry Smith.

Perennials, twining or rarely erect. Leaves opposite. Inflorescences terminal and axillary, 1- or 2-flowered or in cymes. Flowers 5-merous. Calyx tube 10-veined. Corolla tubular, funnellform, or campanulate; plicae present. Stamens inserted on corolla tube, symmetric, equal. Nectaries 5 at ovary base. Ovary 1-locular; ovules many. Fruit a capsule, many seeded. Seeds compressed, wings discoid.

Sixteen species: Bhutan, China, India, Myanmar, Sikkim; 14 species in China.

- 1a. Calyx lobes connate at base into a cupular limb.
 - 2a. Calyx lobes ovate, 5–10 × 5–6 mm; corolla 4–5 cm, lobes 4–6 × ca. 5 mm 2. *C. campanulacea*
 - 2b. Calyx lobes ovate-triangular, 3–5 × ca. 1.5 mm; corolla ca. 3 cm, lobes ca. 3 × 3–4 mm 3. *C. tsangshanensis*
- 1b. Calyx lobes not connate at base into a cupular limb.
 - 3a. Calyx tube with intracalycular membranes at apex.
 - 4a. Corolla 5–8.5 cm.
 - 5a. Stems dark purple spotted 4. *C. maculaticaulis*
 - 5b. Stems not dark purple spotted.
 - 6a. Corolla 6–8.5 cm, lobes 1–1.7 cm; plicae broadly triangular; fruiting gynophore less than 0.5 cm 1. *C. angustata*
 - 6b. Corolla ca. 5 cm, lobes ca. 0.3 cm; plicae semiorbicular to truncate; fruiting gynophore 3–4 cm 6. *C. sessiliflora*
 - 4b. Corolla 2–4.5 cm.
 - 7a. Calyx lobes reflexed 5. *C. pricei*
 - 7b. Calyx lobes not reflexed.
 - 8a. Plants with fleshy rhizomes; leaf blade ovate; petiole 5–7 mm 7. *C. speciosa*
 - 8b. Plants without fleshy rhizomes; leaf blade lanceolate to ovate-lanceolate; petiole to 3 mm 8. *C. tibetica*
 - 3b. Calyx tube without intracalycular membranes at apex.
 - 9a. Leaf blade densely hirsute 9. *C. puberula*
 - 9b. Leaf blade glabrous or sparsely hirsute along veins.
 - 10a. Corolla 2–3.5 cm.
 - 11a. Upper leaf blades lanceolate, ca. 1 cm wide; calyx tube longer than lobes; corolla 3–3.5 cm 10. *C. delavayi*
 - 11b. Upper leaf blades ovate-lanceolate to ovate, 2–3 cm wide; calyx tube as long as lobes; corolla 2–2.5 cm 11. *C. gracilipes*
 - 10b. Corolla more than 3.5 cm.

- 12a. Calyx lobes spatulate, apex obtuse; corolla funnelform, lobes ca. 6 mm 14. *C. semialata*
 12b. Calyx lobes lanceolate, apex acute; corolla campanulate, lobes 2–4 mm.
 13a. Leaf blade glabrous; petiole 1–2 cm 12. *C. dimidiata*
 13b. Leaf blade abaxially hirsute along veins; petiole to 0.3 cm 13. *C. crawfurdioides*

1. *Crawfurdia angustata* C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 106. 1883.

大花蔓龙胆 da hua man long dan

Crawfurdia trailliana Forrest; *Gentiana helenii* C. Marquand.

Stems twining, terete, glabrous, internodes 6–17 cm. Petiole 0.5–1 cm, slender; leaf blade elliptic to ovate, 4–7 × 2–4 cm, leathery, base rounded, margin entire, apex acuminate and caudate, veins 3–5. Inflorescences 1-flowered or cymes. Pedicel 1–15 cm; bractlets 1–3 pairs, lanceolate. Calyx sometimes pale purple, tubular; tube 2–2.5 cm, entire or rarely split on 1 side, apex with intracalycular membranes; lobes spreading to recurved, ovate-triangular to triangular, 3–4 × 2–3 mm. Corolla pale purple, funnelform, 6–8.5 cm; lobes ovate-triangular, 1–1.7 cm × 6–12 mm, apex acuminate; plicae broadly triangular, 2–4 × ca. 5 mm, oblique, margin irregularly crenulate. Stamens inserted at middle of corolla tube; filaments linear-subulate, 1.5–1.8 cm; anthers ellipsoid, 5–7 mm. Nectaries ovate. Style linear, 2.5–3 cm; stigma lobes linear. Capsules ellipsoid, ca. 3 cm; gynophore less than 5 mm. Seeds light brown, triquetrous, 2–2.5 mm, broadly winged along edges. Fl. and fr. Oct-Dec.

Meadow slopes, scrub, scattered forests in valleys; 1500–2800 m. SE Xizang, NW Yunnan [India, Myanmar].

2. *Crawfurdia campanulacea* Wallich & Griffith ex C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 106. 1883.

云南蔓龙胆 yun nan man long dan

Crawfurdia bulleyana Forrest.

Stems twining, stout, terete, internodes 10–20 cm. Petiole 1–3 cm, slender; leaf blade elliptic, ovate, or broadly ovate, 5–10 × 2–5 cm, leathery, base rounded to truncate, margin crenulate, apex acuminate and caudate. Inflorescences 2-flowered or cymes. Pedicel 2–9 cm; bractlets absent, rarely 1–3 pairs and foliose. Calyx tubular; tube 1.2–1.7 cm, entire, rarely split on 1 side, apex with intracalycular membranes; lobes erect, ovate, 5–10 × 5–6 mm, base connate into a cupular limb. Corolla blue to purple, campanulate, 4–5 cm; lobes ovate, 4–6 × ca. 5 mm, apex acute; plicae semiorbicular to truncate, ca. 1 × 3–4 mm, margin erose. Stamens inserted just below middle of corolla tube; filaments linear-subulate, ca. 1.5 cm; anthers sagittate, 3–4 mm. Nectaries ovate. Style short, linear, ca. 6 mm including stigma lobes; stigma lobes linear. Capsules ellipsoid to obovoid, compressed, 2–3 cm, included in corolla to slightly exerted; gynophore 2–2.5 cm. Seeds dark brown, discoid, ca. 2 mm in diam., broadly winged. Fl. and fr. Oct-Dec.

• Grassland slopes, forests; 1800–3400 m. NW Yunnan.

3. *Crawfurdia tsangshanensis* C. J. Wu, Bull. Bot. Res., Harbin 4(3): 135. 1984.

仓山蔓龙胆 cang shan man long dan

Rhizomes stout. Stems twining, terete, striate, internodes 5–14 cm. Basal leaves several pairs; leaf blade scalelike, less than 1 cm. Middle to upper stem leaves sessile or with petiole to ca. 2 mm; leaf blade ovate to broadly ovate, 3–7 × 2–4.5 cm, leathery, base rounded, margin scabrous and ciliate, apex acuminate and caudate, veins 5–7. Inflorescences 2-flowered or cymes. Pedicel 1–8 cm; bractlets ovate, 1–2 cm. Calyx campanulate; tube ca. 1 cm, split on 1 side from apex to middle, narrowly winged along veins, apex with a transparent intracalycular membrane; lobes ovate-triangular, 3–5 × ca. 1.5 mm, base connate into a cupular limb, apex caudate. Corolla pale blue-purple, campanulate, ca. 3 cm; lobes ovate-triangular, ca. 3 × 3–4 mm, apex acute; plicae truncate, ca. 2 mm wide, margin entire or erose. Stamens inserted at basal part of corolla tube; filaments subulate, 1–1.2 mm; anthers sagittate, ca. 2 mm. Nectaries elliptic, ca. 1.2 mm. Gynophore ca. 7 mm, stout. Style cylindrical, ca. 2 mm; stigma lobes linear. Immature capsules ellipsoid, compressed, ca. 1.6 cm, included in corolla. Seeds ellipsoid, ca. 2 mm, broadly winged. Fl. and fr. Oct-Nov.

• Grassland slopes; 2900–3300 m. NW Yunnan.

4. *Crawfurdia maculaticaulis* C. J. Wu, Bull. Bot. Res., Harbin 4(3): 133. 1984.

斑茎蔓龙胆 ban jing man long dan

Rhizomes stout. Stems with dark purple spots, twining, to 5 mm in diam., terete, striate, internodes 12–20 cm. Petiole (0.5–)1–1.5 cm, slender; leaf blade elliptic to ovate, 7–13 × 2–6 cm, leathery, abaxially slightly green, adaxially green, base rounded, margin crenulate, apex acuminate and caudate, veins 3–5. Cymes many flowered; peduncle 1–13 cm. Pedicel 1–12 cm; bractlets usually present, lanceolate, to 1 cm. Calyx campanulate; tube 1.1–1.5 cm, with a transparent intracalycular membrane at apex; lobes lanceolate, 0.7–1.3 cm × 1–2 mm, apex acute. Corolla purple, campanulate, ca. 5 cm; lobes ovate-triangular, slightly oblique, 5–7 × 5–7 mm, apex acute; plicae semiorbicular to truncate, oblique, ca. 3 mm, margin crenulate. Stamens inserted at middle of corolla tube; filaments subulate, ca. 1.5 cm; anthers narrowly ovoid, ca. 3.5 mm. Nectaries ovate. Style short, ca. 5 mm including linear stigma lobes. Capsules brown, ellipsoid, compressed, ca. 2 cm, included in corolla; gynophore ca. 2 cm. Seeds light brown, discoid, ca. 2 mm in diam. Fl. and fr. Oct-May.

• Forest slopes, scrub, in valleys; 1000–1800 m. W Guangxi, S Yunnan.

5. *Crawfurdia pricei* (C. Marquand) Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 244. 1965.

福建蔓龙胆 fu jian man long dan

Gentiana pricei C. Marquand, Bull. Misc. Inform. Kew 1931: 75. 1931.

Root tubers cylindrical, fleshy. Stems twining, terete, striate, internodes 4–21 cm. Lowermost leaves several pairs; leaf blade scalelike, triangular. Stem leaves sessile or with petiole 3–8 mm, hirsute and glandular; leaf blade lanceolate, ovate-lanceolate, or ovate, rarely broadly ovate, 4–11(–15) × 2–5 (–9) cm, leathery, abaxially densely hirsute and glandular along veins, base rounded, margin crenulate, apex acuminate, veins 3–5. Inflorescences cymes, rarely 1-flowered; peduncle to 15 cm. Pedicel 1–9 cm; bractlets usually present, lanceolate, 6–9 mm. Calyx tubular; tube 1–1.5 cm, entire, apex with a transparent intracalycular membrane; lobes reflexed, lanceolate to triangular, 1–4(–7) × 1–1.5(–2) mm, apex acute. Corolla white, pink, or pale purple, campanulate, ca. 4 cm; lobes ovate-triangular, 3–4 × 4–5 mm, apex acute; plicae semiorbicular to truncate, 1–2.5 × 3–4 mm, margin crenulate. Stamens inserted just below middle of corolla tube; filaments linear-subulate, ca. 1.2 cm; anthers ellipsoid, 3–4 mm. Nectaries narrowly ovate. Style short, ca. 8 mm including linear stigma lobes. Capsules light brown, ellipsoid, compressed, ca. 2 × 1 cm, included in corolla to slightly exserted; gynophore 2–3 cm. Seeds brown, discoid, ca. 2 mm in diam., broadly winged. Fl. and fr. Oct-Dec.

• Grassland slopes, scrub in valleys, dense forests; 400–2000 m. W Fujian, N Guangdong, N Guangxi, S Hunan.

6. *Crawfurdia sessiliflora* (C. Marquand) Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 244. 1965.

无柄蔓龙胆 wu bing man long dan

Gentiana sessiliflora C. Marquand, Bull. Misc. Inform. Kew 1931: 76. 1931.

Stems twining, terete, striate, lower internodes 2–4 cm, upper internodes 5–13 cm. Stem leaves larger toward apex; lowermost leaves sessile, ovate, 1–1.5 cm, abaxially hirsute; middle leaves subsessile, ovate, 3–6 × 1–3.5 cm, leathery, base rounded, apex acuminate to acute; upper leaves short petiolate, lanceolate to ovate-lanceolate, 5–7 × 1–1.5 cm, abaxially papillate along veins, base rounded, margin crenulate, apex acuminate, veins 3–5. Inflorescences 1-flowered, rarely cymes. Pedicel 1–10 cm, slender. Calyx sometimes pale purple, tubular, 1.5–2 cm; tube apex with a transparent intracalycular membrane, entire or less often split on 1 side, usually densely hirsute along veins; lobes ovate-triangular to triangular, 3–9 × 2–5 mm, apex acute. Corolla purple, funnellform, ca. 5 cm; lobes broadly triangular, ca. 3 × 4 mm, apex acute; plicae semiorbicular to truncate, oblique, 3–4 × ca. 1 mm, margin erose. Stamens inserted at middle of corolla tube; filaments linear-subulate, 1.2–1.5 cm; anthers ellipsoid, 4–5 mm. Nectaries narrowly ovate. Style linear, ca. 4 mm; stigma lobes linear. Capsules ellipsoid, compressed, 2–3 × 1–1.5 cm, exserted from corolla; gynophore 3–4 cm. Seeds brown, discoid, ca. 3 mm in diam., broadly winged. Fl. and fr. Sep-Oct.

• Forest margins, coniferous forests; 2500–2900 m. W Sichuan.

7. *Crawfurdia speciosa* Wallich, Tent. Fl. Nepal. 64. 1826.

穗序蔓龙胆 sui xu man long dan

Gentiana kingdonii C. Marquand; *Crawfurdia wardii* C. Marquand.

Rhizomes yellow, divaricate, fleshy. Stems twining, terete, glabrous, internodes 5–13 cm. Petiole 5–7 mm; leaf blade ovate, 4–7 × (1.5–)2–3 cm, leathery, base rounded, margin crenulate, apex acuminate, veins 3–5. Inflorescences 1-flowered or cymes. Pedicel 1–6 cm; bractlets 1 pair, lanceolate, less than 10 × 2 mm. Calyx campanulate; tube 1–1.2 cm, apex with a transparent intracalycular membrane, entire or less often split on 1 side; lobes triangular, 2–3 × 1–1.5 mm, apex acute. Corolla blue-purple to purple, campanulate, 4–4.5 cm; lobes broadly ovate-triangular, ca. 3 × 5 mm, apex acute; plicae semiorbicular to truncate, oblique, ca. 1 × 3–4 mm, margin crenulate. Stamens inserted at middle of corolla tube; filaments linear-subulate, 1–1.3 cm; anthers sagittate, ca. 6 mm. Nectaries narrowly ovate. Style linear, ca. 8 mm including linear stigma lobes. Capsules dark brown, ellipsoid, compressed, 2–3 × ca. 1.2 cm, included in corolla to exserted; gynophore 1.5–3.5 cm. Seeds brown, discoid, ca. 1.5 mm in diam., broadly winged. Fl. and fr. Sep-Dec.

• Meadow slopes; 2900–4000 m. SE Xizang.

8. *Crawfurdia thibetica* Franchet, Bull. Soc. Bot. France 46: 307. 1899.

四川蔓龙胆 si chuan man long dan

Gentiana khamensis C. Marquand.

Stems twining, terete, striate, internodes 5–8 cm. Leaves subsessile or petiole to ca. 3 mm; leaf blade lanceolate to ovate-lanceolate, ca. 6 × 1.5–2 cm, leathery, base rounded, apex acuminate, veins 3–5. Inflorescences 1-flowered or cymes. Pedicel 1–3.5 cm, slender; bractlets sometimes present, 1–3 pairs, lanceolate, to 5 mm. Calyx tubular; tube 1.3–1.5 cm, apex with a transparent intracalycular membrane, split on 1 side; lobes lanceolate, 2–3 × ca. 1 mm, apex acute. Corolla purple, campanulate, ca. 4 cm; lobes broadly triangular, ca. 3 × 4 mm, apex acute; plicae semiorbicular to truncate, oblique, ca. 1 × 3 mm, margin entire. Stamens inserted at basal part of corolla tube; filaments linear-subulate, 1.3–1.4 cm; anthers ellipsoid, ca. 2.5 mm. Nectaries ovate. Style linear, ca. 8 mm; stigma lobes linear. Capsules ovoid, compressed, exserted from corolla; gynophore linear, ca. 2 cm. Seeds brown, discoid, broadly winged. Fl. Sep.

• Scrub, bamboo thickets; 3000–3600 m. W Sichuan.

9. *Crawfurdia puberula* C. B. Clarke, J. Linn. Soc., Bot. 14: 442. 1875.

毛叶蔓龙胆 mao ye man long dan

Stems twining, terete, striate, internodes 10–12 cm. Petiole 0.5–1.5 cm, densely hirsute; leaf blade ovate-lanceolate, 4–8 × 2–3 cm, herbaceous, densely hirsute, base rounded to truncate, margin crenulate and ciliate, apex acuminate and caudate, veins 3. Inflorescences 1-flowered or cymes. Pedicel 1–4 cm, slender, sometimes sparsely hirsute. Calyx campanulate; tube 0.9–1.2 cm, entire or rarely split on 1 side; lobes lanceolate, 5–7 × 1–1.5 mm, apex acute. Corolla purple, campanulate, ca. 3.5 cm; lobes broadly triangular, oblique, ca. 2 × 4 mm, apex acute; plicae truncate, oblique, ca. 3 mm wide, margin crenulate. Stamens inserted just below middle of corolla tube; filaments linear-subulate, 1.1–1.3 cm; anthers ellipsoid, ca. 3 mm. Nectaries ovate. Style short, linear, ca. 7 mm including linear stigma lobes. Immature capsules ellipsoid, compressed, ca. 1.5 cm, included in corolla; gynophore ca. 1.3 cm. Fl. and fr. Aug–Oct.

Forests; 3000–3200 m. SE Xizang [Bhutan, India, Sikkim].

10. *Crawfurdia delavayi* Franchet, Bull. Soc. Bot. France 46: 306. 1899.

披针叶蔓龙胆 pi zhen ye man long dan

Gentiana fratri C. Marquand.

Stems twining, stout, terete, striate, lower internodes 1–3 cm, upper internodes 5–10 cm. Lower stem leaves many pairs; leaf blade ovate, 1–3 × 1–2 cm. Upper leaves sessile or petiole to less than 5 mm; leaf blade lanceolate, 4–6 × ca. 1 cm, base rounded, apex acuminate and caudate, veins 3–5. Inflorescences 1- or 2-flowered. Pedicel 1–4 cm, slender; bractlets sometimes present, lanceolate, ca. 10 × 1–3 mm. Calyx narrowly campanulate; tube (0.8–)1–1.2 cm, entire or less often split on 1 side; lobes linear-lanceolate, 2–6 mm, apex acute. Corolla pink, blue-purple, or purple, campanulate, 3–3.5 cm; lobes broadly triangular, 2–3 × ca. 4 mm, apex acute; plicae semiorbicular to truncate, ca. 1 × 2–3 mm, margin erose. Stamens inserted at middle of corolla tube; filaments linear-subulate, ca. 1 cm; anthers ellipsoid, 2–3 mm. Nectaries ovate. Style linear, ca. 5 mm including linear stigma lobes. Capsules brown, ellipsoid, compressed, 2–2.5 cm, included in corolla to exerted; gynophore 1.5–2 cm. Seeds brown, discoid, 2–2.5 mm in diam., broadly winged. Fl. and fr. Sep–Oct.

• Mixed forests, bamboo thickets; 3000–3600 m. NW Yunnan.

11. *Crawfurdia gracilipes* Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 246. 1965.

细柄蔓龙胆 xi bing man long dan

Stems twining, to 3 mm in diam., terete, striate, internodes 4–13 cm. Lower stem leaves 3 to many pairs; leaf blade scalelike, ovate, to 1 cm. Middle to upper leaves sessile or petiole to ca. 3 mm; leaf blade ovate-lanceolate to ovate, 5–8 × 2–3 cm, leathery, sparsely hirsute or papillate along veins, base rounded, apex acuminate and caudate, veins 3–5. Inflorescences 1- (or 2)-flowered. Pedicel 2–9 cm, slender; bractlets sometimes present, small. Calyx campanulate; tube

ca. 8 mm, entire or split on 1 side; lobes linear, 7–8 mm, apex acute. Corolla blue to blue-purple, campanulate, 2–2.5 cm; lobes broadly triangular, ca. 2 × 3 mm, apex acute; plicae semiorbicular to truncate, oblique, ca. 1 × 2 mm, margin erose. Stamens inserted at middle of corolla tube; filaments linear-subulate, 9–10 mm; anthers ellipsoid, ca. 2 mm. Nectaries ovate. Style short, ca. 4 mm including linear stigma lobes. Capsules brown, ellipsoid, compressed, 1–1.5 cm × ca. 6 mm, exerted from corolla; gynophore 2–2.5 cm, slender. Seeds brown, ellipsoid to ovoid, ca. 2.5 × 2 mm. Fl. and fr. Sep–Oct.

• Grassland slopes; ca. 3000 m. SE Xizang, NW Yunnan.

12. *Crawfurdia dimidiata* (C. Marquand) Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 244. 1965.

半侧蔓龙胆 ban ce man long dan

Gentiana dimidiata C. Marquand, Bull. Misc. Inform. Kew 1931: 77. 1931.

Stems twining, terete, striate, internodes 10–13 cm. Petiole 1–2 cm; leaf blade ovate-lanceolate to ovate, 4–6 × 2–3 cm, leathery, base rounded, apex acuminate, veins 3–5. Inflorescences 2-flowered or cymes. Pedicel 0.5–3.5 cm, slender. Calyx campanulate; tube 1.2–1.4 cm, membranous, split on 1 side; lobes lanceolate, ca. 6 × 1 mm, apex acute. Corolla pale purple to blue, campanulate, ca. 4 cm; lobes broadly triangular, 3–4 × 4–5 mm, apex acute; plicae semiorbicular to truncate, oblique, 3–4 mm wide, margin erose. Stamens inserted at middle of corolla tube; filaments linear-subulate, 1.2–1.5 cm; anthers sagittate, ca. 4 mm. Nectaries ovate. Ovary narrowly ellipsoid, 1–1.2 cm; gynophore ca. 1 cm. Style linear, ca. 7 mm including linear stigma lobes. Fl. Sep.

Grassland slopes, scrub, bamboo thickets; 3000–3400 m. SE Xizang, NW Yunnan [Myanmar].

13. *Crawfurdia crawfurdioides* (C. Marquand) Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 244. 1965.

裂萼蔓龙胆 lie e man long dan

Roots dark brown. Rhizomes light brown, 2–3 mm in diam. Stems sometimes dark purple, twining, terete, striate, internodes 4–13 cm. Leaves sessile or petiole to ca. 3 mm; leaf blade ovate to cordate, sometimes orbicular toward stem base, 3–6(–9) × 1.5–3.5(–4) cm, leathery, sparsely hirsute along veins, base rounded to truncate, apex acuminate and caudate, veins 3–5. Flowers solitary. Pedicel less than 0.5 cm or to 6 cm. Calyx dark purple, campanulate; tube 1.2–1.4 cm, split on 1 side or rarely entire; lobes lanceolate, 3–5 × 1–2 mm, apex acute. Corolla purple, campanulate, 3.5–4(–5) cm; lobes ovate-triangular, ca. 2 × 5 mm, apex acute; plicae truncate, ca. 1.5 × 5 mm, margin crenulate. Stamens inserted at middle of corolla tube; filaments linear-subulate, 1–1.3 cm; anthers ellipsoid, 2–3 mm. Nectaries ovate. Style short, ca. 6 mm including linear stigma lobes. Capsules brown, ellipsoid, compressed, ca. 2.2 cm; gynophore ca. 1.5 cm, slender. Seeds dark brown, discoid, ca. 2 mm in diam.,

broadly winged. Fl. and fr. Aug-Oct.

- 1700–3900 m. SE Xizang, NW Yunnan.

- 1a. Pedicel to 6 cm 13a. var. *crawfurdioides*
 1b. Pedicel less than 0.5 cm 13b. var. *iochroa*

13a. *Crawfurdia crawfurdioides* var. *crawfurdioides*

裂萼蔓龙胆 (原变种) lie e man long dan (yuan bian zhong)

Gentiana crawfurdioides C. Marquand, Bull. Misc. Inform. Kew 1931: 72. 1931.
Flowering pedicel to 6 cm.

- Meadows, *Abies* forests, bamboo thickets; 2100–3900 m. SE Xizang, NW Yunnan.

13b. *Crawfurdia crawfurdioides* var. *iochroa* (C. Marquand) C. J. Wu, Fl. Reipubl. Popularis Sin. 62: 286. 1988.

根茎蔓龙胆 gen jing man long dan

Gentiana iochroa C. Marquand, Bull. Misc. Inform. Kew

1931: 74. 1931.

Flowers sessile or pedicel less than 0.5 cm.

- Grassland slopes, forest margins, forests; 1700–3100 m. SE Xizang, NW Yunnan.

14. *Crawfurdia semialata* (C. Marquand) Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 244. 1965.

直立蔓龙胆 zhi li man long dan

Gentiana semialata C. Marquand, Bull. Misc. Inform. Kew 1931: 75. 1931; *G. curviflora* C. Marquand.

Stems erect not twining, 20–25 cm tall, 4-angled, striate. Stem leaves short petiolate; leaf blade ovate to subcordate, 1–3 × 0.7–1.8 cm, leathery, base rounded, apex acuminate. Flowers sessile. Calyx tube ca. 1 cm, entire; lobes spatulate, 6–7 mm, apex obtuse. Corolla purple, funnellform, ca. 5 cm; lobes triangular, ca. 6 × 7 mm, apex acute; plicae truncate, margin erose. Filaments linear-subulate, 1–1.2 cm; anthers 6–7 mm. Gynophore as long as ovary. Fl. Aug-Oct.

- Hillsides; 2700–3600 m. SW and W Sichuan.

9. GENTIANA Linnaeus, Sp. Pl. 1: 227. 1753.

龙胆属 long dan shu

Herbs annual, biennial, or perennial. Rootstock with a fibrous primary root and secondary rootlets, with a stout ± fleshy or woody taproot, or with several linear-cylindric roots from a collar. Stems ascending to erect, striate or angled, in perennial species sometimes both flowering and vegetative. Leaves opposite, rarely whorled, sometimes forming a basal rosette. Inflorescences axillary or terminal, 1- to few-flowered cymes, sometimes in terminal clusters and/or axillary whorls. Flowers (4- or) 5- (or 6–8)-merous. Calyx lobes filiform to ovate, with a prominent midvein. Corolla tubular, salverform, funnellform, obconic, or urceolate, very rarely rotate; tube usually much longer than lobes; plicae between lobes. Stamens inserted on corolla tube; filaments basally ± winged; anthers free or rarely contiguous. Glands 5–10 at ovary base. Pistil sessile or on a long gynophore. Style usually short, linear, less often long and filiform; stigma lobes free or connate, recurved, usually oblong to linear, rarely expanded and rounded. Capsule cylindric to ellipsoid and wingless or narrowly obovoid to obovoid (narrowly ellipsoid in *G. winchuanensis*) and winged, many seeded. Seeds wingless or winged; seed coat minutely reticulate, rugose, simply areolate, or with complex spongy areolation.

About 360 species: NW Africa (Morocco), America, Asia, E Australia, Europe; 248 species in China.

Gentiana pseudazurea Grubov, *G. subpolytrichoides* Grubov, and *G. tischkovii* Grubov have been described from Xizang by Grubov (J. Jap. Bot. 69: 18–21. 1994). However, specimens have not been seen by the authors, and the species are not included in this treatment.

- 1a. Plicae reduced to a small tooth or auricle on side of lobe, less than 1 mm.
 2a. Corolla lobes as long as or longer than tube Sect. I. *Otophora*
 2a. Corolla lobes shorter than tube Sect. XI. *Chondrophyllae* (in *G. prainii*)
- 1b. Plicae usually wider and/or longer than 1 mm.
 3a. Corolla throat with a ring of multicellular hairs (not to be confused with fringed plicae between corolla lobes) Sect. XII. *Fimbricorona*
 3b. Corolla throat naked.
 4a. Style almost as long as or longer than ovary; calyx winged or sharply angled or if terete then stems, leaves, and calyces densely covered with purple and white pilosity.
 5a. Plants 5–12 cm tall, densely branched from base and toward stem apex; stem leaves ± crowded toward apex, leaf blades lanceolate; stamens straight; seed coat alveolate Sect. VIII. *Microsperma*
 5b. Plants (5–)10–50 cm tall, not densely branched; stem leaves widely separated, leaf blades ovate-lanceolate, ovate, or cordate; stamens decurved; seed coat minutely to

- coarsely reticulate Sect. IX. *Stenogyne*
- 4b. Style usually much shorter than ovary (about as long as ovary in some species of sects. *Isomeria* and *Microspermae*); calyx not winged, usually terete.
- 6a. Stigma lobes connate or contiguous, expanded into a discoid or funnellform structure; calyx completely enveloped by upper pair of broad obovate leaves Sect. VI. *Phyllocalyx*
- 6b. Stigma lobes free, recurved, linear to oblong; calyx usually not concealed by upper leaves or leaves narrower.
- 7a. Stamens unequal and plants perennial; flowers 4-merous or if 5-merous then corollas 3–4.5 cm Sect. III. *Kudoa*
- 7b. Stamens equal or if unequal then plants annuals with solitary flowers (flowers of *G. picta* and *G. yunnanensis* in clusters) and corollas 0.6–2.5 mm; flowers 5-merous.
- 8a. Perennials; basal leaves persistent at flowering time, blades (excluding petiole) mostly over 3 cm and much larger than stem leaves or vegetative rosettes present along with flowering stems and their leaves distinctly larger than those of flowering stems.
- 9a. Flowering stems arising singly from slender stolons, often creeping and rooting at lower nodes, without a well-developed caudex or stout rhizome and without a stout persistent taproot; larger leaves generally distinctly pseudopetiolate, with blades less than 1.8 cm, spatulate, elliptic, ovate-elliptic, obovate, or suborbicular, base obtuse, rounded, or truncate, only midvein prominent; flowers solitary or to 8 in terminal clusters, sessile Sect. VII. *Isomeria*
- 9b. Flowering stems arising from a ± stout erect caudex, often with a well-developed ± stout taproot and/or in a dense tuft (sometimes also stoloniferous); leaves and inflorescences diverse but above combination of characters generally not present.
- 10a. Remains of old leaf bases fibrous and conspicuous on caudex; seed coat reticulate, usually minutely so (also winged at 1 end in *G. waltonii*) Sect. II. *Cruciata*
- 10b. Remains of old leaf bases at base of current season's growth absent or membranous, not distinctly fibrous or if somewhat fibrous then with stem leaves numerous, closely spaced, less than 5 mm wide, and with flowers solitary; seed coat with membranous lamellae forming spongy complex hexagonal pits.
- 11a. Stems several to many, ± tufted, strongly decumbent; stem leaves opposite or whorled, numerous, closely spaced (9 or more pairs or whorls per stem and/or upper leaves exceeding internodes) Sect. III. *Kudoa*
- 11b. Stems 1 to several, decumbent or erect; stem leaves opposite, usually fewer than 9 pairs per stem, closely spaced only basally and on short stems.
- 12a. Sepals 3–9 mm, ± erect, 2 conspicuously larger than other three; base of current season's growth without blackish membranous remains of old leaf bases Sect. III. *Kudoa*
- 12b. Sepals smaller, often recurved or if over 3 mm then sepals subequal and/or base of current season's growth covered with blackish membranous remains of old leaf bases Sect. IV. *Frigida*
- 8b. Annuals or if perennials then without conspicuously larger basal or rosette leaves (largest leaves at flowering time usually well above base of stem), and/or with all basal leaves less than 1.5 cm.
- 13a. Perennials, without a stout caudex; flowers solitary.
- 14a. Corolla over 2.5 cm, often much larger; capsule wingless Sect. III. *Kudoa*
- 14b. Corolla usually to 1.5 cm (2.3–3 cm in *G. qiujiangensis* and *G. jamesii*); capsule winged along sutures toward apex Sect. XI. *Chondrophyllae*
- 13b. Annuals or if perennial then with a stout caudex and clustered flowers; flowers solitary or clustered.
- 15a. Perennials; stems usually over 20 cm, from a stout caudex; larger stem leaf blades usually over 3.5 cm; flowers clustered.
- 16a. Calyx lobes subequal or irregularly unequal, linear to narrowly triangular, base not or scarcely narrowed; calyx tube often split along 1 side (except in *G. manshurica*); lowermost stem leaves scalelike; seed coat coarsely reticulate, winged at ends Sect. V. *Pneumonanthae*
- 16b. Calyx lobes dimorphic, 2 larger than other 3, lanceolate to spatulate, base distinctly narrowed; calyx tube entire; lowermost stem leaves larger or scalelike; seed coat alveolate, not winged Sect. III. *Kudoa*
- 15b. Annuals; stems usually shorter than 20 cm, caudex none; all stem leaf blades

usually less than 3 cm; flowers solitary or clustered.

- 17a. Seed coat alveolate, with hexagonal pits; flowers solitary or clustered in axillary or terminal inflorescences, if clustered then with corollas over 1.5 cm and/or with calyx lobes each with distinct blade and petiole Sect. VIII. *Microsperma*
- 17b. Seed coat finely reticulate, without hexagonal pits; flowers usually solitary, if ± clustered in terminal inflorescences then with corolla 0.7–1.1 cm and calyx lobes without petiole.
- 18a. Capsule conspicuously winged along sutures at apex Sect. XI. *Chondrophyllae*
- 18b. Capsule not winged Sect. X. *Dolichocarpa*

I. Sect. *Otophora*

- 1a. Corolla lobes distinctly shorter than tube.
 - 2a. Basal rosettes present at flowering time, with leaves almost 3 × as long as larger stem leaves; stem leaves 3–5 pairs, 7–11 mm; corolla 1.7–2.2 cm; seed coat alveolate 5. *G. doxiongshangensis*
 - 2b. Basal rosettes absent or poorly developed, with leaves only slightly larger than stem leaves; stem leaves numerous, 1.5–4 mm; corolla (0.4–)0.7–1.5 cm; seed coat minutely reticulate.
 - 3a. Stem leaf blades 3.5–4 mm; calyx tube 5–6 mm, lobes 3–3.5 mm; corolla white or pale yellow-white; plicae triangular, 2–2.5 mm 2. *G. leucantha*
 - 3b. Stem leaf blades 1.5–3 mm; calyx tube 2–2.5 mm, lobes 1.8–2.2 mm; corolla dark blue; plicae auricular, 0.3–0.5 mm 4. *G. infelix*
- 1b. Corolla lobes about as long as or longer than tube.
 - 4a. Basal rosettes absent at flowering time or poorly developed, with leaves no larger than those of flowering stems; stem leaves numerous; corolla blue or blue-purple, rarely yellow.
 - 5a. Apex of leaf blades and calyx lobes acuminate, with an aristate tip to 1 mm 1. *G. caryophyllea*
 - 5b. Apex of leaf blades and calyx lobes acute to obtuse, without an aristate tip 3. *G. decorata*
 - 4b. Basal rosettes well developed at flowering time, larger rosette leaves usually more than twice as long as leaves of flowering stems; stem leaves 2–5 pairs; corolla white or pale yellow with pale blue streaks and/or spots.
 - 6a. Basal leaf blades 5–12 × (0.8–)1–2.5 cm; flowers usually in axillary or terminal cymes, occasionally solitary 7. *G. otophora*
 - 6b. Basal leaf blades 1–5 × 0.2–1.2 cm; flowers usually solitary, rarely in cymes of 2 or 3 in *G. sichitoensis*.
 - 7a. Corolla 2.5–3 cm, lobes about as long as tube 8. *G. otophoroides*
 - 7b. Corolla 1.6–2 cm, lobes distinctly longer than tube.
 - 8a. Basal leaf blades linear to oblanceolate, 2–4 mm wide; stem leaf blades linear-lanceolate to ovate-lanceolate, 2–3 mm wide 6. *G. damyonensis*
 - 8b. Basal leaf blades spatulate to oblong-spatulate, 7–12 mm wide; stem leaf blades ovate to suborbicular, 6–8 mm wide 9. *G. sichitoensis*

II. Sect. *Cruciata*

- 1a. Some or all flowers pedicellate or inflorescences divided into small pedunculate cymules; axillary flowers or cymules pedunculate.
 - 2a. Calyx tube split 1/3 or more of its length on 1 side forming a spathe.
 - 3a. Calyx lobes subulate, 0.5–4(–7) mm.
 - 4a. Corolla dark blue; rosette leaf blades linear-lanceolate to linear-elliptic, 3.5–16 × 0.4–1.8 cm 10. *G. decumbens*
 - 4b. Corolla greenish white or pale yellow-green with green spots, occasionally with pale blue suffusion; rosette leaf blades broadly lanceolate to ovate-elliptic, 6–20 × 0.8–4 cm 11. *G. straminea*
 - 3b. Calyx lobes linear, lanceolate, or narrowly elliptic, 4–10 mm or, if subulate, over 4 mm.
 - 5a. Stem leaf blades lanceolate to ovate-elliptic; corolla lobes 9–11 mm; plicae 4–6 mm; anthers 3.5–4 mm; seeds winged along 1 side 12. *G. waltonii*
 - 5b. Stem leaf blades linear to linear-lanceolate; corolla lobes 4–7 mm; plicae 1.5–2.5 mm; anthers 2–3 mm; seeds not winged.
 - 6a. Corolla dark blue-purple; capsule sessile 17. *G. dahurica*
 - 6b. Corolla pale blue or yellow; mature capsule on a gynophore 7–10 mm 18. *G. tianschanica*
 - 2b. Calyx tube not split.
 - 7a. Stems, peduncles, and both surfaces of leaves densely papillate; calyx lobes oblanceolate 14. *G. tenuicaulis*
 - 7b. Plants not papillate; calyx lobes linear, linear-lanceolate, narrowly triangular, or narrowly elliptic.
 - 8a. Flowers usually solitary; calyx lobes narrowly elliptic, base narrowed 13. *G. lhassica*
 - 8b. Flowers generally in axillary or terminal cymes (occasionally solitary in *G. kaufmanniana*);

- calyx lobes linear, linear-lanceolate, or narrowly triangular, base not narrowed.
- 9a. Sinus between calyx lobes cuneate to acute; corolla obconic; plicae 3.5–4.5 mm, margin 2-cleft 15. *G. oliveri*
- 9b. Sinus between calyx lobes truncate; corolla tubular-campanulate, campanulate, or funnel-form; plicae 1.5–3 mm, margin entire or denticulate.
- 10a. Plicae auriculate 16. *G. kaufmanniana*
- 10b. Plicae ovate or triangular.
- 11a. Corolla dark blue-purple; capsule sessile 17. *G. dahurica*
- 11b. Corolla pale blue or yellow; mature capsule on a 7–10 mm gynophore 18. *G. tianschanica*
- 1b. Whole terminal inflorescences dense clusters of sessile flowers; axillary inflorescences, if any, usually sessile clusters on main stems, rarely pedunculate clusters of sessile flowers.
- 12a. Stem leaves increasing in size toward stem apex, upper stem leaf blades 3–5.5(–7) cm wide.
- 13a. Corolla 2–2.2 cm, blue-purple, basally pale yellow 19. *G. crassicaulis*
- 13b. Corolla 2.6–3.2 cm, pale yellow or yellow-green, lobes outside suffused with purplish brown 20. *G. tibetica*
- 12b. Stem leaves decreasing in size toward stem apex, upper stem leaf blades 0.7–2(–3) cm wide.
- 14a. Rosette leaf blades elliptic-lanceolate to elliptic-ovate, 2–6 cm wide.
- 15a. Corolla blue-purple 21. *G. macrophylla*
- 15b. Corolla yellow-white, yellow-green, or pale yellow.
- 16a. Calyx tube not split; lobes 6–8 mm 23. *G. walujewii*
- 16b. Calyx tube split on 1 side; lobes 0.5–5 mm.
- 17a. Corolla (1.5–)1.8–2(–2.5) cm, lobes 3–3.5 mm; calyx lobes dentiform; mature capsule sessile 24. *G. officinalis*
- 17b. Corolla 3–3.5 cm, lobes 5–6 mm; calyx lobes filiform; mature capsule on a gynophore 2–3 mm 26. *G. robusta*
- 14b. Rosette leaf blades linear, narrowly elliptic, or oblanceolate, 0.6–1.8(–2.5) cm wide.
- 18a. Corolla blue or purple-blue.
- 19a. Calyx lobes linear, 7–10 mm; ovary on a gynophore 7–10 mm 18. *G. tianschanica*
- 19b. Calyx lobes filiform to subulate, 0.5–5 mm; ovary sessile.
- 20a. Corolla 2.3–2.6 cm, dark blue or purple-blue 22. *G. siphonantha*
- 20b. Corolla 1.5–2 cm, pale blue (often only limb blue) 25. *G. zekuensis*
- 18b. Corolla pale yellow.
- 21a. Corolla 2.5–3.5 cm.
- 22a. Stem leaves 4 or 5 pairs; plicae triangular; stamens inserted at basal part of corolla tube 27. *G. dendrologi*
- 22b. Stem leaves 2 or 3 pairs; plicae lanceolate; stamens inserted at middle of corolla tube 28. *G. olgae*
- 21b. Corolla 1.5–2(–2.5) cm.
- 23a. Calyx lobes dentiform; corolla pale yellow throughout; lobes obtuse 24. *G. officinalis*
- 23b. Calyx lobes filiform; corolla limb usually suffused with pale blue; lobes acute 25. *G. zekuensis*

III. Sect. *Kudoa*

- 1a. Base of vegetative stems forming a stout caudex; leaves (especially toward stem apex) and calyx lobes with white cartilaginous margin and midrib keel.
- 2a. Basal and rosette leaves distinctly contracted into petioles; calyx lobes obovate to spatulate, base distinctly narrowed 35. *G. stipitata*
- 2b. Basal and rosette leaves not distinctly contracted into petioles; calyx lobes lanceolate, elliptic, or elliptic-triangular, base scarcely narrowed.
- 3a. Corolla white with blue stripes and greenish spots when fresh, drying pale yellow or pale blue; lobes 5–6 mm 36. *G. szechenyii*
- 3b. Corolla ruddy purple with paler base when fresh, usually without stripes or spots; lobes 7–10 mm 37. *G. georgei*
- 1b. Base of vegetative axis usually slender; leaves and calyx lobes without white cartilaginous margin and midrib keel.
- 4a. Calyx lobes dissimilar in shape to upper leaves; plicae always asymmetrical.
- 5a. Flower in clusters of more than 3; stamens equal.
- 6a. Basal rosettes none or poorly developed; lowermost stem leaves scalelike, membranous 29. *G. rigescens*
- 6b. Basal rosettes usually well developed; lowermost stem leaves not scalelike but with expanded herbaceous blades.
- 7a. Stems 3–15(–28) cm; corolla lobes caudate 30. *G. davidii*
- 7b. Stems (10–)20–50 cm; corolla lobes not caudate 31. *G. cephalantha*

- 5b. Flowers 1–3; stamens unequal.
- 8a. Flowers 4-merous; corolla nearly cylindrical 32. *G. jingdongensis*
- 8b. Flowers 5-merous; corolla funnelform.
- 9a. Blades of rosette leaves obovate to elliptic, abruptly narrowed into a petiole; corolla blue 33. *G. melandriifolia*
- 9b. Blades of rosette leaves narrowly spatulate to oblong-ob lanceolate, gradually narrowed into a petiole; corolla rose 34. *G. duclouxii*
- 4b. Calyx lobes similar in shape to upper leaves; plicae always symmetrical.
- 10a. Stem leaves in whorls of 3–8.
- 11a. Corolla lobes without a caudate tip.
- 12a. Margin of stem leaves and calyx lobes scabrous-ciliate 38. *G. ecaudata*
- 12b. Margin of stem leaves and calyx lobes smooth.
- 13a. Flowering stems with largest leaves toward apex; corolla 4.5–6 cm, lobe margin entire 39. *G. ternifolia*
- 13b. Flowering stems with largest leaves near middle; corolla 2.5–4.2 cm, lobe margin erose 40. *G. yakushimensis*
- 11b. Corolla lobes with a caudate tip to 3 mm.
- 14a. Style 5–7 mm; corolla narrowly obconic 44. *G. viatrix*
- 14b. Style 3–5 mm; corolla tubular to tubular-campanulate.
- 15a. Corolla lobes 2–2.5 mm, caudate tip less than 1 mm; stamens inserted just below middle of corolla tube 41. *G. tetraphylla*
- 15b. Corolla lobes 4–6 mm, caudate tip 2–2.5 mm; stamens inserted at basal part of corolla tube.
- 16a. Upper stem leaves and calyx lobes linear-spatulate, apex acute to obtuse 42. *G. hexaphylla*
- 16b. Upper stem leaves and calyx lobes linear, apex acuminate 43. *G. arethusae*
- 10b. Stem leaves opposite.
- 17a. Corolla 1.5–2 cm; calyx lobes spreading 46. *G. altigena*
- 17b. Corolla 2.5–7.5 cm; calyx lobes straight or ascending.
- 18a. Basal rosettes or abbreviated vegetative shoots generally present at flowering time, their leaves usually conspicuously longer than those of flowering stems.
- 19a. Stems papillate; corolla narrowly funnelform, 4–6 cm 50. *G. veitchiorum*
- 19b. Stems not papillate; corolla campanulate, 2.5–4.7 cm.
- 20a. Corolla lobes 4.5–6 mm; plicae 2–3 mm; anthers 3–3.5 mm 51. *G. nyalamensis*
- 20b. Corolla lobes 2.5–3.5 mm; plicae 0.5–1 mm; anthers 1.5–2 mm 52. *G. ornata*
- 18b. Basal rosettes and abbreviated vegetative shoots generally poorly developed or absent at flowering time, lowest leaves sometimes smaller and/or wider but not longer nor otherwise well differentiated.
- 21a. Upper stem leaves orbicular, ovate, or elliptic.
- 22a. Basal rosette absent; corolla cylindrical 45. *G. prolata*
- 22b. Basal rosette present; corolla not cylindrical.
- 23a. Corolla dark blue, obconic, lobes usually mucronate 47. *G. obconica*
- 23b. Corolla pale blue, not obconic, lobes not mucronate.
- 24a. All stem leaves elliptic 48. *G. altorum*
- 24b. Lower stem leaves ovate, upper ones elliptic 49. *G. caelestis*
- 21b. Upper stem leaves linear or linear-lanceolate.
- 25a. Flowering stems 3–5 cm; corolla 3–3.8(–4.5) cm, lobes 3–4 mm; plicae 1.5–2 mm 55. *G. oreodoxa*
- 25b. Flowering stems 5–15(–20) cm; corolla 5–7.5 cm, lobes 6–9 mm; plicae 2–5 mm.
- 26a. Flowers usually pedicellate.
- 27a. Calyx lobes and middle to upper leaves broadly linear, 2–3 mm wide; corolla campanulate-tubular, inflated at middle of tube; anthers 3.5–4 mm 53. *G. dolichocalyx*
- 27b. Calyx lobes and middle to upper leaves linear, often 1–1.5 mm wide; corolla narrowly obconic to funnelform; anthers 2.5–3 mm 54. *G. lawrencei*
- 26b. Flowers sessile.
- 28a. Corolla 7–7.5 cm, inner surface blue-purple 56. *G. helophila*

- 28b. Corolla 5–6 cm, inner surface blue.
 - 29a. Corolla conspicuously spotted; lower stem leaves oblong 57. *G. futtereri*
 - 29b. Corolla unspotted or inconspicuously spotted; lower stem leaves linear-lanceolate 58. *G. sinoornata*

IV. Sect. *Frigida*

- 1a. Corolla 3–6 cm.
 - 2a. Corollas almost white, pale yellow, or yellowish green, with dark blue spots and/or stripes.
 - 3a. Usually only lowermost axillary flowers with true pedicels or all flowers sessile above bracts; pedicels generally less than 1 cm 69. *G. algida*
 - 3b. All or most flowers distinctly pedicellate; basal pedicels often over 4 cm 73. *G. purdomii*
 - 2b. Corollas pale to dark blue (basal part of tube may be whitish or yellowish).
 - 4a. Calyx lobes 2–8.5 mm.
 - 5a. Flowering stems ± decumbent, 3–10(–17) cm; flowers sessile or subsessile; stamens inserted at basal part of corolla tube 71. *G. nubigena*
 - 5b. Flowering stems erect, 15–35 cm; flowers pedicellate; stamens inserted near middle of corolla tube 74. *G. trichotoma*
 - 4b. Calyx lobes 1–2(–3) mm.
 - 6a. Stems densely papillate; calyx tube not split 67. *G. striolata*
 - 6b. Stems glabrous to subglabrous; calyx tube split down 1 side or not.
 - 7a. Upper stem leaves scarcely reduced; petiole of basal leaves 4–8 cm; calyx lobes straight 68. *G. omeiensis*
 - 7b. Upper stem leaves distinctly reduced; petiole of basal leaves 1–3 cm; calyx lobes spreading or reflexed.
 - 8a. Basal leaves linear-lanceolate to linear-elliptic; corolla blue 59. *G. wilsonii*
 - 8b. Basal leaves oblong, narrowly elliptic, or oblanceolate; corolla dark blue 61. *G. atuntsiensis*
 - 1b. Corolla 1.5–3.5 cm.
 - 9a. Corollas almost white, pale yellow, or yellowish green, with dark blue spots and/or stripes.
 - 10a. Flowers distinctly pedicellate; calyx lobes erect.
 - 11a. Basal leaves oblong to spatulate; corolla obconic 72. *G. erectosepala*
 - 11b. Basal leaves linear, linear-elliptic, or rarely oblong; corolla tubular-campanulate to funnelform 73. *G. purdomii*
 - 10b. Flowers sessile (axillary cymes may be pedunculate below bracts) or lowest axillary flowers rarely on pedicels to 1 cm; calyx lobes spreading or reflexed.
 - 12a. Stems papillate, most so toward apex 62. *G. handeliana*
 - 12b. Stems glabrous.
 - 13a. Calyx tube split on 1 side, lobes 1–1.5 mm 63. *G. phyllopoda*
 - 13b. Calyx tube not split, lobes 3.5–5.5 mm 64. *G. apiata*
 - 9b. Corollas pale to dark blue (basal part of tube may be yellowish or whitish).
 - 14a. Flowers solitary; corolla 1.5–2 cm 70. *G. himalayaensis*
 - 14b. Flowers in narrow panicles, cymes, whorls, or clusters; corolla 2–3.5 cm.
 - 15a. Flowers in cymes; gynophore 2.1–2.7 cm; calyx lobes 3–6 mm 75. *G. laxiflora*
 - 15b. Flowers in narrow panicles, whorls, or clusters; gynophore 0.8–2 cm; calyx lobes 1–3 mm.
 - 16a. Flowers in narrow panicles; all but uppermost flowers consistently pedicellate 65. *G. microdonta*
 - 16b. Flowers in whorls or clusters; flowers sessile or lowest occasionally short pedicellate.
 - 17a. Basal leaves oblong, narrowly elliptic, or oblanceolate; corolla dark blue.
 - 18a. Corolla tubular, lobes 1.5–2 mm 60. *G. subuliformis*
 - 18b. Corolla funnelform, lobes 3.5–5 mm 61. *G. atuntsiensis*
 - 17b. Basal leaves linear-lanceolate or linear-elliptic; corolla pale blue.
 - 19a. Calyx lobes straight 66. *G. wasenensis*
 - 19b. Calyx lobes spreading to reflexed 59. *G. wilsonii*

V. Sect. *Pneumonanthae*

- 1a. Leaf margin and veins on abaxial surface slightly rough 76. *G. scabra*
- 1b. Leaf margin and veins smooth.
 - 2a. Flowers solitary (or 2) and terminal (flowers occasionally also solitary in axils of upper leaves); corolla lobes acuminate; stamens inserted at basal part of corolla tube 79. *G. manshurica*
 - 2b. Flowers (1–3 to) many in axillary or terminal clusters; corolla lobes obtuse to rounded; stamens inserted at middle of corolla tube.
 - 3a. Bracts ovate-lanceolate, 2–3 cm; calyx tube 1.4–1.6 cm 77. *G. uchiyamae*
 - 3b. Bracts linear-lanceolate to lanceolate, 0.8–1.2 cm; calyx tube 0.8–1.2 cm 78. *G. triflora*

VI. Sect. Phyllocalyx

Only species: 80. *G. phyllocalyx*

VII. Sect. Isomeria

- 1a. Margin of leaves and calyx lobes conspicuously whitish, membranous or cartilaginous.
 - 2a. Leaf blade lanceolate, broadly oblong, elliptic, or ovate, apex acuminate to obtuse.
 - 3a. Margin of leaves and calyx lobes membranous, scabrous 85. *G. depressa*
 - 3b. Margin of leaves and calyx lobes cartilaginous, smooth.
 - 4a. Corolla 4.5–6 cm, blue-purple; stamens equal 86. *G. amplicrater*
 - 4b. Corolla 2.5–2.8 cm, pale blue; stamens unequal 87. *G. confertifolia*
 - 2b. Leaf blade obovate to flabelliform, apex rounded to truncate and emarginate.
 - 5a. Margin of leaves membranous, minutely lacerate 88. *G. lacerulata*
 - 5b. Margin of leaves cartilaginous, not lacerate.
 - 6a. Margin of leaves and calyx lobes minutely papillate; corolla 1.5–2 cm; seeds 1.3–1.5 mm 90. *G. emodii*
 - 6b. Margin of leaves and calyx lobes smooth; corolla 2–3 cm; seeds 2.3–2.5 mm 89. *G. urnula*
- 1b. Margin of leaves and calyx lobes neither membranous nor cartilaginous (leaf margin cartilaginous in *G. tubiflora*).
 - 7a. Flowers several in a subcapitate inflorescence; petiole of upper leaves conspicuously widened.
 - 8a. Upper pairs of leaves as long as or longer than flowers, clustered, enveloping much of inflorescence; petiole longer or slightly shorter than blades 81. *G. sikkimensis*
 - 8b. Upper pairs of leaves shorter than flowers, enveloping only base of inflorescence; petiole poorly defined or much shorter than blades.
 - 9a. Corolla 2–2.6 cm; calyx lobes spreading to recurved; flowering stems erect, without adventitious roots; style 1–2 mm 82. *G. elwesii*
 - 9b. Corolla 2.6–3.5 cm; calyx lobes erect; flowering stems decumbent, with adventitious roots from lower nodes; style 3–5 mm.
 - 10a. All leaf blades ovate-oblong to ovate-orbicular; stems papillate; corolla 3–3.5 cm 83. *G. chinensis*
 - 10b. Upper stem leaf blades spatulate to obovate; stems smooth; corolla 2.6–3 cm 84. *G. harrowiana*
 - 7b. Flowers generally solitary; petiole slender.
 - 11a. Calyx lobes oblanceolate-spatulate to orbicular-spatulate, base distinctly narrowed.
 - 12a. Corolla 3–3.5(–4.5) cm, with dark blue stripes and spots 92. *G. gilvostriata*
 - 12b. Corolla 4.5–5.5 cm, without stripes or spots 91. *G. stragulata*
 - 11b. Calyx lobes not oblanceolate-spatulate to orbicular-spatulate, base scarcely or not at all narrowed.
 - 13a. Style 7–14 mm, longer than ovary, filiform.
 - 14a. Leaf blade spatulate to obovate, apex rounded; calyx lobes lanceolate to narrowly oblong, apex subacute to obtuse 93. *G. filistyla*
 - 14b. Leaf blade oblong to elliptic, apex acute to obtuse and sometimes caudate; calyx lobes ovate to triangular, apex acute and sometimes caudate 94. *G. tubiflora*
 - 13b. Style 1.5–5 mm, shorter than ovary, cylindrical.
 - 15a. Corolla 3–3.5 cm.
 - 16a. Stolons well developed; leaf blade ovate-elliptic to ovate-orbicular; style 4–5 mm 83. *G. chinensis*
 - 16b. Stolons poorly developed; leaf blade spatulate to obovate; style 1.5–2.5 mm 96. *G. wardii*
 - 15b. Corolla to 2.6 cm.
 - 17a. Stolons well developed; leaf blades of flowering stems narrowly elliptic to ovate-elliptic, those of stolons linear to linear-lanceolate 95. *G. namlaensis*
 - 17b. Stolons poorly developed; leaf blades all spatulate to obovate 96. *G. wardii*

VIII. Sect. Microsperma

- 1a. Flowers 4-merous; keeled midveins of calyx lobes decurrent as conspicuous wings on tube.
 - 2a. Corolla 2–3.5 cm; stamens inserted near base of corolla tube 97. *G. lineolata*
 - 2b. Corolla 3.5–6 cm; stamens inserted at middle of corolla tube 98. *G. praeclara*
- 1b. Flowers 5-merous; calyx lobes and tube not keeled or winged.
 - 3a. Plants 3–5(–10) cm tall, much branched from base, branches spreading or decumbent; leaf blade orbicular to reniform; flowers solitary at ends of branches; stamens equal.
 - 4a. Corolla yellow, with dark blue streaks and spots, (1.4–)2–2.4 cm; stamens inserted at middle of corolla tube 105. *G. tongolensis*
 - 4b. Corolla blue or dark purple, without streaks or spots, (0.8–)1–2 cm; stamens inserted at apical part of corolla tube.
 - 5a. Corolla dark purple; plicae ovate, margin denticulate; style 1.2–1.5 mm; capsule included in corolla; seed coat alveolate 103. *G. atropurpurea*

- 5b. Corolla light blue; plicae strongly oblique and auricular to triangular, margin entire; style 4–7 mm; capsule usually exserted from corolla; seed coat smooth at maturity 104. *G. vernayi*
- 3b. Plants often taller, with 1 to several ± erect stems, if decumbent usually not branched near base; leaf blade linear, lanceolate, spatulate, narrowly elliptic, or obovate; flowers in terminal and often also axillary clusters; stamens unequal.
 - 6a. Leaves densely crowded at apex of branches, subtending clusters of flowers (or stems very short, terminating in a cluster of flowers subtended by several pairs of leaves); flowers mostly confined to terminal clusters; corolla dark blue or violet, without conspicuous streaks or spots 99. *G. delavayi*
 - 6b. Leaves ± evenly spaced along stem; flowers in terminal and axillary clusters along upper half or more of stem; corolla yellow or pale blue, with dark blue streaks and spots.
 - 7a. Leaf blade linear; calyx lobes linear 100. *G. picta*
 - 7b. Leaf blade spatulate to obovate; calyx lobes narrowly elliptic or suborbicular.
 - 8a. Calyx lobes narrowly elliptic, unequal; style 2–3 mm 101. *G. yunnanensis*
 - 8b. Calyx lobes suborbicular, equal; style 3.5–5.5 mm 102. *G. suborbisepala*

IX. Sect. *Stenogyne*

- 1a. Plicae margin fringed.
 - 2a. Annuals; calyx tube with broad wings; corolla 2.3–2.5 cm 107. *G. alata*
 - 2b. Perennials; calyx tube with narrow wings or merely sharply ridged along veins; corolla 2.5–4.5 cm.
 - 3a. Stems, leaves, and calyces densely white and purple pilose; calyx tube prominently veined but not winged 106. *G. villifera*
 - 3b. Plant glabrous or puberulent on petioles and leaf veins only; calyx tube narrowly winged 108. *G. rhodantha*
- 1b. Plicae margin erose, denticulate, or short lacinate.
 - 4a. Corolla yellow, greenish yellow, or yellowish white.
 - 5a. Corolla tube outside puberulent along veins, sometimes purple suffused but not distinctly striped; lobes slightly acuminate to subacute; plicae horizontally truncate, margin erose; stamens inserted near base of corolla tube 110. *G. souliei*
 - 5b. Corolla tube glabrous, distinctly dark striped; lobes long acuminate to caudate; plicate obliquely truncate, margin denticulate; stamens inserted at middle of corolla tube 109. *G. striata*
 - 4b. Corolla pale to dark blue, violet, or purple.
 - 6a. Calyx tube angled, sometimes with slightly rough sharp ridges but without conspicuous wings.
 - 7a. Corolla blue, 2.5–3.2 cm, tubular to funnelform; limb 12 mm wide 111. *G. leptoclada*
 - 7b. Corolla violet to purple, 1–2 cm, salverform; limb 7–10 mm wide.
 - 8a. Calyx lobes subulate; plicae triangular, 2.5–3 mm, margin erose 112. *G. primuliflora*
 - 8b. Calyx lobes narrowly ovate to triangular; plicae lanceolate, 4–6 mm, margin denticulate 113. *G. expansa*
 - 6b. Calyx tube conspicuously winged.
 - 9a. Corolla 3–4.5 cm; calyx lobes narrowly elliptic, lanceolate, or ovate-lanceolate, base narrowed.
 - 10a. Leaf blade 1.3–2.5 cm; internodes 3–8 cm; calyx tube broadly winged; corolla lobes obtuse; seeds broadly winged 114. *G. pterocalyx*
 - 10b. Leaf blade 0.7–1.2 cm; internodes 1–2.5 cm; calyx tube narrowly winged; corolla lobes acuminate; seeds narrowly winged or wingless 115. *G. eurycarpa*
 - 9b. Corolla 2.2–3 cm; calyx lobes linear to subulate, base not narrowed.
 - 11a. Leaves toward stem apex adaxially hispidulous on veins; plicae margin erose; ovary gynophore 8–10 mm 116. *G. gentilis*
 - 11b. Leaves all adaxially glabrous; plicae margin denticulate; ovary gynophore 5–7 mm 117. *G. serra*

X. Sect. *Dolichocarpa*

- 1a. Pedicel exserted from upper leaves.
 - 2a. Corolla 1.1–1.5 cm; plicae ovate, apex obtuse.
 - 3a. Calyx lobes lanceolate; corolla outside with blue-gray stripes; valves of capsules not membranous and transparent 127. *G. caeruleogrisea*
 - 3b. Calyx lobes triangular; corolla outside blue without dark stripes; valves of capsules membranous and transparent 126. *G. clarkei*
 - 2b. Corolla 1.8–2.6 cm; plicae oblong to broadly oblong, apex truncate.
 - 4a. Leaf apex mucronate with a recurved tip; plicae margin serrulate 124. *G. pudica*
 - 4b. Leaf apex not mucronate; plicae margin lacinate 125. *G. producta*
- 1b. Pedicel enveloped by upper leaves (rarely exserted in *G. prostrata*) or leaves sessile.
 - 5a. Stem leaves rigid, shiny, margin broadly membranous except at apex.
 - 6a. Stem branches abbreviated and crowded in a dense tuft; corolla (1–)1.5–2 cm, without bluish gray

- lines in throat 128. *G. micans*
- 6b. Stem branches not abbreviated nor crowded in a tuft; corolla (2–)2.5–3 cm, with bluish gray lines in throat 129. *G. haynaldii*
- 5b. Stem leaves herbaceous, not shiny, margin narrowly membranous, cartilaginous, or not modified.
- 7a. Corolla throat blackish; stamens inserted on apical part of corolla tube 118. *G. gyirongensis*
- 7b. Corolla throat mostly similar in color to rest of corolla, sometimes with black streaks; stamens inserted at middle or basal part of corolla tube.
- 8a. Corolla salverform.
- 9a. Stems not papillate; leaf blade margin membranous, apex acute to obtuse; plicae ovate, margin serrulate 120. *G. stellata*
- 9b. Stems papillate; leaf blade margin cartilaginous, apex rounded; plicae oblong, margin erose 122. *G. crenulatotruncata*
- 8b. Corolla tubular to funnelform.
- 10a. Stems not papillate; leaves overlapping in 4 distinct ranks; stamens inserted near base of corolla tube; filaments 1.5–2.5 mm 119. *G. tetrasticha*
- 10b. Stems usually papillate (not papillate in *G. prostrata* var. *karelinii*); leaves usually lax, not in well-defined ranks; stamens inserted at middle of corolla tube; filaments (2–)3–6.5 mm.
- 11a. Seeds with several irregular spongy edges; stem leaf blades suborbicular 121. *G. nanobella*
- 11b. Seeds without spongy edges; stem leaf blades spatulate to obovate 123. *G. prostrata*

XI. Sect. *Chondrophyllae*

- 1a. Capsule narrowly ellipsoid to narrowly obovoid, apex long attenuate; corolla salverform.
- 2a. Corolla 1.7–2.2 cm, lobes 4–5 mm, throat with short dark lines 245. *G. piasezkii*
- 2b. Corolla 2.5–3.5 cm, lobes 6–8 mm, throat without lines.
- 3a. Calyx 1.3–1.7 cm, lobes 1.5–2 mm; corolla throat with yellow and blackish spots 244. *G. winchuanensis*
- 3b. Calyx 2–2.7 cm, lobes 6–8 mm; corolla throat unmarked 246. *G. shaanxiensis*
- 1b. Capsule narrowly obovoid, ellipsoid, or ovoid, apex rounded to truncate or rarely acute; corolla tubular, obconic, campanulate, or funnelform (salverform in *G. qiujiangensis* and occasionally in *G. curviphylla*).
- 4a. Plicae margin lacinate or fringed (deeply few dentate in *G. epichysantha*).
- 5a. Plicae margin fringes with expanded tips.
- 6a. Stem leaf petioles 4–7 mm; stem branches divaricate 134. *G. divaricata*
- 6b. Stem leaf petioles 0.5–1.5 mm; stem branches narrowly divergent.
- 7a. Corolla outside bluish gray, inside white 135. *G. oligophylla*
- 7b. Corolla blue or blue-purple.
- 8a. Leaf blade margin distinctly densely papillate-ciliolate; corolla lobes erose-undulate; filaments inserted near base of corolla tube 136. *G. deltoidea*
- 8b. Leaf blade margin smooth or minutely papillate; corolla lobes entire; filaments inserted near middle of corolla tube 137. *G. recurvata*
- 5b. Plicae margin filiform-fringed or lacinate with acuminate tips or deeply few dentate.
- 9a. Calyx lobes ovate, spreading to recurved; corolla 2.3–3 cm 222. *G. jamesii*
- 9b. Calyx lobes filiform to narrowly triangular, erect; corolla 0.8–1.5 cm (2.2–2.6 cm in *G. qiujiangensis*).
- 10a. Plicae margin deeply few dentate, not truly fringed; corolla white to yellowish green, outside with blue-gray stripes 133. *G. epichysantha*
- 10b. Plicae margin truly fringed; corolla pale to dark blue, violet, or purple (sometimes pale yellow or white in *G. mairei* and *G. formosa*).
- 11a. Stems at least 2 × dichotomously branched at various levels (occasionally simple in *G. exquisita*).
- 12a. Annuals with at least remains of basal leaves; calyx ca. 1/2 as long as corolla; plicae shorter than corolla lobes.
- 13a. Corolla inside with short blackish lines in throat; plicae margin usually with 8–10 fringes; filaments inserted near base of corolla tube 138. *G. mairei*
- 13b. Corolla inside without short blackish lines in throat; plicae margin usually with 15–20 fringes; filaments inserted near middle of corolla tube 139. *G. panthaica*
- 12b. Perennials with stolons but lacking distinctive basal leaves at anthesis; calyx 1/4–1/3 as long as corolla; plicae slightly shorter to as long as corolla lobes.

- 14a. Corolla with dark blue spots; plicae 3–4 × as wide as linear lobes 143. *G. exquisita*
 14b. Corolla without spots; plicae not wider than ovate-elliptic to ovate lobes 145. *G. grata*
- 11b. Stems generally simple or branched only near base (occasionally few branched in *G. formosa* and *G. burmensis*).
 15a. Corolla salverform, 2.2–2.6 cm 140. *G. qiujiangensis*
 15b. Corolla tubular-campanulate, obconic, or funnelform, 0.8–1.5 cm.
 16a. Plicae less than 1/2 as long as corolla lobes, margin laciniate; stamens inserted at apical part of corolla tube.
 17a. Corolla lobes suborbicular, base distinctly contracted, apex rounded, plicae broadly oblong; style 1.5–2 mm 141. *G. lacinulata*
 17b. Corolla lobes ovate-triangular to ovate-lanceolate, base not contracted, apex obtuse; plicae ovate; style 3–4 mm 142. *G. muscicola*
 16b. Plicae as long as or slightly shorter than corolla lobes, margin filiform-fringed; stamens inserted at middle or basal part of corolla tube.
 18a. Flowers nodding on pedicel bent near apex; calyx lobes filiform to subulate; corolla white to pale blue 144. *G. formosa*
 18b. Flowers ± erect; calyx lobes narrowly triangular; corolla purple 146. *G. burmensis*
- 4b. Plicae margin entire, crenulate, 2-cleft, dentate, or erose (irregularly laciniate in *G. aristata* and *G. leucomelaena*, few laciniate in *G. stellulata*).
 19a. Plants perennial with stolons and/or fleshy roots.
 20a. Leaves congested, recurved and ± folded, leathery, margin thickened cartilaginous; basal leaves scarcely or not at all larger than stem leaves.
 21a. Leaf blade leathery but scarcely rigid, narrowly linear-elliptic, 1–2 mm wide; calyx lobes subulate, (3–)5–6 mm 156. *G. kwangsiensis*
 21b. Leaf blade rigid, lanceolate, ovate-elliptic, or ovate, 2–3.5 mm wide; calyx lobes ovate-lanceolate to triangular, 2–3 mm 243. *G. arisanensis*
 20b. Leaves not congested, neither recurved nor folded, rarely upper leaves occasionally ± recurved, herbaceous, margin membranous or indistinctly cartilaginous; basal leaves distinctly larger than stem leaves.
 22a. Roots stout, fusiform; stems as long as or slightly longer than basal leaves; basal leaves linear to linear-lanceolate 240. *G. napulifera*
 22b. Roots slender, cylindrical; stems apparently longer than basal leaves; basal leaves elliptic to ovate-lanceolate.
 23a. Flowers clustered in ± involucre heads, subsessile; anthers 1–1.5 mm 241. *G. praticola*
 23b. Flowers solitary on short to long branches, subsessile to pedicellate; anthers 1.8–2.5 mm 242. *G. loureiroi*
- 19b. Plants annual or biennial with fibrous roots.
 24a. Calyx lobes spreading, recurved, or reflexed (rarely erect in *G. bryoides*, *G. crassuloides*, and *G. pedicellata*).
 25a. Calyx lobes needlelike, straight spreading, rigid 157. *G. asterocalyx*
 25b. Calyx lobes not needlelike, recurved, not rigid.
 26a. Corolla 4–5 mm 186. *G. pluviarum*
 26b. Corolla 5.5–23 mm.
 27a. Leaf blade pubescent to hirsute.
 28a. Stem leaf blades deltate-spatulate, 3–4.5 mm; corolla 5.5–6 mm 175. *G. nyingchiensis*
 28b. Stem leaf blades ovate to ovate-triangular, 2.5–3 mm; corolla 8–10 mm 185. *G. hirsuta*
 27b. Leaf blade glabrous or merely papillate, not pubescent (margin sometimes ciliolate).
 29a. Stem leaf blades lanceolate, narrowly elliptic, ovate, ovate-triangular, or cordate (occasionally oblanceolate in *G. pedicellata*).
 30a. Leaves and calyx lobes without a distinctly thickened margin.
 31a. Corolla yellow or pale yellow, with dark spots in throat 167. *G. scabrida*
 31b. Corolla outside pale yellow-green, inside pale blue, blue, or blue-purple, without spots in throat.
 32a. Corolla twice as long as calyx, inside blue to blue-purple with yellow to orange throat 168. *G. pedicellata*
 32b. Corolla scarcely exceeding calyx, inside pale blue 169. *G. moniliformis*
 30b. Leaves and calyx lobes with a distinctly thickened cartilaginous margin (calyx lobes margin membranous in *G. scabrifilamenta*).
 33a. Leaves and calyx lobes with a somewhat fleshy to subcoria-

- ceous aristate tip to 0.7 mm; flowering branches usually short, erect, crowded.
- 34a. All stem leaf blades ovate or cordate; anthers 0.5–0.8 mm 170. *G. yokusai*
- 34b. Upper stem leaf blades narrowly elliptic; anthers 0.8–1 mm 171. *G. sutchuenensis*
- 33b. Leaves and calyx lobes with an herbaceous apiculate or cuspidate tip; flowering branches long, spreading, lax.
- 35a. Corolla 12–14 mm; calyx lobes narrowly triangular; stamens inserted at middle of corolla tube; filaments 1–1.2 mm, scabrous or papillate 172. *G. scabrifilamenta*
- 35b. Corolla 7–8 mm; calyx lobes ovate; stamens inserted at basal part of corolla tube; filaments 2–2.5 mm, glabrous 174. *G. alsinoides*
- 29b. Stem leaf blades oblong, spatulate, obovate, spatulate-orbicular, or (at least upper leaves) reniform.
- 36a. Calyx lobes inside papillate, margin not distinctly thickened ... 176. *G. mailingensis*
- 36b. Calyx lobes inside not papillate, margin distinctly cartilaginously thickened.
- 37a. Upper stem leaf blades wider than long, reniform 177. *G. crassuloides*
- 37b. All stem leaf blades longer than wide, spatulate or obovate.
- 38a. Stems often solitary (occasionally to 10), simple toward base, fastigiate short branched toward apex; flowers in a ± capitate or corymbose inflorescence.
- 39a. Flowering branches ± crowded into a head; corolla 6–7 mm, pale blue 223. *G. intricata*
- 39b. Flowering branches corymbose; corolla 11–14 mm, purplish 224. *G. subintricata*
- 38b. Stems 2 to several, simple or branched only near base, if branched higher then ultimate branches distinctly longer than flowers, not fastigate; flowers not in heads or dense corymbs.
- 40a. Basal leaves poorly developed, 4–7 mm.
- 41a. Calyx tube uniformly herbaceous; stem leaf blades and calyx lobes rounded at apex 178. *G. crassula*
- 41b. Calyx tube membranous; stem leaf blades and calyx lobes deltate-acute at apex 179. *G. curviphylla*
- 40b. Basal leaves well developed, (5–)6–30 mm.
- 42a. Corolla pale blue, throat with short dark blue lines, lobes mucronate.
- 43a. Stems branched only at base; stem leaf blades obovate 180. *G. bryoides*
- 43b. Stems branched throughout; stem leaf blades spatulate to oblanceolate 181. *G. ludingensis*
- 42b. Corolla blue to dark blue, throat unmarked, lobes obtuse.
- 44a. Corolla scarcely exceeding calyx; seeds dark brown 182. *G. squarrosa*
- 44b. Corolla twice as long as calyx; seeds pale brown 183. *G. pseudosquarrosa*
- 24b. Calyx lobes erect and ± appressed to corolla (rarely slightly spreading in *G. simulatrix*).
- 45a. Plants with 1 or occasionally few conspicuous main stems, branched above middle or fastigiate throughout, rarely simple.
- 46a. Stem solitary, lower part simple and leafless, upper part much branched with internodes very short and leaves plus flowering branches congested into a dense head.
- 47a. Margin of all stem leaf blades cartilaginous.
- 48a. Calyx lobes subulate, apex acuminate and awned; stamens inserted near base of corolla tube; stigma lobes narrowly oblong 216. *G. xingrenensis*
- 48b. Calyx lobes suborbicular, apex rounded and cuspidate; stamens inserted at or about middle of corolla tube; stigma lobes semiorbicular

- 221. *G. globosa*
- 47b. Margin of upper stem leaf blades membranous.
- 49a. Margin of lower stem leaf blades conspicuously membranous.
- 50a. Calyx campanulate, 7–8.5 mm, lobes ovate-elliptic; corolla 8–9 mm 217. *G. albomarginata*
- 50b. Calyx obconic, 4–4.5 mm, lobes oblong to suborbicular; corolla 7–8 mm 220. *G. albicalyx*
- 49b. Margin of lower stem leaf blades not membranous but usually cartilaginous.
- 51a. Leaves and calyx pubescent; corolla 1.2–1.4 cm; stamens unequal 214. *G. pedata*
- 51b. Leaves and calyx glabrous; corolla 0.7–1.1 cm; stamens equal.
- 52a. Calyx campanulate, 8–9 mm; corolla lobes 2–3 mm 219. *G. huxleyi*
- 52b. Calyx tubular, 4.5–7 mm; corolla lobes 1–1.5 mm.
- 53a. Calyx lobes ovate to triangular, 2.5–3.5 mm; plicae ovate; stamens inserted at or about middle of corolla tube, filaments 1.5–2 mm 215. *G. scytophylla*
- 53b. Calyx lobes broadly oblong, 1.5–2 mm; plicae semi-orbicular; stamens inserted near base of corolla tube, filaments 3–3.5 mm 218. *G. capitata*
- 46b. Stems solitary or several from base, leafy throughout or most of their length, usually ± fastigiately branched near or above middle, branches forming dense or ± corymbose inflorescences (occasionally unbranched in small plants).
- 54a. Calyx lobes filiform to filiform-subulate.
- 55a. Corolla 1–1.8 cm, outside yellowish green, inside pale blue 147. *G. delicata*
- 55b. Corolla (1.5–)1.8–6 cm, purple or blue.
- 56a. Calyx lobes shorter than tube; corolla purple; style 1.5–2.5 mm 148. *G. rubicunda*
- 56b. Calyx lobes twice as long as tube; corolla blue; style 3–4.5 mm 149. *G. itzershanensis*
- 54b. Calyx lobes lanceolate, elliptic-lanceolate, ovate, or triangular.
- 57a. Stem leaf blades spatulate or obovate.
- 58a. Calyx lobes about as long as or longer than tube.
- 59a. Leaves densely pubescent on both surfaces and calyx pubescent outside; corolla pale yellow, scarcely exceeding calyx 233. *G. kunmingensis*
- 59b. Leaves and calyx lobes glabrous or merely papillate on adaxial surface or midvein, sometimes ciliolate on margin; corolla pale blue or blue, distinctly longer than calyx.
- 60a. Midrib of leaves and calyx lobes densely papillate; stamens equal; lateral branches well developed 234. *G. papillosa*
- 60b. Midrib of leaves and calyx lobes glabrous; stamens unequal; lateral branches short and weak 232. *G. maeulchanensis*
- 58b. Calyx lobes shorter than tube.
- 61a. Upper stem leaf blades linear to narrowly elliptic; corolla throat with short blackish lines 236. *G. bomiensis*
- 61b. Upper stem leaf blades spatulate; corolla throat without lines or spots.
- 62a. Whole plant blackish purple; petiole of stem leaves longer than blade; flowering branches lax 237. *G. daochengensis*
- 62b. Whole plant green except sometimes for purple stems; petiole of stem leaves shorter than blade; flowering branches crowded at apex of stem.
- 63a. Corolla blue, funnellform 238. *G. riparia*
- 63b. Corolla outside yellow-green and inside pale blue, tubular 239. *G. densiflora*
- 57b. Stem leaf blades oblong, lanceolate, narrowly elliptic, elliptic-ovate, ovate, ovate-orbicular, or orbicular.
- 64a. Corolla 0.6–1 cm.
- 65a. Stamens unequal; stem leaf blades lanceolate 228. *G. exigua*
- 65b. Stamens equal; stem leaf blades elliptic, ovate-lanceolate,

- ovate-elliptic, or ovate.
- 66a. Calyx lobes ovate; corolla lobes 1.5–2 mm; stamens inserted at basal part of corolla tube 173. *G. simulatrix*
- 66b. Calyx lobes linear-lanceolate; corolla lobes 1–1.2 mm; stamens inserted near middle of corolla tube ... 227. *G. franchetiana*
- 64b. Corolla 1–2.5 cm.
- 67a. Stems consistently simple, 1-flowered; leaf blade margin thickened 235. *G. tentyoensis*
- 67b. Stems at least of larger plants generally branched, 2- to several flowered (rarely 1-flowered in *G. zollingeri*); leaf blade margin not thickened.
- 68a. Corolla 2–2.5 cm; seeds winged; margin of leaf blade and calyx lobes not distinctly cartilaginous or membranous 225. *G. taiwanica*
- 68b. Corolla 1–2 cm; seeds wingless; margin of leaf blade and calyx lobes distinctly cartilaginous or membranous.
- 69a. Flowering branches not crowded together; stamens equal 226. *G. zollingeri*
- 69b. Flowering branches crowded together; stamens unequal.
- 70a. Leaf blade and calyx lobe margins irregularly long ciliate, midribs produced into a prominent ciliate wing or crest; stem leaf blades ovate-orbicular 229. *G. cristata*
- 70b. Leaf blade and calyx lobe margins not long ciliate, midribs prominent but not winged; stem leaf blades oblong to lanceolate.
- 71a. Middle to upper stem leaves incurved; basal leaf blades scarcely larger than stem leaves; calyx 1–1.2 mm 159. *G. linoides*
- 71b. Middle to upper stem leaves arcuately spreading; basal leaf blades conspicuously larger than stem leaves; calyx 6–10 mm.
- 72a. Stem leaf blades lanceolate, apex aristate; corolla 1–1.3 cm; plicae margin entire or emarginate 230. *G. taliensis*
- 72b. Stem leaf blades oblong to oblong-lanceolate, apex mucronate; corolla 1.3–2 cm; plicae margin denticulate 231. *G. anisostemon*
- 45b. Plants with stems usually branched only near base, without a distinct main stem, rarely simple in depauperate specimens.
- 73a. Stem leaf blades linear, lanceolate, or spatulate.
- 74a. Anthers straight.
- 75a. Calyx lobes as long as or longer than tube; anthers subglobose 158. *G. asparagoides*
- 75b. Calyx lobes shorter than tube (as long as tube in *G. linoides*); anthers linear to oblong.
- 76a. Margin of leaf blade and calyx lobes broadly membranous; corolla blue-purple with yellow-green base, lobe margin entire; stamens unequal; stem leaves incurved and folded 159. *G. linoides*
- 76b. Margin of leaf blade and calyx lobes narrowly membranous; corolla outside blue-gray and inside white to bluish gray, lobe margin serrate to erose; stamens often equal; stem leaves straight but apex sometimes recurved 162. *G. heleonastes*
- 74b. Anthers curved.
- 77a. Corolla throat with dark spots and stripes.
- 78a. Margin of lower stem leaves cartilaginous and of upper leaves membranous; corolla purple; stamens inserted at basal part of corolla tube 160. *G. syringea*
- 78b. Margin of all stem leaves membranous; corolla blue with yellow-green base; stamens inserted at middle of corolla tube 161. *G. grunii*
- 77b. Corolla throat without dark spots or stripes.

- 79a. Stems papillate toward apex, pedicel papillate; corolla tubular 164. *G. tricolor*
- 79b. Stems and pedicels not papillate; corolla obconic.
- 80a. Lower stem leaf blades ovate to ovate-orbicular; corolla lobes ovate-orbicular 165. *G. choanantha*
- 80b. Lower stem leaf blades linear to linear-lanceolate; corolla lobes ovate-elliptic to ovate.
- 81a. Pedicel 5–20 mm; corolla lobes 3–4 mm; plicae oblong, 1.5–2 mm, margin irregularly laciniate 163. *G. aristata*
- 81b. Pedicel 3–4 mm; corolla lobes 2–2.5 mm; plicae ovate-elliptic, 1–1.2 mm, margin denticulate 166. *G. curvianthera*
- 73b. Stem leaf blades broader than linear, lanceolate, or spatulate.
- 82a. Calyx lobes usually filiform or filiform subulate.
- 83a. Calyx 2–4 mm; corolla 4–7 mm.
- 84a. Stem leaves recurved; calyx 3.5–4 mm; corolla blue; plicae obliquely truncate, margin irregularly crenulate 130. *G. myrioclada*
- 84b. Stem leaves spreading; calyx 2–3.5 mm; corolla white or blue-gray; plicae symmetrical, margin entire, 2-cleft, or few lacinate.
- 85a. Stem leaf blades ovate; corolla 4–6 mm, tube longer than lobes; plicae margin entire; calyx 2–3 mm 131. *G. microphyta*
- 85b. Stem leaf blades elliptic-lanceolate to sometimes ovate-lanceolate; corolla 6–7 mm, tube shorter than lobes; plicae margin 2-cleft to few lacinate; calyx 3–3.5 mm 132. *G. stellulata*
- 83b. Calyx (4–)4.5–9 mm; corolla 8–20 mm.
- 86a. Corolla purple, throat with many short dark lines.
- 87a. Leaf blade margin hirsute; corolla 0.9–1 cm; calyx coarsely papillate 150. *G. baoxingensis*
- 87b. Leaf blade margin almost smooth; corolla 1.7–2 cm; calyx not papillate 151. *G. filisepala*
- 86b. Corolla white to pale yellow or pale blue to pale purple, throat unmarked or with yellow spots.
- 88a. Corolla with yellow spots in throat; plicae almost as long as lobes 152. *G. flavomaculata*
- 88b. Corolla without spots in throat; plicae shorter than lobes.
- 89a. Leaf blade adaxially densely papillate; corolla white, yellowish white, or yellowish green, blue on outside only; plicae margin deeply few dentate 133. *G. epichysantha*
- 89b. Leaf blade adaxially glabrous; corolla pale blue at least in throat; plicae margin entire or 2-cleft.
- 90a. Leaf blade broadly ovate or cordate, base rounded and contracted into a slender petiole; stem branches divaricate 153. *G. vandellioides*
- 90b. Leaf blade lanceolate, narrowly elliptic, or ovate, base attenuate or obtuse, subsessile; stem branches narrowly divergent.
- 91a. Stems purple, densely papillate; basal leaf blades linear-elliptic, 13–17 × 2–3.5 mm; corolla pale purple 154. *G. tatakensis*
- 91b. Stems green, not papillate; basal and stem leaf blades lanceolate, 6–11 × 1–2.5 mm; corolla yellowish white, throat pale blue 155. *G. yiliangensis*
- 82b. Calyx lobes lanceolate or triangular.
- 92a. Plicae very small, auriculate, attached to right side of corolla lobe 184. *G. prainii*
- 92b. Plicae large, oblong, ovate, or triangular, borne between corolla lobes.
- 93a. Calyx lobes and/or corolla lobes caudate.
- 94a. Leaves and calyx lobes glabrous except for minute marginal cilia; leaf blade margin on at least uppermost stem broadly membranous (not or scarcely so in *G. ninglangensis* var. *glabrescens*).
- 95a. Leaf blade margin not membranous; corolla 1.4–1.6 cm 191b. *G. ninglangensis*
- 95b. Leaf blade margin broadly membranous; corolla

- 1.7–2.2 cm 211. *G. chungtienensis*
- 94b. Leaves and usually also calyx papillate or puberulent to hirsute at least on midribs; leaf blade margin not membranous (sometimes narrowly cartilaginous).
- 96a. Leaves and calyx hirsute.
- 97a. All stem leaf blades ovate to ovate-orbicular 189. *G. pubiflora*
- 97b. At least lower stem leaf blades obovate or spatulate.
- 98a. All stem leaf blades obovate or spatulate 190. *G. pubigera*
- 98b. Lower stem leaf blades obovate or spatulate, middle to upper elliptic to linear-lanceolate 191. *G. ninglangensis*
- 96b. Leaves and calyx papillate or puberulent.
- 99a. Corolla lobes caudate with tips 1–1.5 mm; stem leaf blade margins narrowly cartilaginous.
- 100a. Stem leaf blades spatulate to obovate; corolla 0.8–1 cm; stamens equal; stems much branched 187. *G. xanthonnos*
- 100b. Stem leaf blades elliptic to ovate; corolla 1.2–1.4 cm; stamens unequal; stems 1–3-branched 188. *G. parvula*
- 99b. Corolla lobes obtuse to acute, sometimes mucronate but not caudate; stem leaf blade margins broadly membranous.
- 101a. All stem leaf blades ovate or basally sometimes obovate; calyx 6–8 mm 212. *G. subuniflora*
- 101b. Stem leaf blades lanceolate; calyx 13–15 mm 213. *G. radiata*
- 93b. Neither calyx lobes nor corolla lobes caudate.
- 102a. Stamens unequal.
- 103a. Corolla throat with blackish stripes and spots.
- 104a. All stem leaf blades spatulate to obovate; stems usually branched only at base; corolla (1.3–)1.4–2 cm 195. *G. bella*
- 104b. Upper stem leaf blades linear to elliptic; stems 2- or 3-branched; corolla 1–1.5 cm 196. *G. forrestii*
- 103b. Corolla throat without stripes or spots.
- 105a. Stem leaf blade margins cartilaginous; corolla outside yellowish green 197. *G. complexa*
- 105b. Stem leaf blade margins indistinctly membranous; corolla outside blue or purple.
- 106a. Whole plant subglabrous; corolla 1.2–1.6 cm, clear pale blue 198. *G. flexicaulis*
- 106b. Stems densely papillate and margins of leaves and calyx lobes ciliolate; corolla 0.7–1 cm, purple 199. *G. inconspicua*
- 102b. Stamens equal.
- 107a. Basal leaves well developed, involucriform.
- 108a. Lower stem leaf blades spatulate, upper elliptic; calyx lobes 1.2–1.5 mm; plicae triangular, apex 2-cleft 192. *G. licentii*
- 108b. Stem leaf blades oblong or lanceolate; calyx lobes 2.5–3 mm; plicae oblong or ovate, apex obtuse or rounded.
- 109a. Stems much branched; corolla tubular; calyx lobes broadly triangular; plicae ovate, apex obtuse 193. *G. macrauchena*
- 109b. Stems few branched; corolla funnel-form; calyx lobes narrowly triangular; plicae broadly oblong, apex rounded 194. *G. thunbergii*
- 107b. Basal leaves poorly developed, not involucriform.

- 110a. Stem leaf blades spatulate or obovate, widest above middle.
 - 111a. Stem leaf blade apices triangular acute, cartilaginous margin indistinct; corolla purple.
 - 112a. Leaves and calyx glabrous 200. *G. spathulifolia*
 - 112b. Leaves and calyx densely pubescent 201. *G. abaensis*
 - 111b. Stem leaf blade apices rounded, cartilaginous margin distinct; corolla blue.
 - 113a. Calyx \pm 1/2 as long as corolla, obconic, tube without longitudinal white stripes 202. *G. pseudoaquatica*
 - 113b. Calyx slightly shorter than corolla, tubular, tube with 5 longitudinal white stripes 203. *G. burkillii*
- 110b. Stem leaf blades oblong, lanceolate, elliptic, or ovate, widest below middle or with parallel sides.
 - 114a. Margins of at least upper leaves and calyx lobes broadly membranous.
 - 115a. Corolla throat with short dark blue lines; stem leaf blades linear, linear-lanceolate, oblong, or ovate, all with membranous margins; calyx outside and leaves not papillate 209. *G. micantiformis*
 - 115b. Corolla throat with dark blotches or unmarked; stem leaf blades ovate, navicular, or spatulate, lower with cartilaginous margins, upper with membranous margins; calyx outside and leaves abaxially papillate 210. *G. tatsienensis*
 - 114b. Margins of leaves and calyx lobes cartilaginous or narrowly membranous.
 - 116a. Corolla campanulate, with spots in throat.
 - 117a. Corolla with yellow-green spots; plicae deeply 2-cleft 204. *G. aperta*
 - 117b. Corolla with dark blue spots; plicae irregularly lacinate 205. *G. leucomelaena*
 - 116b. Corolla tubular, without spots in throat.
 - 118a. Corolla lobes yellowish white; leaves distinctly ciliolate 206. *G. prattii*
 - 118b. Corolla lobes pale blue or blue-purple; leaves not ciliolate.
 - 119a. Flowers subsessile; calyx lobes ovate, base contracted, margin thick cartilaginous; corolla 7–8 mm 173. *G. simulatrix*
 - 119b. Flowers with pedicels 2–4 mm; calyx lobes triangular, base not contracted, margin narrowly membranous; corolla 9–20 mm.
 - 120a. Corolla blue, staying closed, lobe apices obtuse; plicae ovate; stamens inserted at basal part

- of corolla tube .. 207. *G. aquatica*
 120b. Corolla blue-purple
 with pale yellow-
 green base and blackish
 ring in throat, opening
 normally, lobe apices
 acute; plicae oblong;
 stamens inserted at
 middle of corolla
 tube 208. *G. conduplicata*

XII. Sect. *Fimbricorona*

- 1a. Corolla throat with 5 distinct bundles of hairs; style 4–5 mm, filiform 247. *G. cuneibarba*
 1b. Corolla throat with a sparse ring of hairs; style 1–2 mm, cylindrical 248. *G. faucipilosa*

I. Sect. *Otophora* Kusnezow, Trudy S.-Peterburgsk. Obshch. Estestvoisp., Otd. Bot. 24(2): 102. 1894.

耳褶龙胆组 er zhe long dan zu

Perennials. Taproot cylindrical or fusiform, stout, slightly fleshy. Stem branching monopodially. Corolla usually lobed to middle or below; tube as long as or shorter than lobes (except in *Gentiana doxiangshangensis*); plicae reduced to a small tooth or auricle on side of lobe. Anthers ellipsoid. Seed coat usually minutely reticulate, rarely alveolate with simple shallow hexagonal pits.

Twelve species: Bhutan, China, NE India, Nepal; nine species in China.

1. *Gentiana caryophylla* Harry Smith, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 101. 1926.

石竹叶龙胆 shi zhu ye long dan

Perennials 3–5 cm tall. Taproot cylindrical, 5–10 × ca. 0.5 cm. Stems perennial, many, forming a cushion, prostrate to ascending, slender, simple. Basal rosette leaves absent or very small; leaf blade triangular, less than 5 mm. Stem leaves many, crowded, withering toward stem base; petiole 3–5 mm; leaf blade lanceolate, oblanceolate, or ovate, 3–8 × 1–2.5 mm, base obtuse, margin cartilaginous and scabrous, apex acuminate and awned with a tip to 1 mm, veins 1–3. Flowers terminal, solitary, slender, sessile or on pedicels 2–4 mm. Calyx shallowly cupular, tube 3–4 mm; lobes slightly spreading, lanceolate to oblong, 3–5 mm, unequal, margin cartilaginous and scabrous; apex acuminate and with a tip to 1 mm. Corolla dark blue, tubular to tubular-campanulate, 1.5–1.8 cm; lobes elliptic, 7–8 mm, margin entire, apex obtuse; plicae 0.5–1 mm, auricular. Stamens inserted at basal part of corolla tube; filaments 7–9 mm; anthers 1.5–2 mm. Style 1.5–2 mm; stigma lobes narrowly triangular. Capsules sessile, ellipsoid, 1.2–1.4 cm. Seeds dark brown, fusiform, 0.8–1 mm. Fl. and fr. Aug–Sep.

Alpine meadows; 4000–4300 m. NW Yunnan [NE Myanmar].

2. *Gentiana leucantha* Harry Smith ex T. N. Ho & S. W. Liu, Bull. Nat. Hist. Mus. London (Bot.) 23: 55. 1993.

黄耳褶龙胆 huang er zhe long dan

Perennials 2–5 cm tall. Taproot cylindrical, 5–10 × ca. 0.5 cm. Stems perennial, many, prostrate to ascending, slender, simple. Basal rosette leaves absent or very small; leaf blade triangular, less than 5 mm. Stem leaves many, crowded,

withering toward stem base; petiole 3–5 mm; leaf blade elliptic to ovate, 3.5–4 × 1.8–2.2 mm, base obtuse, margin cartilaginous and scabrous, apex acute and mucronate, vein 1. Flowers terminal, solitary, sessile. Calyx shallowly cupular, tube 5–6 mm; lobes slightly spreading, elliptic to ovate, 3–3.5 mm, unequal, apex acute to obtuse. Corolla white or pale yellow-white, tubular to tubular-campanulate, 1.3–1.5 cm; lobes elliptic-ovate to ovate, 4–5 mm, apex obtuse; plicae triangular, 2–2.5 mm, 2-cleft. Stamens inserted at middle of corolla tube; filaments 6–8 mm; anthers 1.5–2 mm. Style 1–1.5 mm; stigma lobes narrowly triangular. Capsules sessile, narrowly ellipsoid, 1–1.2 cm. Seeds brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jun–Aug.

Grassy and stony slopes, alpine meadows; 4000–4600 m. SE Xizang [NE Bhutan].

3. *Gentiana decorata* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 220. 1912.

美龙胆 mei long dan

Gentiana tsarongensis I. B. Balfour & Forrest.

Perennials 2–5 cm tall. Taproot cylindrical, 5–10 cm × ca. 5 mm. Stems perennial, many, prostrate to ascending, slender, simple. Basal rosette leaves absent or very small; leaf blade triangular, less than 5 mm. Stem leaves many, crowded to widely spaced, withering toward stem base; petiole 3–5 mm; leaf blade spatulate, elliptic, ovate, or obovate, 3–8 × 2–3 mm, base obtuse, margin cartilaginous and smooth, apex acute to obtuse, veins 1–3. Flowers terminal, solitary. Pedicel 2–4 mm, slender. Calyx shallowly cupular, tube 3–4 mm; lobes slightly spreading, elliptic to ovate, 2–5 mm, unequal, margin cartilaginous and smooth, apex acute to obtuse.

Corolla dark blue to blue-purple, tubular to tubular-campanulate, 1.5–1.8(–2) cm; lobes elliptic, 7–11 mm, apex obtuse; plicae triangular, 1–2 mm. Stamens inserted at basal part of corolla tube; filaments 6–8(–10) mm; anthers 1.5–2 mm. Style 1.5–2 mm; stigma lobes linear. Capsules sessile, ellipsoid, 1.4–1.6 cm. Seeds dark brown, ellipsoid to ovoid, 0.6–1 mm. Fl. and fr. Aug–Nov.

Meadows along streams and on slopes; 3200–4600 m. SE Xizang, NW and W Yunnan [NE Myanmar].

4. *Gentiana infelix* C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 111. 1883.

小耳褶龙胆 xiao er zhe long dan

Gentiana microtophora C. Marquand; *G. minuta* N. E. Brown.

Perennials 2–5 cm tall. Taproot cylindrical, 3–5 × 0.2–0.3 cm. Stems perennial, many, prostrate to ascending, slender, simple. Basal rosette leaves absent or very small; leaf blade triangular, less than 5 mm. Stem leaves crowded, withering toward stem base; petiole 3–5 mm; leaf blade elliptic to ovate, 1.5–3 × 1.2–1.5 mm, papillate, base obtuse, margin cartilaginous and scabrous, apex acute to obtuse, vein 1. Flowers terminal, solitary. Pedicel 2–3 mm, slender. Calyx shallowly cupular, tube 2–2.5 mm; lobes slightly spreading, ovate, 1.8–2.2 mm, unequal, margin cartilaginous and scabrous, apex acute to obtuse. Corolla dark blue, tubular, (4–)7–10 mm; lobes ovate-elliptic, 3–3.5 mm, apex obtuse; plicae auricular, 0.3–0.5 mm. Stamens inserted at middle of corolla tube; filaments 2.7–3 mm; anthers 0.8–1 mm. Style 0.5–1 mm; stigma lobes narrowly triangular. Capsules sessile, ellipsoid, 8–10 mm. Seeds dark brown, nearly globose, 1.1–1.3 mm. Fl. and fr. Aug–Oct.

Alpine meadows; 4100–4500 m. S and SE Xizang, W Yunnan [Bhutan, NE Myanmar, Nepal, Sikkim].

5. *Gentiana doxiongshangensis* T. N. Ho, Bull. Bot. Res., Harbin 4(1): 73. 1984.

多雄山龙胆 duo xiong shan long dan

Perennials 5–10 cm tall. Taproot cylindrical, long, usually 3–5 mm in diam. Vegetative stems sometimes prolonged and few branched; branches prostrate, stout, with dense brown membranous remnants of old petioles, each with an apical rosette; flowering stems annual, ascending, simple. Basal leaves in 2–5 usually lax rosettes; petiole 5–7 mm, membranous; leaf blade narrowly elliptic, 1–2.5 cm × 2.5–4.5 mm, base narrowed, margin scabrous, apex obtuse, vein 1. Stem leaves 3–5 pairs, very widely spaced; petiole 3–5 mm; leaf blade elliptic to ovate-elliptic, 7–11 × 3–4.5 mm, base narrowed, apex obtuse, vein 1. Flowers terminal, solitary. Pedicel (0.5–)1–2 cm. Calyx cupular, tube 6–7 mm; lobes linear-lanceolate, 2–2.5 mm, equal, apex acute, vein 1. Corolla dark blue, unspotted, tubular to tubular-campanulate, 1.7–2.2 cm; lobes ovate, 4–4.5 mm, margin entire, apex obtuse; plicae auricular, 0.5–1 mm, apex acute. Stamens inserted at basal part of corolla tube; filaments 0.9–1.1 cm; anthers 1.2–1.5 mm. Style absent; stigma lobes linear.

Capsules narrowly ellipsoid, 1.3–1.5 cm; gynophore 6–7 mm. Seeds brown, ellipsoid, 0.8–1 mm; seed coat alveolate. Fl. and fr. Aug–Oct.

Alpine meadows; 3900–4300 m. S and SE Xizang [Bhutan, NE India].

6. *Gentiana damyonensis* C. Marquand, Bull. Misc. Inform. Kew 1928: 51. 1928.

深裂龙胆 shen lie long dan

Perennials 5–10 cm tall, sometimes forming mats. Taproot cylindrical, long, usually 3–5 mm in diam. Vegetative stems sometimes prolonged; branches prostrate, stout, with dense brown membranous remnants of old petioles, each with an apical rosette; flowering stems annual, ascending, simple. Basal leaves in 3–6 or more rosettes, crowded in a cushion; petiole 2–3 cm, membranous; leaf blade usually linear-lanceolate, rarely linear or oblanceolate, 2–3.5 cm × 2–4 mm, base narrowed, apex acuminate to obtuse, veins 3. Stem leaves 3–5 pairs, widely spaced; petiole 3–5 mm; leaf blade linear-lanceolate to ovate-lanceolate, 8–11 × 2–3 mm, base narrowed, apex obtuse, vein 1. Flowers terminal, solitary, sessile or pedicel to 5 mm. Calyx cupular, tube 3.5–4.5 mm; lobes linear-lanceolate, 1–3 mm, unequal, apex obtuse. Corolla white or pale yellow, with pale blue spots, tubular to tubular-campanulate, 1.6–2 cm; lobes elliptic, 1.3–1.7 cm, margin entire, apex obtuse; plicae triangular, 1–1.5 mm, apex acute. Stamens inserted at basal part of corolla tube; filaments 1–1.4 cm; anthers 1.5–2 mm. Ovary narrowly ellipsoid, ca. 1 cm. Style absent; stigma lobes linear. Fl. and fr. Aug–Oct.

Alpine meadows, bamboo thickets, alpine scree; 3300–4200 m. SW Sichuan, SE Xizang, NW Yunnan [NE Myanmar].

7. *Gentiana otophora* Franchet in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 130. 1890.

耳褶龙胆 er zhe long dan

Perennials 5–15 cm tall. Taproot cylindrical, long, 5–8 mm in diam. Vegetative stems sometimes prolonged, few branched; branches prostrate, to 1 cm in diam., with dense blackish membranous remnants of old petioles, each with an apical rosette; flowering stems tinged purple, annual, simple, ascending to erect. Basal leaves in 3–6 or more rosettes, usually crowded; petiole 1–5 cm, membranous; leaf blade oblong-spatulate, oblong, narrowly elliptic, or spatulate-obovate, 5–12 × 1–2.5 cm, base narrowed, apex rounded, veins 3–5. Stem leaves 2–5 pairs, widely spaced; petiole 5–10 mm; leaf blade ovate-elliptic, 1–3 × 0.8–1.5 cm, both ends obtuse, veins 3. Cymes axillary or terminal, few to many flowered, occasionally flowers solitary. Pedicel 0.5–3 cm, slender. Calyx cupular, 4–6.5 mm; lobes lanceolate, oblong, or ovate, 1.5–5 mm, unequal, apex obtuse, vein 1. Corolla yellow, with pale blue streaks and spots, tubular to tubular-campanulate, (1.8–)2–2.5 cm; lobes ovate-elliptic, 1.3–1.5

cm, margin entire, apex obtuse; plicae triangular, 2–3 mm, apex acute. Stamens inserted at middle of corolla tube; filaments 7–9 mm, unequal; anthers 1.5–2 mm. Style absent; stigma lobes linear. Capsules sessile, ellipsoid, 1.3–1.6 cm. Seeds light brown, fusiform, 1.8–2 mm.

Grassland on slopes or in valleys, *Rhododendron* scrub; 2800–4200 m. SE Xizang, NW Yunnan [NE Myanmar].

Gentiana otophora var. *otophora* is endemic to China. *Gentiana otophora* var. *ovatisejala* C. Marquand occurs in NE Myanmar and differs from var. *otophora* by the smaller corolla.

8. *Gentiana otophoroides* Harry Smith, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 101. 1926.

类耳褶龙胆 lei er zhe long dan

Perennials 5–10 cm tall. Taproot cylindric, long, 5–8 mm in diam. Vegetative stems sometimes prolonged, few branched; branches usually short, to 8 mm in diam., with dense blackish membranous remnants of old petioles, each with an apical rosette; flowering stems annual, ascending, slender, simple. Basal leaves in 1–3 rosettes, usually crowded; petiole 0.5–2 cm, membranous; leaf blade linear-lanceolate, oblong-spatulate, oblanceolate, or narrowly elliptic, 1.5–3 cm × 2–12 mm, base narrowed, apex rounded, veins 3. Stem leaves 2 or 3 pairs, widely spaced; petiole 3–5 mm; leaf blade ovate-lanceolate to ovate-elliptic, 1–1.8 cm × 4–8 mm, base broadly cuneate to subrounded, apex acuminate to obtuse, veins 3. Flowers terminal, solitary. Pedicel 2–11 mm, slender. Calyx cupular, tube 4–5 mm; lobes linear-lanceolate, 4–7 mm, subequal, apex obtuse, vein 1. Corolla white or yellow, with pale blue streaks, tubular, 2.5–3 cm; lobes ovate-elliptic, 1.2–1.5 cm, margin entire, apex obtuse; plicae auricular, 2–3 mm, apex acute. Stamens inserted at middle of corolla tube; filaments 8–10 mm; anthers 2–2.5 mm. Style 3–4 mm; stigma lobes linear. Capsules ellipsoid, ca. 1.2 cm. Seeds light

II. Sect. *Cruciata* Gaudin, Fl. Helv. 2: 269. 1828.

秦艽组 qin jiao zu

Perennials. Roots fleshy, usually several contiguous and twisted into a cylindric stout structure. Stems branching monopodially; caudex covered with conspicuously fibrous remains of leaf bases. Basal leaves large, forming a well-developed rosette. Seed coat minutely reticulate (thick reticulate in *Gentiana olivieri*).

Twenty-one species: Asia, Europe; 19 species in China.

10. *Gentiana decumbens* Linnaeus f., Suppl. Pl. 174. 1781.

斜升秦艽 xie sheng qin jiao

Gentiana adscendens Pallas; *G. gebleri* Ledebour ex Bunge.

Perennials 15–45 cm tall. Roots to 1.5 cm in diam. Stems ascending, stout, glabrous, simple. Basal leaves petiole 1–3 cm, membranous; leaf blade linear-lanceolate to linear-elliptic, 3.5–16 × 0.4–1.8 cm, base narrowed, margin scabrous, apex acuminate, veins 1–3. Stem leaves 2 or 3 pairs, smaller and with shorter petioles toward apex; petiole 1–1.5 cm; leaf blade linear to lanceolate, 1.7–5 cm × 3–6 mm, base obtuse, margin scabrous, apex acuminate, veins 1–3. Cymes axillary or terminal, forming a narrow panicle, axillary cymes

brown, fusiform, ca. 1.5 mm. Fl. and fr. Aug-Sep.

• Meadows on rocky slopes; 3200–4100 m. SE Xizang, NW Yunnan.

9. *Gentiana sichitoensis* C. Marquand, Bull. Misc. Inform. Kew 1928: 56. 1928.

短管龙胆 duan guan long dan

Perennials 5–15 cm tall. Taproot cylindric, long, 5–8 mm in diam. Vegetative stems sometimes prolonged, few branched; branches short, to 1 cm in diam., with dense blackish membranous remnants of old petioles, each with an apical rosette; flowering stems annual, ascending to erect, simple. Basal leaves in 2–5 rosettes, crowded; petiole 1–3 cm, membranous; leaf blade spatulate to oblong-spatulate, 1–5 × 0.7–1.2 cm, base narrowed, apex rounded, veins 3. Stem leaves 2–4 pairs, widely spaced; petiole 2–5 mm; leaf blade ovate to suborbicular, 8–10 × 6–8 mm, base obtuse to rounded, apex rounded, veins 3. Flowers terminal, solitary, rarely in cymes. Pedicel 1–1.5 cm, slender. Calyx cupular, 4–5 mm; lobes lanceolate, elliptic, ovate, or orbicular, 1–2(–3) mm, unequal, base sometimes narrowed, apex rounded, vein 1. Corolla yellow, with pale blue streaks and spots, tubular-campanulate, 1.8–2 cm; lobes ovate-elliptic, 1.2–1.5 cm, margin entire, apex obtuse; plicae lanceolate, 1–1.5 mm, apex acute. Stamens inserted at middle of corolla tube; filaments 7–9 mm, equal; anthers 1.5–2 mm. Style absent; stigma lobes triangular. Capsules ellipsoid, 1.4–1.6 cm; gynophore to 4 mm. Seeds light brown, fusiform, 1.5–2 mm. Fl. and fr. Sep-Nov.

Meadow and rocky slopes, bamboo thickets; 3300–4200 m. SE Xizang, NW Yunnan [NE Myanmar].

sometimes on pedunclelike branches; peduncle to 5 cm. Pedicel to 1 cm. Calyx tube spatulate, 1–1.5 cm, split on 1 side to near base, membranous; lobes 1–5, subulate, 0.5–1 mm. Corolla dark blue, tubular-campanulate, 3–3.5 cm; lobes ovate-orbicular, 4–5 mm, margin entire, apex rounded; plicae ovate-triangular to truncate, 1–1.5 mm, oblique, margin entire. Stamens inserted just below middle of corolla tube; filaments 1–1.3 cm; anthers narrowly ellipsoid, 2–3 mm. Style 1.5–2 mm; stigma lobes linear. Capsules ovoid-ellipsoid to ovoid, 2–2.5 cm; gynophore to 2.2 cm. Seeds brown, ovoid-ellipsoid, 1.2–1.5 mm. Fl. and fr. Aug.

Along streams, grassland slopes, clearings in forests, dry steppes; 1200–2700 m. NE Nei Mongol, NW Xinjiang [Kazakhstan, E Mongolia, Russia; NE Europe].

11. *Gentiana straminea* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg, 27: 502. 1881.

麻花苳 ma hua jiao

Perennials 10–35 cm tall. Roots to 20 × 1.5 cm. Stems ascending, stout, simple, glabrous. Basal leaves petiole 2–4 cm, membranous; leaf blade broadly lanceolate to ovate-elliptic, 6–20 × 0.8–4 cm, base narrowed, margin scabrous, apex acuminate, veins 3–5. Stem leaves 3–5 pairs, distinctly smaller and with shorter petioles toward apex; petiole 0.5–2.5 cm; leaf blade linear to linear-lanceolate, 2.5–8 cm × 5–10 mm, base obtuse, margin scabrous, apex acuminate, veins 1–3. Cymes axillary or terminal, forming a narrow panicle, axillary cymes sometimes on pedunclelike branches; peduncle to 9 cm. Pedicel to 4 cm. Calyx tube purple, spathe-like, 1.5–2.8 cm, split on 1 side to near base, membranous; lobes 2–5, subulate, 0.5–1 mm. Corolla greenish white to pale yellow-green, occasionally suffused with pale blue, outside sometimes tinged brown, with green spots in throat, funnelform, (3–)3.5–4.5 cm; lobes ovate-elliptic to ovate, 5–6 mm, margin entire, apex obtuse; plicae triangular, 2–3 mm, oblique, margin entire or denticulate, apex obtuse. Stamens inserted just below middle of corolla tube; filaments 1.1–1.5 cm; anthers narrowly ellipsoid, 2–3 mm. Style 3–5 mm; stigma lobes oblong. Capsules ovoid-ellipsoid, 2.5–3 cm; gynophore 7–12 mm. Seeds light brown, narrowly ellipsoid to ellipsoid, 1.1–1.3 mm. Fl. and fr. Jul–Nov.

Along streams, valleys, rocky slopes, alpine meadows, scrub, forests, clearings in forests; 2000–5000 m. Gansu, Hubei, Ningxia, Qinghai, Xizang [Nepal].

12. *Gentiana waltonii* Burkill, J. Proc. Asiat. Soc. Bengal 2: 310. 1906.

长梗秦苳 chang geng qin jiao

Gentiana lhasaensis Hsiao & K. C. Hsia.

Perennials 10–30 cm tall. Roots to 1.5 cm in diam. Stems ascending to erect, stout, simple, glabrous. Basal leaves petiole 0.5–3 cm, membranous; leaf blade linear-elliptic to elliptic-lanceolate, 3–16 × 0.8–2.3 cm, thick herbaceous, base narrowed, margin scabrous, apex acuminate, veins 3–5. Stem leaves 3–5 pairs; petiole to 1.5 cm, shorter toward apex; leaf blade lanceolate to ovate-elliptic, 1–6 × 0.6–1.5 cm, base obtuse, margin scabrous, apex acuminate, veins 1–3. Cymes axillary or terminal, usually forming a thyrse, axillary cymes rarely on pedunclelike branches; peduncle purple, to 2 cm. Pedicel purple, to 7 cm. Calyx tube purple, spathe-like, 1.5–2.5 cm, split on 1 side; lobes lanceolate to narrowly elliptic, 5–8 mm, unequal, margin scabrous, apex acute to obtuse, veins distinct. Corolla white or blue, funnelform, 4–4.5 cm; lobes ovate-elliptic to ovate, 0.9–1.1 cm, margin entire, apex obtuse; plicae triangular, 4–6 mm, oblique, margin denticulate, apex acute. Stamens inserted just below middle of corolla tube; filaments 1.2–1.5 cm; anthers ellipsoid, 3.5–4 mm. Style 3–4 mm; stigma lobes narrowly triangular. Capsules narrowly ellipsoid, 1.5–1.8 cm; gynophore 1–1.5 cm. Seeds light brown, ellipsoid, 1.2–1.5 mm, winged at 1 end. Fl. and fr. Aug–Oct.

• Meadow slopes, rocky pastures, forests; 3000–4800 m. S and

SE Xizang.

13. *Gentiana lhasica* Burkill, J. Proc. Asiat. Soc. Bengal 2: 311. 1906.

全萼秦苳 quan e qin jiao

Perennials 7–10 cm tall. Roots to 15 cm. Stems ascending, slender, simple, glabrous. Basal leaves petiole 0.5–2 cm, membranous; leaf blade linear-lanceolate to linear-elliptic, 4–10 cm × 5–8 mm, base narrowed, margin scabrous, apex acuminate, veins 1–3. Stem leaves 2 or 3 pairs; petiole 5–10 mm; leaf blade elliptic-lanceolate to elliptic, 1.5–3 cm × 4–6 mm, both ends obtuse, margin scabrous, midvein distinct. Flowers solitary, rarely in cymes. Pedicel purple, to 2.5 cm. Calyx tube narrowly obconic, 8–10 mm, membranous, margin entire; lobes 5, narrowly elliptic, subequal, 6–9 mm, herbaceous, base narrowed, margin scabrous, apex obtuse, midvein distinct. Corolla inside pale blue to blue, outside dark brown, tubular to funnelform, 2.4–2.8 cm; lobes ovate-orbicular, 4–5.5 mm, margin entire, apex rounded; plicae narrowly triangular, 2–2.5 mm, margin denticulate, apex acute. Stamens inserted just below middle of corolla tube; filaments 5–8 mm; anthers narrowly ellipsoid, 2–2.5 mm. Style 1–2 mm; stigma lobes oblong. Capsules sessile, ovoid-ellipsoid, 1.2–1.5 cm. Seeds brown, ellipsoid, 1.4–1.6 mm. Fl. and fr. Aug–Sep.

• Alpine meadows; 4200–4900 m. SW Qinghai, E Xizang.

14. *Gentiana tenuicaulis* Ling, Contr. Inst. Bot. Natl. Acad. Peiping 3: 380. 1935.

纤茎秦苳 xian jing qin jiao

Perennials 10–15 cm tall. Stems ascending, stout, simple, densely papillate. Basal leaves petiole 1–2 cm, membranous; leaf blade linear-elliptic to narrowly elliptic, 5–8 × 0.6–1.5 cm, densely papillate, base narrowed, margin ciliolate, apex acuminate to obtuse, veins 1–3. Stem leaves 3 or 4 pairs; petiole to 8 mm; leaf blade oblong to ovate-lanceolate, 1–7 cm × 3–7 mm, base obtuse, margin ciliolate, apex obtuse to rounded, veins 1–3. Cymes axillary or terminal, forming a lax panicle; axillary cymes sometimes on pedunclelike branches; peduncle purple, densely papillate, to 2 cm. Pedicel 5–10 mm. Calyx tube 8–9 mm, membranous, entire; lobes 5, oblanceolate, 7.5–9.5 mm, base narrowed and oblique, margin ciliolate, apex obtuse. Corolla pale blue, with pale yellow base, tubular to narrowly funnelform, 3–3.7 cm; lobes ovate-triangular, 8–9 mm, margin entire, apex acute; plicae ovate, 2.5–3 mm, margin denticulate, apex obtuse. Stamens inserted at basal part of corolla tube; filaments 0.9–1.1 cm; anthers narrowly ellipsoid, 2–3.5 mm. Style 4–5 mm; stigma lobes oblong. Capsules ovoid-ellipsoid, 1.5–1.8 cm; gynophore 4–5 mm. Seeds brown, narrowly ellipsoid, 1.8–2 mm. Fl. and fr. Jul–Aug.

• Limestone slopes; 700–1800 m. Hebei.

15. *Gentiana olivieri* Grisebach, Gen. Sp. Gent. 278. 1838.

楔湾缺秦苳 xie wan que qin jiao

Gentiana regeliana Gandoger; *G. weschniakowii* Regel.

Perennials 10–30(–40) cm tall. Stems erect, slender, simple, glabrous. Basal leaves petiole 1–3.5(–10) cm, membranous; leaf blade linear-elliptic to elliptic-lanceolate, rarely oblanceolate, 2–10 cm × 4–8(–10) mm, base narrowed, margin scabrous, apex acuminate to obtuse, veins distinct. Stem leaves 2 or 3 pairs; petiole 3–5 mm; leaf blade linear to linear-lanceolate, 1.5–3 cm × 3–6(–10) mm, base obtuse, margin scabrous, apex acuminate, midvein distinct. Inflorescences terminal corymbose cymes of 3–5 flowers. Pedicel to 3(–5) cm, slender. Calyx tube obconic, 4–8 mm, entire; lobes triangular, unequal, 5–7 mm, apex acute, sinus between lobes cuneate-acute. Corolla blue, obconic, (1.8–)2–2.5(–3) cm; lobes oblong, 5–6 mm, margin entire, apex obtuse; plicae triangular, 3.5–4.5 mm, 2-cleft. Stamens inserted just below middle of corolla tube; filaments 6–8 mm; anthers linear, 2.5–3 mm. Style 4–5 mm; stigma lobes oblong. Capsules ellipsoid. Seeds brown, ellipsoid, 0.8–1 mm; seed coat thick reticulate. Fl. and fr. Aug–Oct.

Limestone slopes, marly steppes, wet grasslands; 600–2300 m. Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan; SW Asia].

16. *Gentiana kaufmanniana* Regel & Schmalhausen, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 331. 1879.

中亚秦艽 zhong ya qin jiao

Perennials 10–25(–40) cm tall. Roots ± fleshy, sometimes several contiguous and twisted into a stout structure to 15 cm. Stems ascending, stout, simple, glabrous. Basal leaves petiole 1–2 cm, membranous; leaf blade linear, elliptic-lanceolate, or narrowly elliptic, 3–8 × 0.5–1.8 cm, base narrowed, margin smooth, apex acuminate to obtuse, veins 3–5. Stem leaves 2 or 3 pairs; petiole 5–12 mm, shortened toward apex; leaf blade linear-lanceolate to narrowly elliptic, 3–5.2 × 0.7–1.2 cm, base obtuse, margin smooth, apex acuminate, veins 1–3. Inflorescences terminal, 1-flowered or cymes, rarely terminal and subapical axillary cymes on pedunclelike branches to 6 cm. Pedicel to 1.8 cm, very unequal. Calyx tube narrowly obconic, 1–1.4 cm, membranous, entire; lobes linear, linear-lanceolate to linear-oblong, 0.6–2.1 cm, very unequal, as long as or longer than tube, midvein decurrent into angles of tube. Corolla blue-purple to dark blue, tubular-campanulate, 4–5 cm; lobes ovate, 6–9 mm, margin entire, apex obtuse; plicae auriculate, 2–3 mm, oblique, margin crenulate, apex obtuse. Stamens inserted at middle of corolla tube; filaments 0.9–1.1 cm; anthers narrowly ellipsoid, 3–4.5 mm. Style 1.5–2 mm; stigma lobes linear. Capsules narrowly ellipsoid to ovoid-ellipsoid, 1.3–2 cm; gynophore 7–11 mm. Seeds light brown, ellipsoid, 1.4–1.6 mm, narrowly winged on 1 side. Fl. and fr. Jul–Sep.

Grasslands, wet meadows, valleys; 1800–3500 m. N Xinjiang [Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan].

Gentiana kaufmanniana var. *affghanica* (Kusnezow) Schiman-Czeika occurs in Afghanistan and Pakistan and differs from var. *kaufmanniana* in having the flowers in a thyrse and the calyx lobes shorter than the tube.

17. *Gentiana dahurica* Fischer, Mem. Soc. Imp. Naturalistes

Moscou 3: 63. 1812.

达乌里秦艽 da wu li qin jiao

Perennials 10–25 cm tall. Roots to 20 × 1.5 cm. Stems ascending, stout, simple, glabrous. Basal leaves petiole 2–4 cm, membranous; leaf blade linear-elliptic to elliptic-lanceolate, 5–15 × 0.8–1.4 cm, base narrowed, margin scabrous, apex acuminate, veins 3–5. Stem leaves 3–5 pairs; petiole 5–10 mm, shortened toward apex; leaf blade linear to linear-lanceolate, 2–5 cm × 2–4 mm, base obtuse, margin scabrous, apex acuminate, veins 1–3. Cymes few to many flowered. Pedicel to 3 cm. Calyx tube 7–10 mm, membranous, entire or rarely slightly split on 1 side; lobes 1–5, linear to subulate, 3–8 mm, unequal. Corolla dark blue-purple, with yellow spots in throat, funnellform or campanulate, 2.5–4.5 cm; lobes ovate-elliptic to ovate, 4–7 mm, margin entire, apex obtuse; plicae ovate to triangular, 1.5–2 mm, margin entire or erose, apex obtuse. Stamens inserted at or just below middle of corolla tube; filaments (0.8–)1–1.2 cm; anthers narrowly ellipsoid, 2–3 mm. Style 2–4 mm; stigma lobes oblong. Capsules sessile, narrowly ellipsoid, 2.3–3 cm. Seeds light brown, ellipsoid, 1.2–1.5 mm. Fl. and fr. Jul–Sep.

800–4500 m. Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, N and NW Sichuan [Mongolia, Russia (E Siberia)].

1a. Corolla funnellform, 3.5–4.5 cm 17a. var. *dahurica*
1b. Corolla campanulate, 2.5–3 cm

..... 17b. var. *campanulata*

17a. *Gentiana dahurica* var. *dahurica*

达乌里秦艽 (原变种) da wu li qin jiao (yuan bian zhong)

Gentiana biflora Regel ex Kusnezow; *G. gracilipes* Turill; *G. kurroo* Royle var. *brevidens* Maximowicz ex Kusnezow; *G. pseudodecumbens* Harry Smith; *G. tianschanica* Ruprecht var. *koslowii* Kusnezow.

Cymes axillary or terminal, many flowered, forming a lax narrow raceme or panicle, axillary cymes sometimes on pedunclelike branches; peduncle to 5.5 cm. Corolla funnellform, 3.5–4.5 cm.

Roadsides, stream banks, sandy places around lakes, sunny slopes, dry steppes, edges of cultivated land; 800–4500 m. Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, N and NW Sichuan [Mongolia, Russia (E Siberia)].

17b. *Gentiana dahurica* var. *campanulata* T. N. Ho, Bull. Bot. Res., Harbin 4(1): 75. 1984.

钟花达乌里秦艽 zhong hua da wu li qin jiao

Inflorescences 1–3-flowered cymes. Corolla campanulate, 2.5–3 cm.

• Alpine meadows, scrub; 4200–4400 m. Qinghai, NW Sichuan.

18. *Gentiana tianschanica* Ruprecht, Mém. Acad. Imp. Sci. Saint Pétersbourg, sér. 7, 14(4): 61. 1869.

天山秦艽 tian shan qin jiao

Gentiana glomerata Kusnezow; *G. regelii* Maximowicz ex Kusnezow; *G. regelii* Kusnezow var. *glomerata* Kusnezow; *G. tianschanica* var. *glomerata* Kusnezow; *G. tianschanica* var. *intermedia* Kusnezow; *G. tianschanica* var. *pumila* Kusnezow.

Perennials 15–25 cm tall. Roots to 1.5 cm in diam. Stems ascending, simple, glabrous. Basal leaves petiole 2–5 cm, membranous; leaf blade linear-elliptic to elliptic-lanceolate, 8–16 × 0.8–1.8 cm, base narrowed, margin smooth or scabrous, apex acuminate, veins 3–5. Stem leaves 3–5 pairs; petiole 0.5–2.5 cm, shortened toward apex; leaf blade linear to linear-lanceolate, 3.2–7 cm × 5–9 mm, base obtuse, margin smooth or scabrous, apex acuminate, veins 1–3. Cymes axillary or terminal, forming a narrow panicle, axillary cymes sometimes on pedunclelike branches; peduncle purple, to 4 cm. Flowers sessile, rarely with pedicel to 1 cm. Calyx tube 7–9 mm, membranous, sometimes split on 1 side; lobes linear to linear-subulate, 7–10 mm, unequal. Corolla pale blue or yellow, funnellform, 2–3(–3.5) cm; lobes ovate-elliptic to ovate, 4–6 mm, margin entire, apex obtuse; plicae narrowly triangular, 2–2.5 mm, 2-cleft. Stamens inserted at middle of corolla tube; filaments 0.9–1.2 cm; anthers narrowly ellipsoid, 2–3 mm. Style 2–2.5 mm; stigma lobes narrowly ellipsoid. Capsules narrowly ellipsoid, 1.2–1.5 cm; gynophore 7–10 mm. Seeds light brown, ellipsoid, 1.2–1.5 mm. Fl. and fr. Aug–Sep.

Along streams, grassland slopes, forests; 1200–3900 m. N Xinjiang, W Xizang [NW India, Kazakhstan, Kyrgyzstan, Nepal, Pakistan].

19. *Gentiana crassicaulis* Duthie ex Burkill, J. Proc. Asiat. Soc. Bengal 2: 311. 1906.

粗茎秦艽 cu jing qin jiao

Perennials 25–40 cm tall. Roots to 30 × 2 cm. Stems ascending, stout, simple, glabrous. Basal leaves petiole 5–8 cm, membranous; leaf blade narrowly elliptic to ovate-elliptic, 12–20 × 4–6.5 cm, base narrowed, margin scabrous, apex acute, veins 5–7. Stem leaves 3–5 pairs, distinctly larger toward apex, sessile, spreading, and surrounding flower cluster; petiole to 3 cm, membranous, completely connate; leaf blade ovate-elliptic to ovate-triangular, 6–16 × 3–4.5(–7) cm, base obtuse to truncate, margin scabrous, apex acute to obtuse, veins 3–5. Inflorescences crowded, many-flowered terminal clusters, rarely also few-flowered axillary whorls. Flowers sessile. Calyx tube spathe-like, 4–6 mm, membranous, split on 1 side, apex truncate; lobes 1–5, dentiform, 0.5–1 mm. Corolla blue-purple, base pale yellow base or sometimes white or dark green, urceolate, 2–2.2 cm; lobes ovate-triangular, 2.5–3.5 mm, margin entire, apex acute; plicae triangular, 1–1.5 mm, oblique, margin denticulate, apex acute. Stamens inserted at middle of corolla tube; filaments 6–8 mm; anthers narrowly ellipsoid, 1.5–2.5 mm. Style 2–2.5 mm; stigma lobes oblong. Capsules sessile, ovoid-ellipsoid, 1.8–2 cm. Seeds light brown, ellipsoid, 1.2–1.5 mm. Fl. and fr. Jun–Nov.

• Wastelands, grasslands, roadside slopes, alpine meadows, scrub, forest margins, forests; 2100–4500 m. NW Guizhou, W

Sichuan, SE Xizang, NW Yunnan.

Gentiana crassicaulis is similar to the Himalayan *G. tibetica*, with which it has been confused in past literature. The former differs by having smaller urceolate corollas.

20. *Gentiana tibetica* King ex J. D. Hooker, Hooker's Icon. Pl. 15: 33. 1883.

西藏秦艽 xi zang qin jiao

Gentiana brevidens Regel.

Perennials 40–50 cm tall. Roots to 30 × 2 cm. Stems erect, stout, simple, glabrous. Basal leaves petiole 5–7 cm, membranous; leaf blade narrowly elliptic to ovate-elliptic, 9–16 × 4–5.5 cm, base narrowed, margin scabrous, apex acuminate to acute, veins 3–5; upper leaves distinctly larger, sessile, spreading, and surrounding flower cluster. Inflorescences crowded into terminal clusters, many flowered, rarely also in few-flowered axillary whorls. Flowers sessile. Calyx tube spathe-like, 6–8 mm, membranous, split on 1 side, apex truncate; lobes 5, dentiform, 0.3–0.5 mm. Corolla inside pale yellow to yellow-green; limb outside tinged dark brown, broadly tubular, (2.6–)3–3.2 cm; lobes ovate-triangular, 4–5 mm, margin entire, apex acute; plicae triangular, 0.5–1.5 mm, oblique, margin denticulate, apex acute. Stamens inserted at middle of corolla tube; filaments 7–9 mm; anthers narrowly ellipsoid, 1.5–2 mm. Style 2.5–3 mm; stigma lobes oblong. Capsules sessile, ellipsoid to ovoid-ellipsoid, 1.8–2.2 cm. Seeds light brown, ellipsoid, 1.3–1.5 mm. Fl. and fr. Jun–Aug.

Edges of cultivated land, roadsides, forest margins; 2100–4200 m. S and SE Xizang [Bhutan, Nepal, Sikkim].

21. *Gentiana macrophylla* Pallas, Fl. Ross. 1(2): 108. 1789.

秦艽 qin jiao

Perennials 30–60 cm tall. Roots to 30 × 2 cm. Stems ascending to erect, stout, simple, glabrous. Basal leaves petiole 3–5 cm, membranous; leaf blade elliptic-lanceolate to elliptic-ovate, 6–28 × 2.5–6 cm, base narrowed, margin scabrous, apex acuminate, veins 5–7. Stem leaves 3–5 pairs; petiole to 4 cm, membranous; leaf blade elliptic-lanceolate to narrowly elliptic, 4.5–15 × 1.2–3.5 cm, base obtuse, margin scabrous, apex acuminate, veins 3–5. Inflorescences crowded into terminal clusters, many flowered, sometimes also in few-flowered axillary whorls; axillary whorls sessile, rarely on pedunclelike branches. Flowers sessile. Calyx tube spathe-like, membranous, split on 1 side; lobes 4 or 5, dentiform, 0.5–1 mm. Corolla blue-purple, with pale yellow base, tubular or urceolate; lobes ovate, 3–4.5 mm, margin entire, apex obtuse to subrounded; plicae triangular, 1–1.5 mm, margin entire, apex acute. Stamens inserted just below middle of corolla tube; filaments 5–7 mm; anthers narrowly ellipsoid, 2–2.5 mm. Style 1.5–2 mm; stigma lobes oblong. Capsules ovoid-ellipsoid, 1.5–1.7 cm; gynophore short. Seeds light brown, ellipsoid, 1.2–1.5 mm. Fl. and fr. Jul–Oct.

400–3700 m. Hebei, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi [Kazakhstan, N Mongolia, Russia (Siberia)].

- 1a. Calyx ca. 1/3 as long as corolla;
corolla urceolate 21a. var. *macrophylla*
1b. Calyx ca. 1/2 as long as corolla;
corolla tubular 21b. var. *fetissowii*

21a. *Gentiana macrophylla* var. *macrophylla*

秦艽 (原变种) qin jiao (yuan bian zhong)

Gentiana jakutensis Bunge ex Grisebach; *G. quinquenervia* Turill.

Calyx ca. 1/3 as long as corolla. Corolla urceolate, 1.8–2 cm, lobes 3–4 mm.

Stream and river banks, roadsides, grassland slopes, wet meadows, forest margins, forests; 400–2400 m. Hebei, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi [N Mongolia, Russia (Siberia)].

21b. *Gentiana macrophylla* var. *fetissowii* (Regel & Winkler) Ma & K. C. Hsia, Acta Sci. Nat. Univ. Intramongol. 6(1): 43. 1964.

大花秦艽 da hua qin jiao

Gentiana fetissowii Regel & Winkler, Trudy Imp. S.-Peterburgsk. Bot. Sada 7: 548. 1881; *G. wutaiensis* C. Marquand.

Calyx ca. 1/2 as long as corolla. Corolla tubular, 2–2.5 (–2.8) cm, lobes 3.5–4.5 mm. Fl. and fr. Jul-Oct.

River banks, roadsides, grassland slopes; 600–3700 m. Hebei, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi [Kazakhstan].

22. *Gentiana siphonantha* Maximowicz ex Kusnezow, Bull. Acad. Imp. Sci. Saint-Petersbourg 34: 506. 1891.

管花秦艽 guan hua qin jiao

Gentiana siphonantha var. *latifolia* C. Marquand.

Perennials 10–25 cm tall. Roots to 25 × 1.5 cm. Stems ascending to erect, slender, simple, glabrous. Basal leaves petiole 3–6 cm, membranous; leaf blade linear, rarely broadly linear, 4–14 × 0.8–1(–2.5) cm, base narrowed, margin scabrous, apex acuminate, veins 3–5. Stem leaves 2–5 pairs; petiole to 2 cm, membranous; leaf blade linear, 3–8 cm × 3–9 mm, base obtuse, margin scabrous, apex acuminate, veins 1–3. Inflorescences crowded into terminal clusters, many flowered, rarely also in few-flowered axillary whorls; axillary whorls sessile, rarely on pedunclelike branches. Flowers sessile. Calyx tube 4–6 mm, sometimes split on 1 side; lobes 5, filiform to subulate, 1–3.5 mm, unequal. Corolla dark blue-purple, tubular-campanulate to funnelform, 2.3–2.6 cm; lobes oblong, 3.5–4 mm, margin entire, apex rounded; plicae triangular, 2.5–3 mm, oblique, margin entire or 2-cleft, apex acute. Stamens inserted at basal part of corolla tube; filaments 1.1–1.4 cm; anthers ellipsoid, 1.5–2.5 mm. Style 2–3 mm; stigma lobes oblong. Capsules sessile, narrowly ellipsoid to ellipsoid, 1.4–1.7 cm. Seeds brown, ellipsoid, 1.1–1.5 mm.

Fl. and fr. Jul-Sep.

• River banks, meadows, dry steppes, scrub; 1800–4500 m. Gansu, Ningxia, Qinghai, NW Sichuan.

23. *Gentiana walujewii* Regel & Schmalhaus, Trudy Imp. S.-Peterburgsk. Bot. Sada 6: 334. 1879.

新疆秦艽 xin jiang qin jiao

Gentiana kesselringii Regel; *G. walujewii* var. *kesselringii* (Regel) Kusnezow.

Perennials 25–40 cm tall. Stems ascending, simple, glabrous. Basal leaves petiole 1.5–3 cm, membranous; leaf blade narrowly elliptic-lanceolate to elliptic-ovate, (7–)15–20 × (1.5–)2–4.5 cm, base narrowed, margin scabrous, apex obtuse, veins 3–5. Stem leaves 2 or 3 pairs; petiole to 1.5 cm, shorter toward apex, membranous; leaf blade lanceolate to ovate-elliptic, (3.5–)5–7 × 0.7–2.5 cm, base obtuse, margin scabrous, apex obtuse, veins 1–3; uppermost leaves sessile, spreading, surrounding flower cluster. Inflorescences crowded into terminal clusters, many flowered. Flowers sessile. Calyx tube 6–11 mm, membranous; lobes linear-lanceolate to oblanceolate, 6–8 mm, almost as long as tube, margin scabrous, apex acute to obtuse, midvein distinct. Corolla pale yellow, tubular to tubular-funnelform, (2.1–)2.5–3(–3.5) cm; lobes ovate-oblong, 4–5 mm, margin entire, apex obtuse; plicae lanceolate, 2.5–3 mm, margin entire or 2-cleft. Stamens inserted at middle of corolla tube; filaments 8–11 mm; anthers narrowly ellipsoid, 1.5–2.5 mm. Style 2–2.5 mm; stigma lobes oblong. Capsules ellipsoid, 1.3–1.5 cm; gynophore 8–10 mm. Seeds brown, ellipsoid, 1.2–1.5 mm. Fl. and fr. Aug-Sep.

River banks, hillsides; 2200–2600 m. N Xinjiang [Kazakhstan].

24. *Gentiana officinalis* Harry Smith in Handel-Mazzetti, Symb. Sin. 7: 979. 1936.

黄管秦艽 huang guan qin jiao

Gentiana gannanensis Y. Wang & Z. C. Lou; *G. macrophylla* Pallas var. *albolutea* H. Limpricht.

Perennials 15–35 cm tall. Roots to 25 × 1.5 cm. Stems ascending, simple, glabrous. Basal leaves petiole 3.5–5 cm, membranous; leaf blade lanceolate to broadly lanceolate, 7–25 × 1.5–4 cm, base narrowed, margin scabrous, apex acuminate, veins 3–7. Stem leaves 3–5 pairs; petiole to 2 cm, membranous; leaf blade lanceolate, 3–6 × 0.5–2.2 cm, base obtuse, margin scabrous, apex acuminate, veins 1–3. Inflorescences crowded into terminal clusters, many flowered, rarely also in few-flowered axillary whorls. Flowers sessile. Calyx tube 4.5–7 mm, membranous, usually split on 1 side; lobes 5, triangular, 0.5–1 mm. Corolla pale yellow, tubular, (1.5–)1.8–2(–2.5) cm; lobes ovate, 3–3.5 mm, margin entire, apex obtuse; plicae triangular, 1–1.5 mm, oblique, margin entire, apex acute. Stamens inserted at basal part of corolla tube; filaments 5–8 mm; anthers narrowly ellipsoid, 2–2.5 mm. Style 2–2.5 mm; stigma lobes oblong. Capsules sessile, narrowly ellipsoid, 1.3–1.5 cm. Seeds light brown, ellipsoid, 1.4–1.6 mm. Fl. and fr. Aug-Sep.

• River banks, edges of cultivated land, meadow slopes, scrub, alpine meadows; 2300–4200 m. S Gansu, SE Qinghai, S Shaanxi,

N Sichuan.

Gentiana gannanensis is said to be allied to *G. macrophylla*. The authors have not seen its type, but from the illustration it is apparently synonymous with *G. officinalis*.

25. *Gentiana zekuensis* T. N. Ho & S. W. Liu, Bull. Nat. Hist. Mus. London (Bot.) 23: 56. 1993.

泽库秦艽 ze ku qin jiao

Perennials 15–40 cm tall. Roots to 20 × 1.5 cm. Stems ascending, slender, simple, glabrous. Basal leaves petiole 1–3 cm, membranous; leaf blade linear-lanceolate to narrowly elliptic, 8–22.5 × 0.5–2.5 cm, base narrowed, margin scabrous, apex acuminate, veins 3–5. Stem leaves 3–5 pairs; petiole to 2 cm, membranous; leaf blade linear-lanceolate to elliptic-lanceolate, (1.2–)1.8–5.5 cm × 6–12 mm, base obtuse, margin scabrous, apex acuminate to obtuse, veins 1–3. Inflorescences crowded into terminal clusters, many flowered, rarely also in few-flowered axillary whorls. Flowers sessile. Calyx tube 4–7 mm, membranous, split on 1 side; lobes 5, filiform, 0.5–5 mm, unequal. Corolla usually pale yellow but pale blue toward limb, rarely entire corolla pale blue, tubular, 1.5–2 cm; lobes ovate, 2.5–3.5 mm, margin entire, apex acute; plicae triangular, 1–1.5 mm, oblique, margin entire, apex acute. Stamens inserted at basal part of corolla tube; filaments 6–8 mm; anthers narrowly ellipsoid, 1.5–2.5 mm. Style 2–2.5 mm; stigma lobes oblong. Capsules sessile, narrowly ellipsoid, 1.3–1.5 cm. Seeds light brown, ellipsoid, 1.4–1.6 mm. Fl. and fr. Jul-Sep.

• Moist meadows, scrub; 3200–3600 m. SE Qinghai.

26. *Gentiana robusta* King ex J. D. Hooker, Hooker's Icon. Pl. 15: 31. 1883.

粗壮秦艽 cu zhuang qin jiao

Gentiana lhakangensis C. Marquand; *G. pharica* Burkill; *G. tibetica* King ex J. D. Hooker var. *robusta* (King ex J. D. Hooker) Kusnezow.

Perennials 10–30 cm tall. Roots to 20 × 1.5 cm. Stems ascending, simple, glabrous. Basal leaves petiole 2–3 cm, membranous; leaf blade elliptic-lanceolate to ovate-elliptic, 8–23 × 2–4.5 cm, base narrowed, margin scabrous, apex acuminate, veins 3–5. Stem leaves 3–5 pairs; petiole ca. 2 cm, shorter toward apex, membranous; leaf blade lanceolate, 3.5–6.5 × 0.7–1.7 cm, base obtuse, margin scabrous, apex acuminate, veins 1–3; uppermost leaves sessile, spreading, surrounding flower cluster. Inflorescences crowded into terminal clusters, many flowered, sometimes also in few-flowered axillary whorls rarely subapical on pedunclelike branches. Flowers sessile. Calyx tube 1.2–2 cm, membranous, split on 1 side; lobes (3–)5, filiform, 0.5–5 mm, unequal. Corolla yellow-white, greenish white, or yellow-green, tubular-campanulate to campanulate, 3–3.5 cm; lobes ovate to ovate-triangular, 5–6 mm, margin entire, apex acute to obtuse; plicae triangular to truncate, 2–2.5 mm, oblique, margin denticulate. Stamens inserted at basal part of corolla tube; filaments 1–1.3 cm; anthers narrowly ellipsoid, 2.5–3 mm. Style 2–2.5 mm; stigma lobes oblong. Capsules ovoid-ellipsoid, 1.8–2 cm; gynophore 2–3 mm. Seeds dark brown, narrowly ellipsoid, 1.5–1.7 mm. Fl. and fr. Jul-Oct.

Edges of cultivated land, roadsides, hillsides, alpine meadows; 3500–4800 m. S and SE Xizang [Nepal, Sikkim].

27. *Gentiana dendrologi* C. Marquand, Bull. Misc. Inform. Kew 1931: 79. 1931.

川西秦艽 chuan xi qin jiao

Perennials 20–35 cm tall. Stems erect, slender, simple, glabrous. Basal leaves petiole 6–14 cm, membranous; leaf blade linear-lanceolate to linear-elliptic, 10–24 × 0.8–1.5 (–2.5) cm, base narrowed, margin scabrous, apex acuminate, veins 5–7. Stem leaves 4 or 5 pairs; petiole to 3 cm, membranous; leaf blade similar to those of rosette leaves, 3–10 cm × 6–10(–12) mm; upper leaves smaller and with shorter petioles; uppermost leaves sessile, spreading, surrounding flower cluster. Inflorescences crowded into terminal clusters, many flowered, sometimes also in few-flowered axillary whorls, subapical whorls rarely on pedunclelike branches. Flowers sessile. Calyx tube spathe-like, 1.2–1.5 cm, membranous, split on 1 side; lobes 5, filiform, 1–2 mm. Corolla pale yellow, tubular-funnelform, 2.5–3 cm; lobes ovate, 4–5 mm, margin entire, apex acute; plicae triangular, 1.5–2.5 mm, oblique, margin dentate, apex acute. Stamens inserted at basal part of corolla tube; filaments 1–1.3 cm; anthers narrowly ellipsoid, 1.5–2 mm. Style 1.5–2 mm; stigma lobes linear. Capsules sessile, ovoid-ellipsoid, 1.8–2 cm. Seeds light brown, ellipsoid, 1.4–1.6 mm. Fl. and fr. Jul-Aug.

• Meadow slopes; 3000–4500 m. N and W Sichuan.

Gentiana dendrologi has been considered to be a synonym of *G. straminea* or *G. robusta*. However, it differs from the former by its smaller, sessile flowers crowded into a capitulum, and from the latter by the much narrower basal rosette leaves and tubular-funnelform corollas only 6–8 mm diam. at the throat.

28. *Gentiana olgae* Regel & Schmalhausen, Izv. Obshch. Ljubit. Estestv. Moskovsk. Univ. 34(2): 55. 1882.

北疆秦艽 bei jiang qin jiao

Gentiana grombaczewskii Kusnezow; *G. renardii* Regel.

Perennials 25–35 cm tall. Roots 0.9–1.2 cm in diam. Stems ascending, slender, simple, glabrous. Basal leaves petiole 3–4.5 cm, slender, membranous; leaf blade linear-lanceolate, linear-elliptic, or oblanceolate, (5–)8–13 × 0.8–(–2.2) cm, base narrowed, margin scabrous, apex obtuse, veins 3–5. Stem leaves 2 or 3 pairs; petiole to 3.5 cm, shorter toward stem apex, membranous; leaf blade linear to linear-elliptic, 2.5–9 × 0.4–1.5 cm, base obtuse, margin scabrous, apex acuminate to obtuse, veins 1–3; uppermost leaves sessile, spreading, surrounding flower cluster. Inflorescences crowded into terminal clusters, many flowered, sometimes also in few-flowered axillary whorls; subapical whorls rarely on pedunclelike branches. Flowers sessile. Calyx tube 6–13 mm, membranous, usually split on 1 side; lobes 5, linear to dentiform, (2–)3–4 mm, unequal. Corolla pale yellow, sometimes with brown spots in throat, tubular-funnelform, (2.5–)3–3.5 cm; lobes ovate-oblong, 4–5 mm, margin entire, apex obtuse; plicae lanceolate, 2–2.5(–3.5) mm, slightly

2-cleft. Stamens inserted at middle of corolla tube; filaments 0.9–1.1 cm; anthers narrowly ellipsoid, 1–2 mm. Ovary ellipsoid, 1.3–1.5 cm; gynophore 0.9–1.1 cm. Style 1–1.5 mm; stigma lobes oblong. Fl. Aug–Oct.

Steppes; 3000–3100 m. N Xinjiang [Kazakhstan, Kyrgyzstan, Tajikistan].

III. Sect. *Kudoa* (Masamune) Satake & Toyokuni ex Toyokuni, J. Jap. Bot. 35: 202. 1960.

多枝组 duo zhi zu

Kudoa Masamune, J. Soc. Trop. Agric. 2: 29. 1930; *Gentiana* sect. *Monopodiae* (Harry Smith) T. N. Ho; *Gentiana* subsect. *Monopodiae* Harry Smith.

Perennials. Roots linear-cylindric, lax, fleshy, arising from a collar. Stems branching monopodially. Stamens unequal (equal in *Gentiana altorum*). Seed coat alveolate, with simple shallow hexagonal pits.

Thirty-nine species: Asia; 30 species in China.

29. *Gentiana rigescens* Franchet in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 134. 1890.

滇龙胆 dian long dan

Gentiana esquirolii H. Léveillé; *G. rigescens* var. *stictantha* C. Marquand; *G. rigescens* var. *violacea* Harry Smith.

Perennials (10–)20–50 cm tall. Flowering stems simple, erect, rigid, woody at base, papillate when young. Basal rosette absent or very poorly developed. Stem leaves 7–15 pairs; lower leaves 2 or 3 pairs, scalelike, membranous; middle to upper leaves with petiole 5–8 mm, margin ciliate; leaf blade oblong, ovate-oblong, obovate-lanceolate, or obovate, 1.2–4.5 × 0.7–2.2 cm, thick herbaceous to subleathery, margin slightly revolute and scabrous, apex obtuse to rounded, veins 1–3. Inflorescences terminal clusters, 3–10-flowered, rarely also subapical axillary clusters on pedunclelike branches. Flowers sessile. Calyx narrowly obconic, 1–1.2 cm, tube membranous; lobes very unequal, larger 2 lobes oblong to obovate-oblong, 5–8 mm, base narrowed, apex obtuse, vein 1; smaller 3 lobes, linear to lanceolate, 2–3.5 mm, base not narrowed, apex acuminate, vein 1. Corolla violet, with blue spots in throat, tubular-campanulate, 2.5–3 cm; lobes broadly ovate, 5–5.5 mm, margin entire or denticulate, apex acute; plicae triangular, 1.5–2 mm, oblique, margin entire, apex obtuse. Stamens inserted at basal part of corolla tube; filaments 1.4–1.6 cm; anthers narrowly ellipsoid, 2.5–3 mm. Style 2–3 mm; stigma lobes linear. Capsules ovoid-ellipsoid to ellipsoid, 1–1.2 cm; gynophore to 1.5 cm. Seeds light brown, subglobose, 0.6–1 mm. Fl. and fr. Aug–Dec.

Grassland slopes, valleys, scrub, forests; 1100–3000 m. Guizhou, Sichuan, Yunnan [Myanmar].

30. *Gentiana davidii* Franchet, Pl. David. 5: 211. 1884.

五岭龙胆 wu ling long dan

Perennials 3–15(–28) cm tall. Vegetative stems usually short; flowering stems simple, ascending, apically papillate, not horizontally elongated basally nor producing a basal rosette. Leaf blade linear-lanceolate to elliptic-lanceolate, base narrowed, margin slightly revolute and scabrous, apex acuminate to obtuse, veins 1–3. Basal rosette leaves 3–5

pairs; petiole 5–11 mm, membranous; leaf blade 3–7 cm × 6–12 mm. Stem leaves 5–10 pairs, distinctly larger toward apex, apically crowded and subtending flower cluster; petiole 4–7 mm; leaf blade 1.3–5.5 × 3–8 mm. Inflorescences terminal clusters, (1–)3–10-flowered. Flowers sessile, 5-merous. Calyx narrowly obconic, 0.9–1.6 cm, tube membranous; lobes 3–7 mm, very unequal, 2 larger and 3 smaller, linear-lanceolate to lanceolate, base ± narrowed, margin scabrous, apex acuminate, midvein distinct. Corolla blue, tubular-campanulate to funnelform, 1.5–4 cm; lobes ovate to triangular, 2.5–4 mm, margin entire, apex acute and caudate; plicae triangular or subtruncate, 0.5–2.5 mm, oblique, margin entire or denticulate, apex acute to subtruncate. Stamens inserted at basal part of corolla tube; filaments 0.6–1.5 cm; anthers narrowly ellipsoid, 1.5–2 mm. Style 4–6 mm; stigma lobes linear. Capsules narrowly ellipsoid to ovoid-ellipsoid, 1–1.7 cm; gynophore to 2.5 cm. Seeds light brown, subglobose, 0.6–1 mm. Fl. and fr. Aug–Nov.

• 300–3000 m. Anhui, Fujian, Guangdong, Guangxi, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Taiwan, Zhejiang.

- 1a. Plicae subtruncate 30c. var. *fukienensis*
1b. Plicae triangular.
2a. Corolla 3–4 cm 30a. var. *davidii*
2b. Corolla (1.5–)2–2.5 cm 30b. var. *formosana*

30a. *Gentiana davidii* var. *davidii*

五岭龙胆 (原变种) wu ling long dan (yuan bian zhong)

Gentiana atkinsonii Burkill.

Plants 5–15 cm tall. Corolla 3–4 cm, plicae triangular.

• Grasslands and roadside slopes, forest margins, forests; 300–2500 m. Anhui, Fujian, Guangdong, Guangxi, Hainan, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Taiwan, Zhejiang.

30b. *Gentiana davidii* var. *formosana* (Hayata) T. N. Ho, Fl. Reipubl. Popularis Sin. 62: 103. 1988.

台湾龙胆 tai wan long dan

Gentiana formosana Hayata, J. Coll. Sci. Imp. Univ. Tokyo 22: 242. 1906; *G. fasciculata* Hayata.

Plants 5–10 cm tall. Corolla (1.5–)2–2.5 cm, plicae triangular.

- Grasslands; 500–3000 m. Taiwan.

30c. *Gentiana davidii* var. *fukienensis* (Ling) T. N. Ho, *Novon* 4: 370. 1994.

福建龙胆 fu jian long dan

Gentiana fukienensis Ling, *Contr. Inst. Bot. Natl. Acad. Peiping* 6(4): 217. 1949.

Plants 2.5–4 cm tall. Corolla 1.5–2 cm, plicae subtruncate.

- Sunny slopes, 1300–1500 m. Fujian, Taiwan.

31. *Gentiana cephalantha* Franchet in F. B. Forbes & Hemsley, *J. Linn. Soc., Bot.* 26: 125. 1890.

头花龙胆 tou hua long dan

Perennials (10–)20–50 cm tall. Stems glabrous or copiously glandular toward apex; vegetative stems short; flowering stems simple, ascending, base usually woody, basally horizontal, with a basal rosette. Basal leaves with petiole 0.7–3 cm, membranous; leaf blade 3.5–10 × 0.8–2.2 cm, narrowly elliptic to elliptic-lanceolate, uppermost leaves oblanceolate, base narrowed, margin slightly revolute and scabrous, apex acuminate to obtuse, veins 1–3. Stem leaves 4–10 pairs, distinctly larger toward apex, apically crowded and subtending terminal flower cluster; petiole 5–12 mm; leaf blade 3–7 × 1.2–2.2 cm. Inflorescences terminal clusters, (3–)5–12-flowered, occasionally also subapical axillary clusters on pedunclelike branches. Flowers sessile. Calyx obconic, 1.5–2 cm, tube membranous; lobes very unequal, herbaceous, base narrowed, margin ± scabrous, apex acuminate, midvein distinct; larger 2 lobes, spatulate, 7–9 mm, apex obtuse; smaller 3 lobes linear-lanceolate, 5.5–6.5 mm. Corolla blue, tubular-campanulate to funnelform, 2.5–3.5 cm; lobes ovate to triangular, 4–5 mm, margin entire, apex acute; plicae triangular, 1–1.5 mm, oblique, margin entire, apex acute. Stamens inserted at basal part of corolla tube; filaments 1.3–1.5 cm; anthers ellipsoid, 2.5–3 mm. Style 2–3 mm; stigma lobes linear. Capsules ellipsoid, 1.2–1.5 cm; gynophore to 1.7 cm. Seeds light brown, ellipsoid to subglobose, 0.4–0.6 mm. Fl. and fr. Aug–Nov.

1800–4500 m. Guangxi, Guizhou, Sichuan, Yunnan [Myan-mar, Thailand, Vietnam].

- 1a. Stems completely glabrous 31a. var. *cephalantha*
1b. Stems copiously glandular toward apex 31b. var. *vaniotii*

31a. *Gentiana cephalantha* var. *cephalantha*

头花龙胆 (原变种) tou hua long dan (yuan bian zhong)

Stems completely glabrous.

Grassland and roadside slopes, scrub, forest margins, forests;

1800–4500 m. Guangxi, Guizhou, Sichuan, Yunnan [Myanmar, Thailand, Vietnam].

31b. *Gentiana cephalantha* var. *vaniotii* (H. Léveillé) T. N. Ho, *Novon* 4: 370. 1994.

腺龙胆 xian long dan

Gentiana vaniotii H. Léveillé, *Repert. Sp. Nov. Regni Veg.* 12: 182. 1913.

Stems copiously glandular toward apex.

- Grassland slopes, forests; 1800–1900 m. Yunnan.

The two syntypes of *Gentiana vaniotii* belong to different taxa. The lectotype, *Bodinier* 31, corresponds to the original description, whereas *Esquirol* 701 is *G. rigescens*.

32. *Gentiana jingdongensis* T. N. Ho, *Acta Phytotax. Sin.* 23: 46. 1985.

景东龙胆 jing dong long dan

Perennials 1–2 cm tall. Stems short, with crowded leaves and few flowering branches crowded into a tuft. Petiole 5–12 mm, slender; leaf blade ovate, 8–10 × 5–8 mm, base obtuse to subtruncate, margin slightly revolute, apex acute, midvein distinct. Leaves of flowering branches 2–3 mm, bractlike. Inflorescences subapical, axillary, 1- or 2-flowered. Flowers sessile, 4-merous. Calyx campanulate, 6–7 mm; lobes linear, 1.5–2 mm, equal. Corolla blue, subcylindric, 1.7–2 cm; lobes ovate, 2.5–3 mm, margin entire, apex obtuse; plicae oblique, truncate, margin entire. Stamens inserted at middle of corolla tube; filaments 1.1–1.3 cm, unequal; anthers ellipsoid, 1–1.5 mm. Ovary ellipsoid to obovoid-ellipsoid, 6–7 mm; gynophore 4–5 mm. Style 2.5–3 mm; stigma lobes linear. Fl. Apr.

- Roadside slopes; 2800–2900 m. C Yunnan.

33. *Gentiana melandriifolia* Franchet in F. B. Forbes & Hemsley, *J. Linn. Soc., Bot.* 26: 129. 1890.

女娄菜叶龙胆 nu lou cai ye long dan

Perennials 5–7 cm tall. Vegetative stems usually prolonged; flowering stems simple, ascending, apically papillate, basally prostrate, producing a basal rosette. Leaf blade oblong, ovate-oblong, elliptic, ovate, or obovate, base abruptly narrowed, margin slightly revolute, apex obtuse, veins 1–3. Basal rosette leaves well developed; petiole 0.8–2 cm, slender; leaf blade 1.4–3.2 × 0.6–1.8 cm. Stem leaves 4 or 5 pairs, distinctly larger toward apex, crowded close to calyx; petiole 5–10 mm, slender; leaf blade 7–13 × 3–10 mm. Inflorescences terminal, 1–3-flowered. Flowers sessile. Calyx obconic, 1.2–1.5 cm, tube membranous; lobes narrowly triangular, 3–5 mm, equal, margin membranous, apex acute, midvein distinct. Corolla pale blue, with dark blue spots in throat, funnelform, 3.2–4.5 cm; lobes ovate, 4.5–5.5 mm, margin entire or denticulate, apex acute; plicae ovate, 1–1.5 mm, oblique, margin denticulate, apex obtuse. Stamens inserted at basal part of corolla tube; filaments 1.1–1.5 cm; anthers ellipsoid, 1.2–1.5 mm. Style 5–6 mm; stigma lobes linear. Capsules ellipsoid to ovoid-ellipsoid, 1–1.2 cm; gynophore to 1.7 cm. Seeds light brown, subglobose, 0.7–0.9

mm. Fl. and fr. May-Oct.

- Rocky slopes; 2200–3000 m. C and NW Yunnan.

34. *Gentiana duclouxii* Franchet, Bull. Soc. Bot. France 46: 305. 1899.

昆明龙胆 kun ming long dan

Perennials 4–7 cm tall. Vegetative stems usually prolonged; flowering stems simple, erect, glabrous, basally prostrate, producing a basal rosette. Leaf blade spatulate to oblong-ob lanceolate, base gradually narrowed into a broad petiole, margin slightly revolute, veins 1–3. Basal rosette leaves well developed; petiole 1–3.5 cm, narrowly winged; leaf blade 1–4 cm × 5–12 mm. Stem leaves several pairs, crowded close to calyx; petiole 7–10 mm; leaf blade 8–10 × 2–3 mm. Inflorescences subapical, 1–3-flowered. Flowers sessile. Calyx narrowly obconic, 1.3–1.5 mm, tube membranous; lobes triangular, 1–1.5 mm, unequal, margin membranous, apex acute, midvein distinct. Corolla rose with blue spots in throat, funnelform, 3–4 cm; lobes ovate-triangular, 4–5 mm, margin entire, apex obtuse; plicae ovate, 1.5–2 mm, oblique, margin denticulate, apex obtuse. Stamens inserted at basal part of corolla tube; filaments 1–1.4 cm; anthers ellipsoid, 1–1.3 mm. Style 3–4 mm; stigma lobes linear. Capsules ellipsoid, 1.2–1.5 cm; gynophore to 2 cm. Seeds light brown, ellipsoid, 0.8–1 mm. Fl. and fr. Apr-Oct.

- Hillsides; 1800–1900 m. C Yunnan.

35. *Gentiana stipitata* Edgeworth, Trans. Linn. Soc. London 20: 84. 1846.

短柄龙胆 duan bing long dan

Perennials 4–10 cm tall, base surrounded by numerous black remnants of old leaves. Taproot short, stout. Stems ascending, 6–7 cm, simple, sometimes papillate. Leaves flat; petiole to 1 cm, membranous; leaf blade base narrowed, margin cartilaginous, apex acute to obtuse, midvein scabrous. Basal leaves forming a rosette; leaf blade narrowly elliptic to elliptic-lanceolate, 1.5–2 cm × 4–6 mm. Stem leaves 7–12 pairs; lower leaves widely spaced, leaf blade broadly oblong, ovate, or ovate-orbicular, 4–7 × 2.5–4 mm; upper leaves crowded, leaf blade elliptic-lanceolate, elliptic, or oblanceolate, 1–1.6 cm × 4–8 mm. Flowers terminal, solitary, sessile. Calyx tube obconic, 0.8–1.2 cm, membranous; lobes obovate to spatulate, 5–10 mm, unequal, herbaceous, base narrowed, margin cartilaginous, apex obtuse, midvein scabrous. Corolla pale blue-gray, rarely white, with dark blue spots and stripes, tubular-campanulate to campanulate, 2.5–4 cm; lobes ovate, 4–4.5 mm, margin entire, apex obtuse and cuspidate, awned; plicae ovate, 2–2.5 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube; filaments 0.8–1.2 cm; anthers narrowly ellipsoid, 4–4.5 mm. Style 1–1.5 cm; stigma lobes narrowly triangular. Capsules ovoid-ellipsoid, 1.5–1.7 cm; gynophore to 6 mm. Seeds dark brown, ellipsoid, 1.3–1.5 mm. Fl. and fr. Jun-Nov.

- 3200–4600 m. Gansu, Qinghai, W Sichuan, Xizang [NW India,

Nepal].

1a. Corolla lobes distinctly awned 35a. subsp. *stipitata*

1b. Corolla lobes indistinctly awned

..... 35b. subsp. *tizuensis*

35a. *Gentiana stipitata* subsp. *stipitata*

短柄龙胆 (原变种) duan bing long dan (yuan bian zhong)

Corolla 2.5–3 cm, lobes distinctly awned.

Stream and river banks, alpine meadows; 3200–4200 m. E Xizang [NW India, Nepal].

35b. *Gentiana stipitata* subsp. *tizuensis* (Franchet) T. N. Ho, Novon 4: 371. 1994.

提宗龙胆 ti zong long dan

Gentiana tizuensis Franchet, Bull. Soc. Bot. France 43: 494. 1896.

Corolla (2.5–)3–4 cm, lobes indistinctly awned.

- Stream and river banks, alpine scrub and meadows; 3200–4600 m. Gansu, Qinghai, W Sichuan, Xizang.

36. *Gentiana szechenyii* Kanitz, Pl. Exped. Szechenyi in As. Centr. Coll. 40. 1891.

大花龙胆 da hua long dan

Gentiana callistantha Diels & Gilg; *G. rosularis* Franchet.

Perennials 5–7 cm tall. Taproot short, stout. Stems ascending, 2–3 cm, simple, glabrous; caudex sheathed by black membranous remnants of old petioles. Leaf blade sometimes folded, base slightly broadened, margin cartilaginous, apex acuminate, midvein scabrous. Basal rosette leaves well developed; petiole to 1 cm, membranous; leaf blade lanceolate to ensiform-lanceolate, 4–6 cm × 3–10 mm. Stem leaves 2–4 pairs, upper leaves 2 (or 3) pairs, surrounding calyx; petiole to 6 mm, membranous; leaf blade lanceolate, ovate-lanceolate, or ovate-triangular, 1.5–3 cm × 3–6 mm. Flowers terminal, solitary, sessile. Calyx tube obconic, 1.2–1.7 cm, membranous; lobes lanceolate to elliptic, 0.7–1.7 cm, unequal, margin and midvein cartilaginous and scabrous, apex acuminate to obtuse. Corolla white when fresh but pale yellow or pale blue when dry, with greenish spots and blue stripes, campanulate, 4–6 cm; lobes broadly ovate, 5–6 mm, margin entire, apex rounded and cuspidate; plicae ovate, 2.5–3 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube; filaments 1.5–1.7 cm; anthers narrowly ellipsoid, 4–5 mm. Style 1–1.3 cm; stigma lobes triangular. Capsules narrowly ellipsoid, 1.7–2 cm; gynophore to 2.3 cm. Seeds dark brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jun-Nov.

- Alpine meadows; 3000–4800 m. S Gansu, Qinghai, W Sichuan, SE Xizang, NW Yunnan.

Gentiana szechenyii is a very common and variable species. The calyx lobes show considerable variation. They are unequal and usually lanceolate to elliptic, but sometimes even on the same plant

the calyx lobes can be elliptic, lanceolate, and toothlike. The corolla color has been described as blue or pale yellow, but in living plants is white with blue stripes and spots, and it changes color on drying.

37. *Gentiana georgei* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 221. 1912.

滇西龙胆 dian xi long dan

Perennials 5–7 cm tall. Taproot short, stout. Stems ascending 2–3 cm, simple, glabrous; caudex sheathed by black membranous remnants of old petiole. Leaf blade sometimes folded, base slightly broadened, margin cartilaginous and scabrous, apex acuminate, midvein distinct. Basal rosette leaves well developed; petiole to 1 cm, membranous; leaf blade lanceolate, ensiform-lanceolate, or ovate-triangular, 4–8 cm × 3–13 mm. Stem leaves 2–4 pairs, upper leaves 2 (or 3) pairs, surrounding calyx; petiole to 6 mm, membranous; leaf blade lanceolate to ovate-lanceolate, 1.5–4 cm × 3–8 mm. Flowers terminal, solitary, sessile. Calyx tube obconic, 1.2–2 cm, membranous; lobes lanceolate, elliptic, or elliptic-triangular, 0.7–1.7 cm, unequal, margin and midvein cartilaginous and scabrous, apex acuminate to obtuse. Corolla ruddy purple, with paler base when fresh, usually without spots and stripes, campanulate, 4–6 cm; lobes broadly ovate, 7–10 mm, margin entire, apex rounded and cuspidate; plicae ovate, 3–5 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube; filaments 1.5–1.7 cm; anthers narrowly ellipsoid, 4–5 mm. Ovary ovoid-ellipsoid, 1.3–1.5 cm; gynophore 8–10 mm. Style 1–2 cm; stigma lobes triangular. Fl. and fr. Aug–Nov.

• Grassland slopes, alpine meadows; 3000–4200 m. S Gansu, S Qinghai, N Sichuan, NW Yunnan.

38. *Gentiana ecaudata* C. Marquand, Bull. Misc. Inform. Kew 1928: 51. 1928.

无尾尖龙胆 wu wei jian long dan

Perennials 4–10 cm tall. Stems ascending, simple, papillate. Basal rosette leaves absent or poorly developed; leaf blade triangular, 3–7 × 1–1.5 mm, membranous, apex acute. Stem leaves in whorls of 4(–6), larger and more crowded toward apex, uppermost surrounding calyx; leaf blade base connate for 2–3 mm, margin scabrous-ciliate, midvein abaxially distinct. Lower stem leaves withered at anthesis, ovate, 2–3 × 1.5–2 mm, apex acute; middle to upper leaves linear to linear-lanceolate, 5–10 × 1.5–2 mm, apex acuminate. Flowers terminal, solitary, sessile, 5(–8)-merous. Calyx tube obconic, 6–8 mm, membranous; lobes linear, 8–10 mm, herbaceous, margin scabrous-ciliate, apex acuminate, midvein distinct. Corolla pale blue-gray, with dark blue stripes, usually closed, tubular, 3–3.5 cm; lobes triangular, 4.5–5.5 mm, margin denticulate, apex acute and not caudate; plicae broadly triangular, 1–2 mm, margin entire or denticulate, apex obtuse. Stamens inserted just below middle of corolla tube; filaments 6–8 mm; anthers ellipsoid, 2–2.5 mm. Style 4–5 mm; stigma lobes triangular. Capsules ellipsoid, 1–1.2 cm; gynophore to 1.2 cm. Seeds dark brown, ellipsoid, 1–1.2 mm. Fl. and fr. Oct.

• Meadow slopes; 3000–4500 m. SE Xizang, NW Yunnan.

39. *Gentiana ternifolia* Franchet, Bull. Soc. Bot. France

31: 377. 1884.

三叶龙胆 san ye long dan

Perennials 4–10 cm tall. Stems ascending, simple, papillate. Basal rosette leaves poorly developed; leaf blade triangular, 5–10 × 1.5–2 mm, herbaceous, apex acute. Stem leaves in whorls of ca. 3, larger and more crowded toward apex, uppermost leaves surrounding calyx; leaf blade base connate for 2–3 mm, margin smooth, midvein abaxially distinct. Lower stem leaves withered at anthesis, lanceolate to ovate, 5–8 × 1.5–2 mm, apex acute; middle to upper leaves linear to linear-lanceolate, 0.8–1.7 cm × 1.5–2 mm, apex acuminate. Flowers terminal, solitary, sessile, 5-merous. Calyx tube obconic, 1.2–1.4 cm, membranous; lobes linear, 1–1.7 mm, herbaceous, margin smooth, apex acuminate, midvein distinct. Corolla blue, with dark blue stripes, tubular-campanulate to funnellform, 4.5–6(–7) cm; lobes ovate-triangular, 5–6 mm, margin entire, apex obtuse and cuspidate; plicae ovate, 2–2.5 mm, margin denticulate, apex obtuse. Stamens inserted at middle of corolla tube; filaments 1–1.2 cm; anthers ellipsoid, 2–2.5 mm. Ovary narrowly ellipsoid, 1.1–1.3 cm; gynophore 1.6–1.8 cm. Style 3–4 mm; stigma lobes triangular. Fl. Apr–May.

• Wet meadows; 3000–4100 m. N Yunnan.

40. *Gentiana yakushimensis* Makino, Bot. Mag. (Tokyo) 23: 252. 1909.

台湾轮叶龙胆 tai wan lun ye long dan

Perennials 10–15 cm tall. Stems erect, simple, glabrous. Basal rosette leaves poorly developed; leaf blade triangular, 3–7 × 1–1.5 mm, membranous, margin weakly hispid, apex acute, midvein distinct. Stem leaves in whorls of 3 or 4, middle leaves larger than lower or upper leaves, uppermost leaves surrounding calyx; leaf blade linear-lanceolate, 1–1.5 cm × 1.5–3 mm, base connate for 2–3 mm, margin smooth and slightly revolute, midvein abaxially distinct. Flowers terminal, solitary, sessile, 6–8-merous. Calyx tube campanulate, 6–8 mm, membranous; lobes narrowly elliptic, 3.5–4.5 mm, herbaceous, base narrowed, margin smooth and slightly revolute, apex obtuse, midvein distinct. Corolla blue, tubular-campanulate, 2.5–4.2 mm; lobes ovate, 2.5–3 mm, margin erose, apex obtuse; plicae narrowly triangular, as long as lobes, margin erose, apex obtuse. Stamens inserted at basal part of corolla tube; filaments 8–10 mm; anthers ellipsoid, 1.5–2 mm. Ovary narrowly obovoid, ca. 1 cm; gynophore ca. 5 mm. Style ca. 4 mm; stigma lobes narrowly oblong. Capsules ellipsoid; gynophore short. Seeds fusiform.

Grassland slopes. Taiwan [Japan].

41. *Gentiana tetraphylla* Maximowicz ex Kusnezow, Bull. Acad. Imp. Sci. Saint-Petersbourg 35: 349. 1894.

四叶龙胆 si ye long dan

Gentiana ×quaterna Harry Smith; *G. ×quaterna* subsp. *longiflora* Harry Smith.

Perennials 8–13 cm tall. Stems ascending, simple, papillate. Basal rosette leaves absent or poorly developed; leaf blade triangular, 3–7 × 1–1.5 mm, membranous, apex acute. Stem leaves in whorls of 4 (or 5), larger and more crowded toward apex, uppermost leaves surrounding calyx; leaf blade base connate for 2–3 mm, margin smooth, apex obtuse, midvein abaxially distinct. Lower to middle stem leaves oblong to ovate, 2–3 × 1–1.5 mm, apex acute; upper leaves linear-spatulate to narrowly oblong, 4–8 × 1–1.5 mm. Flowers terminal, solitary, sessile, 6–8-merous. Calyx tube narrowly obconic, 0.9–1.2 cm; lobes linear-spatulate to narrowly oblong, 4–5 mm, herbaceous, base narrowed, margin smooth, apex obtuse, midvein distinct. Corolla pale blue, with pale yellow base and dark blue stripes, tubular to tubular-campanulate, 4–4.5 cm; lobes ovate, 2–2.5 mm, margin denticulate, apex obtuse with a caudate tip less than 1 mm; plicae oblong to broadly ovate, 0.8–1 mm, margin denticulate, apex obtuse. Stamens inserted just below middle of corolla tube; filaments 0.9–1.1 cm; anthers ellipsoid, 2–2.5 mm. Ovary ovoid-ellipsoid, 7–8 mm; gynophore 0.9–1.1 cm. Style 4–4.5 mm; stigma lobes linear. Fl. Aug.

- Grassland slopes; 3300–4500 m. N and W Sichuan.

42. *Gentiana hexaphylla* Maximowicz ex Kusnezow, Bull. Acad. Imp. Sci. Saint-Petersbourg 35: 349. 1894.

六叶龙胆 liu ye long dan

Gentiana hexaphylla var. *caudata* C. Marquand; *G. hexaphylla* var. *pentaphylla* Harry Smith; *G. hexaphylla* var. *septemloba* Harry Smith; *G. ×quaterna* Harry Smith var. *octoloba* Harry Smith; *G. ×quaterna* subsp. *sankarensis* Harry Smith.

Perennials 5–20 cm tall. Stems ascending, simple, papillate. Basal rosette leaves absent or poorly developed; leaf blade triangular, 5–10 × 1.5–2 mm, membranous, base connate for 2–3 mm, margin smooth, midvein distinct. Stem leaves in whorls of 6 or 7, larger and more crowded toward apex, uppermost surrounding calyx; leaf blade margin smooth, apex acute, midvein abaxially distinct. Lower stem leaves withered at anthesis, lanceolate to ovate, 2.5–6 × 1–2 mm, apex acute; middle to upper leaves linear-spatulate, 5–15 × 1.5–3 mm. Flowers terminal, solitary, sessile, (5- or) 6- or 7- (or 8)-merous. Calyx tube narrowly obconic, 8–10 mm; lobes linear-spatulate, 5–11 mm, herbaceous, margin smooth, midvein distinct, apex obtuse. Corolla blue, with pale yellow-white base and dark blue streaks, tubular-campanulate, 3.5–5 cm; lobes broadly ovate to ovate-orbicular, 4.5–6 mm, margin erose, apex acute to obtuse and with a caudate tip 2–2.5 mm; plicae broadly triangular, 0.5–1 mm, margin erose, apex obtuse. Stamens inserted at basal part of corolla tube; filaments 2–3 mm; anthers narrowly ellipsoid, 2–3 mm. Style 3–5 mm; stigma lobes oblong. Capsules ovoid-ellipsoid, 1.3–1.7 cm; gynophore to 5 cm. Seeds light brown, ellipsoid to ovoid, 1.2–1.5 mm. Fl. and fr. Jul-Sep.

- Grassland and roadside slopes, alpine meadows, scrub; 2700–4400 m. S Gansu, SE Qinghai, Shaanxi (Taibai Shan), N and W Sichuan.

43. *Gentiana arethusae* Burkill, J. Proc. Asiat. Soc. Bengal

2: 309. 1906.

川东龙胆 chuan dong long dan

Perennials 10–15 cm tall. Stems very numerous, ascending, simple, papillate. Basal rosette leaves poorly developed; leaf blade triangular, 3–7 × 1–1.5 mm, membranous, margin weakly hispid, apex acute, midvein distinct. Stem leaves in whorls of 6 (or 7), larger toward apex, uppermost surrounding calyx; leaf blade base connate for 2–3 mm, margin smooth, apex acute to acuminate, midvein abaxially distinct. Lower stem leaves withered at anthesis, ovate-elliptic, 3–5 × 1–1.5 mm; middle to upper leaves 1–1.7 cm × 1–1.5 mm. Flowers terminal, solitary, sessile, (5- or) 6- or 7-merous. Calyx tube narrowly obconic, 1–1.3 cm; lobes linear, 1–1.4 cm, herbaceous, margin smooth, apex acuminate, midvein distinct. Corolla blue, with dark blue stripes, tubular-campanulate or campanulate-funnelform, 3.5–6 cm, throat 1.5–2.5 cm in diam.; lobes ovate, 4–5 mm, margin entire, apex obtuse with a caudate tip 2–2.5 mm; plicae broadly ovate, 1–1.5 mm, margin entire, apex obtuse. Stamens inserted at basal part of corolla tube; filaments 1.7–2 cm; anthers ellipsoid, 2–2.5 mm. Style 3–5 mm; stigma lobes linear. Capsules ellipsoid, 1.4–1.6 cm; gynophore to 3 cm. Seeds light brown, ellipsoid, 0.8–1 mm. Fl. and fr. Aug-Sep.

- 2000–4800 m. E Sichuan, SE Xizang, NW Yunnan.

Gentiana arethusae is very similar to *G. hexaphylla*, supposedly differing only by the linear and acuminate upper stem leaves and calyx lobes. However, these character states are not consistent, and perhaps *G. arethusae* should be included within *G. hexaphylla*.

- 1a. Corolla tubular to tubular-campanulate..... 43a. var. *arethusae*
- 1b. Corolla campanulate-funnelform 43b. var. *delicatula*

43a. *Gentiana arethusae* var. *arethusae*

川东龙胆 (原变种) chuan dong long dan (yuan bian zhong)

Corolla tubular to tubular-campanulate, 5–6 cm, throat 1.5–1.8 cm in diam. Style 3–5 mm.

- Grassland slopes; 2000–3000 m. E Sichuan.

There is a specimen from W Sichuan, *G. L. Chu s.n.* collected in 1935, which is inadequate for certain identification but may well be *Gentiana arethusae* var. *arethusae*, which would extend the distribution farther west.

43b. *Gentiana arethusae* var. *delicatula* C. Marquand, Bull. Misc. Inform. Kew 1931: 81. 1931.

七叶龙胆 qi ye long dan

Gentiana arethusae var. *rotundalobata* C. Marquand; *G. heptaphylla* I. B. Balfour & Forrest; *G. heptaphylla* var. *mixta* Harry Smith; *G. suboculta* C. Marquand.

Corolla campanulate-funnelform, 3.5–4.5(–5) cm, throat 1.7–2.5 cm in diam. Style 2–3 mm. Fl. and fr. Aug-Nov.

- Grassland slopes, alpine meadows, scrub meadows, forest

margins, roadsides; 2700–4800 m. SE Xizang, NW Yunnan.

44. *Gentiana viatrix* Harry Smith, Bull. Misc. Inform. Kew 1937: 127. 1937.

五叶龙胆 wu ye long dan

Perennials 8–15 cm tall. Stems ascending, simple, papillate. Basal rosette leaves poorly developed; leaf blade triangular, 3–7 × 1–1.5 mm, membranous, apex acute. Stem leaves sessile, in whorls of 5 (or 6), larger toward apex, uppermost leaves surrounding calyx, base connate for 2–3 mm, margin smooth, apex obtuse, midvein distinct. Lower stem leaves withered at anthesis, linear-spatulate, 2–3 × 1–1.5 mm; middle to upper leaves linear to linear-lanceolate, 5–7 × 1.5–2 mm, apex acuminate. Flowers terminal, solitary, sessile, 5-merous. Calyx tube narrowly obconic, 6–8 mm; lobes linear-spatulate, 4–4.5 mm, herbaceous, base narrowed, margin smooth, apex obtuse, midvein distinct. Corolla blue, with dark blue streaks, narrowly obconic, 3.5–5 cm; lobes broadly triangular, 2–3 mm, margin entire, apex obtuse with a caudate tip 1–2 mm; plicae broadly ovate, 1–1.5 mm, margin erose, apex obtuse. Stamens inserted at basal part of corolla tube; filaments 8–10 mm; anthers narrowly ellipsoid, 2–2.5 mm. Ovary narrowly ellipsoid, 0.9–1.1 cm; gynophore 1.1–1.5 cm. Style 5–7 mm; stigma lobes linear. Fl. Jul-Sep.

• Alpine meadows, forest margins; 3400–4800 m. N and W Sichuan.

45. *Gentiana prolata* I. B. Balfour, Trans. & Proc. Bot. Soc. Edinburgh 27: 266. 1918.

观赏龙胆 guan shang long dan

Perennials 3–7 cm tall. Stems ascending, simple, papillate. Basal rosette leaves few, indistinct; leaf blade triangular, 4–8 × 1.5–2 mm, membranous, apex acute. Stem leaves larger toward apex, uppermost surrounding calyx; petiole tube 2–3 mm; leaf blade ovate to orbicular or sometimes upper leaves lanceolate to elliptic, 4–6(–12) × 3–4 mm, margin smooth, apex obtuse to rounded or rarely acute, midvein distinct. Flowers terminal, solitary, sessile, 5-merous. Calyx tube tubular, 7–10 mm, membranous; lobes erect, lanceolate to oblong, 4–7(–9) mm, herbaceous, base slightly narrowed, margin smooth, apex acute to obtuse, midvein distinct. Corolla blue, with pale yellow-white base and dark blue stripes, streaks, and spots, usually closed, tubular to narrowly funnelform, 3–4 cm; lobes ovate to triangular, 4–5 mm, margin entire, apex obtuse; plicae broadly triangular to subtruncate, 0.5–1 mm, margin entire or denticulate, apex obtuse. Stamens inserted at middle of corolla tube; filaments 6–8 mm; anthers narrowly ellipsoid, 1.8–2 mm. Style 1.5–2.5 mm; stigma lobes suborbicular. Capsules ellipsoid, 1.3–1.5 cm; gynophore to 5 cm. Seeds light brown, ellipsoid, 1–1.2 mm. Fl. and fr. Aug-Nov.

Grassland slopes, dry rocky hillsides, wet meadows; 3400–4500 m. SE Xizang [Bhutan, NE India, Nepal, Sikkim].

46. *Gentiana altigena* Harry Smith, Anz. Akad. Wiss. Wien,

Math.-Naturwiss. Kl. 63: 99. 1926.

椭圆龙胆 tuo ye long dan

Perennials 3–7 cm tall. Stems numerous, ascending, simple, papillate. Basal rosette leaves few, indistinct; leaf blade triangular, 4–8 × 1.5–2 mm, membranous, apex acute. Stem leaves larger toward apex, uppermost leaves surrounding calyx; petiole membranous, papillate, petiole tube 1.5–2 mm; leaf blade base obtuse, margin ciliolate, apex obtuse, midvein distinct. Lower stem leaves withered at anthesis, elliptic to ovate-orbicular, 3–4.5 × 1.5–2.5 mm; middle to upper leaves lanceolate to elliptic, 6–9 × 1.5–3 mm. Flowers terminal, solitary, sessile. Calyx tube tubular, 4–5 mm, membranous; lobes spreading, lanceolate to elliptic, 4–6 mm, herbaceous, base slightly narrowed, margin ciliolate, apex obtuse, midvein distinct. Corolla blue, with dark blue streaks, usually closed, tubular, 1.5–2 cm; lobes ovate, 3–3.5 mm, margin entire, apex obtuse; plicae ovate, 1–1.2 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube; filaments 5–6 mm; anthers narrowly ellipsoid, 1–1.5 mm. Style 1.5–2 mm; stigma lobes linear. Capsules ellipsoid to ovoid-ellipsoid, 5–8 mm; gynophore to 8 mm. Seeds light brown, broadly ellipsoid to subglobose, 0.6–0.8 mm. Fl. and fr. Aug-Oct.

Meadow slopes; 3700–4200 m. SE Xizang, NW Yunnan [NE India].

47. *Gentiana obconica* T. N. Ho, Acta Phytotax. Sin. 23: 45. 1985.

倒锥花龙胆 dao zhui hua long dan

Perennials 4–7 cm tall, sometimes appearing stoloniferous. Stems ascending, simple, with several shoots not flowering, glabrous. Basal rosette leaves poorly developed; leaf blade lanceolate to triangular, 1–2 cm × 2–4 mm, base connate for 3–5 mm, margin smooth or scabrous, apex acuminate, midvein distinct. Stem leaves larger toward apex, uppermost surrounding calyx; leaf blade base obtuse and connate for 2–3 mm, margin smooth or scabrous, apex acute, midvein distinct. Lower to middle stem leaves ovate, 2–5 × 2–4 mm; upper leaves elliptic to ovate-elliptic, 5–11 × 2–3 mm. Flowers terminal, solitary, sessile, 5-merous. Calyx tube tubular, 6–10 mm; lobes green, elliptic to ovate-elliptic, 5–8 mm, base slightly narrowed, margin smooth or scabrous, apex obtuse, midvein distinct. Corolla dark blue, sometimes with pale yellow-white base, with black stripes, sometimes with black spots, obconic, 3–4 cm, 2–3 mm wide inside calyx tube, throat 1.8–2.2 cm in diam.; lobes ovate, 2.5–3 mm, margin entire, apex obtuse and mucronate; plicae broadly triangular to subtruncate, 1–1.5 mm, margin erose, apex obtuse. Stamens inserted just below middle of corolla tube; filaments 1.3–1.5 cm; anthers ellipsoid, 1–1.5 mm. Ovary narrowly ellipsoid, 1–1.2 cm; gynophore 1.4–1.6 cm. Style 4–5 mm; stigma lobes oblong. Fl. Aug-Sep.

Alpine meadows and scrub; 4000–5500 m. S and SE Xizang [Bhutan, E Nepal, Sikkim].

48. *Gentiana altorum* Harry Smith, Bull. Misc. Inform. Kew

1937: 129. 1937.

道孚龙胆 *dao fu long dan*

Perennials 4–7 cm tall. Stems ascending, simple, with several shoots not flowering, glabrous. Basal rosette leaves poorly developed; leaf blade lanceolate, 5–10 × 2.5–4 mm, base connate for 2–4 mm, margin smooth or scabrous, apex acuminate, midvein distinct. Stem leaves larger toward apex, uppermost surrounding calyx; leaf blade narrowly elliptic to elliptic, 5–8(–13) × 2.5–4 mm, base obtuse and connate for 2–3 mm, margin smooth or scabrous, apex acute to obtuse, midvein distinct. Flowers terminal, solitary, sessile, 5-merous. Calyx tube narrowly obconic, 7–11 mm; lobes green, equal, narrowly elliptic to elliptic, 5–7 mm, base slightly narrowed, margin smooth or scabrous, apex obtuse, midvein distinct. Corolla pale blue, with pale yellow base and dark blue streaks, sometimes with dark blue spots, funnellform, 3–4.5 cm; lobes ovate, 4–6 mm, margin entire, apex acute to obtuse; plicae broadly ovate, 2–2.5 mm, margin denticulate, apex obtuse. Stamens equal, inserted just below middle of corolla tube; filaments 7–9 mm; anthers narrowly ellipsoid, 2–3 mm. Style 4–5 mm; stigma lobes linear. Capsules ovoid-ellipsoid, 1.1–1.4 cm; gynophore to 1.5 cm. Seeds light brown, subglobose, 1–1.2 mm. Fl. and fr. Aug-Sep.

• Meadow slopes; 3700–4200 m. W Sichuan, SE Xizang.

49. *Gentiana caelestis* (C. Marquand) Harry Smith in Handel-Mazzetti, *Symb. Sin.* 7: 972. 1936.

天兰龙胆 *tian lan long dan*

Gentiana veitchiorum Hemsley var. *caelestis* C. Marquand, *Bull. Misc. Inform. Kew* 1931: 84. 1931; *G. ampla* Harry Smith.

Perennials 5–8 cm tall. Stems ascending, simple, with several shoots not flowering, glabrous. Basal rosette leaves poorly developed; leaf blade lanceolate, 0.5–2 cm × 2–4 mm, base connate for 2–4 mm, margin smooth or scabrous, apex acuminate, midvein distinct. Stem leaves larger toward apex, uppermost surrounding calyx; leaf blade base obtuse and connate for 2–3 mm, margin smooth or scabrous, apex acute, midvein distinct. Lower to middle stem leaves ovate, 3–8 × 2–4 mm; upper leaves linear-elliptic to elliptic, 1.1–1.8 cm × 2–4 mm. Flowers terminal, solitary, sessile. Calyx tube narrowly obconic, 1–1.3 cm; lobes green, linear-elliptic to elliptic, 8–11 mm, base slightly narrowed, margin smooth or scabrous, apex obtuse, midvein distinct. Corolla pale blue, sometimes with a few dark blue streaks in tube, tubular-campanulate, (3.5–)4–5 cm; lobes ovate to triangular, 5–7 mm, margin entire, apex acute to obtuse; plicae ovate, 2–3 mm, margin entire or denticulate, apex obtuse. Stamens inserted just below middle of corolla tube; filaments 1–1.3 cm; anthers narrowly ellipsoid, 2.5–3 mm. Ovary narrowly ellipsoid, 1–1.2 mm; gynophore 1.4–1.8 cm. Style 4–5 mm; stigma lobes linear. Fl. Aug-Sep.

Grassland slopes, alpine meadows, scrub, roadsides in valleys; 2600–4500 m. SW Sichuan, SE Xizang, NW Yunnan [NE Myanmar].

50. *Gentiana veitchiorum* Hemsley, *Gard. Chron.*, ser. 3, 46: 178. 1909.

蓝玉簪龙胆 *lan yu zan long dan*

Gentiana ornata (Wallich ex G. Don) Grisebach var. *acutifolia* Franchet; *G. ornata* var. *obtusifolia* Franchet.

Perennials 5–8 cm tall, sometimes ± rhizomatous or stoloniferous. Stems ascending, simple, papillate. Basal rosette leaves well developed; leaf blade linear-lanceolate to linear-elliptic, 3–5.5 cm × 2–5 mm, base connate for 2–4 mm, margin scabrous, apex acuminate, midvein distinct. Stem leaves larger and more crowded toward apex, uppermost surrounding calyx; leaf blade base narrowed and connate for 2–3 mm, margin scabrous, apex acuminate to acute, midvein distinct. Lower stem leaves ovate, 2.5–7 × 2–4 mm; middle to upper leaves linear, linear-elliptic, narrowly elliptic, or elliptic-lanceolate, 0.7–1.5 cm × 3–4.5 mm. Flowers terminal, solitary, sessile. Calyx tube tubular to narrowly obconic, 1.2–1.4 cm; lobes green, linear-elliptic, 6–11 mm, base slightly narrowed, margin scabrous, apex acuminate, midvein distinct. Corolla intense blue, with pale yellow-white base and black streaks and spots, occasionally corolla cream white to very pale lavender, narrowly funnellform, 4–6 cm; lobes ovate to triangular, 5–7 mm, margin entire, apex acute; plicae ovate, 2.5–3.5 mm, margin entire or erose, apex obtuse. Stamens inserted just below middle of corolla tube; filaments 1–1.3 cm; anthers narrowly ellipsoid, 3–3.5 mm. Style 5–6 mm; stigma lobes linear. Capsules ellipsoid to ovoid-ellipsoid, 1.5–1.7 cm; gynophore 1.5–2 cm. Seeds light brown, ellipsoid, 1–1.3 mm. Fl. and fr. Jul-Oct.

River banks, grassland slopes, alpine meadows, scrub, forests; 2500–4800 m. Gansu, Qinghai, W Sichuan, S and SE Xizang, NW Yunnan [Bhutan, Myanmar, Sikkim].

51. *Gentiana nyalamensis* T. N. Ho, *Acta Phytotax. Sin.* 23: 46. 1985.

聂拉木龙胆 *nie la mu long dan*

Perennials 5–10 cm tall. Stems ascending, simple, glabrous. Basal rosette leaves well developed; leaf blade linear-lanceolate, 3–4 cm × 4–6 mm, base connate for 2–4 mm, margin scabrous, apex acuminate, midvein distinct. Stem leaves larger and more crowded toward apex, uppermost surrounding calyx; leaf blade base obtuse and connate for 2–3 mm, margin scabrous, apex acuminate, midvein distinct. Lower stem leaves ovate, 7–11 × 3–4 mm; middle to upper leaves linear-lanceolate to elliptic, 1–2 cm × 3–5.5 mm. Flowers terminal, solitary, sessile, 5-merous. Calyx tube obconic, 1.1–1.4 cm; lobes green, linear-lanceolate to elliptic, 0.9–1.4 cm, base slightly narrowed, margin scabrous, apex obtuse, midvein distinct. Corolla pale blue, with pale yellow-white base and dark blue streaks and spots, campanulate, 2.5–4.7 cm; lobes ovate, 4.5–6 mm, margin entire, apex obtuse and mucronate; plicae ovate, 2–3 mm, margin entire or 2-cleft, apex obtuse. Stamens inserted just below middle of corolla tube; filaments 8–10 mm; anthers narrowly ellipsoid, 3–3.5 mm. Style 5–6 mm; stigma lobes oblong. Capsules ellipsoid, 1.3–1.5 cm; gynophore to 2 cm. Seeds light brown, ellipsoid, 0.8–1 mm. Fl. and fr. Aug-Sep.

3500–4700 m. S Xizang [Bhutan].

- 1a. Corolla 4.2–4.7 cm 51a. var. *nyalamensis*
1b. Corolla 2.5–3 cm 51b. var. *parviflora*

51a. *Gentiana nyalamensis* var. *nyalamensis*

聂拉木龙胆 (原变种) nie la mu long dan (yuan bian zhong)

Corolla 4.2–4.7 cm.

Alpine meadows; 3500–3600 m. S Xizang [Bhutan].

51b. *Gentiana nyalamensis* var. *parviflora* T. N. Ho, Acta Phytotax. Sin. 23: 46. 1985.

小花聂拉木龙胆 xiao hua nie la mu long dan

Corolla 2.5–3 cm.

• Alpine meadows; 4500–4700 m. S Xizang.

52. *Gentiana ornata* (Wallich ex G. Don) Grisebach, Gen. Sp. Gent. 277. 1838.

华丽龙胆 hua li long dan

Pneumonanthe ornata Wallich ex G. Don, Gen. Hist. 4: 194. 1837.

Perennials 4–7 cm tall. Stems ascending, simple, glabrous. Basal rosette leaves developed; leaf blade linear, 1.8–3.5 cm × 2–4 mm, base connate for 2–4 mm, margin scabrous, apex acuminate, midvein distinct. Stem leaves larger, more crowded toward apex, uppermost surrounding calyx; leaf blade base obtuse and connate for 1.5–2 mm, margin scabrous, apex acute to obtuse, midvein distinct. Lower stem leaves elliptic to ovate, 3–7 × 1–2.5 mm; middle to upper leaves linear, 0.8–1.5 cm × 1–1.5 mm; rarely all stem leaf blades linear to narrowly elliptic. Flowers terminal, solitary, sessile. Calyx narrowly obconic, 1–1.3 cm; lobes green, linear, (0.5–)0.9–1.1 cm, margin scabrous, apex obtuse, midvein distinct. Corolla pale blue, with pale yellow-white base and dark blue streaks and spots, campanulate, 2.5–4 cm; lobes broadly triangular, 2.5–3.5 mm, margin entire, apex obtuse and sometimes mucronate; plicae ovate, 0.5–1 mm, margin entire, apex obtuse. Stamens inserted just below middle of corolla tube; filaments 8–10 mm; anthers narrowly ellipsoid, 1.5–2 mm. Style 5–5.5 mm; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 1.2–1.3 cm; gynophore to 3.5 cm. Seeds light brown, ellipsoid, 1–1.2 mm. Fl. and fr. Aug–Nov.

Stony pastures, grassland slopes; 3300–5000 m. S Xizang [Bhutan, E Nepal, Sikkim].

53. *Gentiana dolichocalyx* T. N. Ho, Acta Phytotax. Sin. 23: 43. 1985.

长萼龙胆 chang e long dan

Perennials 10–15 cm tall. Stems ascending, simple, gla-

brous. Basal rosette leaves poorly developed; leaf blade lanceolate, 4–6(–20) × 2.5–3.5 mm, base connate for 2–4 mm, margin scabrous, apex acuminate, midvein distinct. Stem leaves widely spaced, larger toward apex; leaf blade base connate for 2–3 mm, margin smooth or scabrous, apex acuminate, midvein distinct. Lower stem leaves oblong, 4–6 × 1.5–2 mm; middle to upper leaves broadly linear, 2–4.5 cm × 2–3 mm. Flowers terminal, solitary. Pedicel 0.5–1.5 cm, glabrous, sometimes purple. Calyx narrowly obconic, 1.5–1.7 cm; lobes green, broadly linear, 2.3–3.5 cm, margin smooth or scabrous, apex obtuse, midvein distinct. Corolla pale blue, with pale yellow-white tube, outside with blue streaks, campanulate-tubular, inflated at middle of tube, 6–7 cm; lobes ovate, 6–7.5 mm, margin entire, apex obtuse; plicae ovate, 2–3 mm, margin entire or erose, apex obtuse. Stamens inserted just below middle of corolla tube; filaments 0.9–1.1 cm; anthers ellipsoid, 3.5–4 mm. Style 5–7 mm; stigma lobes linear. Capsules ellipsoid, 1.5–1.7 cm; gynophore to 2.6 cm, stout. Seeds light brown, ellipsoid, 1–1.2 mm. Fl. and fr. Aug–Sep.

• Alpine meadows, roadside slopes, scrub; 2900–3800 m. SE Qinghai, NW Sichuan.

Gentiana dolichocalyx is similar to *G. lawrencei* var. *farreri*. Although T. N. Ho treats them as distinct, J. S. Pringle considers *G. dolichocalyx* as a synonym of *G. lawrencei* var. *farreri*.

54. *Gentiana lawrencei* Burkill, Gard. Chron., ser. 3, 38: 307. 1905.

湖边龙胆 hu bian long dan

Perennials 5–10 cm tall. Stems ascending, simple, glabrous. Basal rosette leaves poorly developed; leaf blade lanceolate, 4–6(–20) × 2–3 mm, base connate for 2–4 mm, margin scabrous, apex acuminate, midvein distinct. Stem leaves larger and more crowded toward apex; leaf blade base connate for 2–3 mm, margin smooth or scabrous, apex acuminate, midvein distinct. Lower stem leaves narrowly oblong, 3–6 × 1.5–2 mm; middle to upper leaves linear, 0.6–2 cm × 1–1.5(–2) mm. Flowers terminal, solitary. Pedicel 5–10 mm. Calyx tube narrowly obconic, 1.5–1.6 cm; lobes green, linear, 1–2.5 cm, margin scabrous, apex acuminate, midvein distinct. Corolla pale blue, narrowly obconic to funnelform, 4.5–5.5(–6) cm, tube pale yellow-white with blue streaks; lobes ovate-triangular, 6–7.5 mm, margin entire, apex acute; plicae broadly ovate, 4–5 mm, margin entire or erose, apex obtuse. Stamens inserted at middle of corolla tube; filaments 7–9 mm; anthers narrowly ellipsoid, 2.5–3 mm. Style 5–6 mm; stigma lobes linear. Capsules ellipsoid, 1.8–2 cm; gynophore to 2.8 cm, slender. Seeds light brown, ellipsoid, 1–1.2 mm. Fl. and fr. Aug–Oct.

• 2400–4600 m. SW Gansu, Qinghai, W and N Sichuan.

Gentiana lawrencei is a very common species native to the Qinghai-Xizang Plateau. It includes two taxa with intermediate morphological characters.

- 1a. Calyx lobes about as long as tube 54a. var. *lawrencei*
1b. Calyx lobes at least 1.8 × as long as tube 54b. var. *farreri*

54a. *Gentiana lawrencei* var. *lawrencei*

湖边龙胆 (原变种) hu bian long dan (yuan bian zhong)

Calyx lobes about as long as tube. Fl. and fr. Aug-Oct.

• Alpine meadows, scrub; 2400–4600 m. SW Gansu, N Sichuan.

Gentiana lawrencei was described from a garden plant grown from seed collected by M. Jules Brocherel on a journey from Lake Baikal into Mongolia. It is probable that the original seeds were actually collected from SW Gansu (China) rather than from near Lake Baikal, because there are no collections from the Baikal area.

54b. *Gentiana lawrencei* var. *farreri* (I. B. Balfour) T. N. Ho, Novon 4: 371. 1994.

线叶龙胆 xian ye long dan

Gentiana farreri I. B. Balfour, Trans. & Proc. Bot. Soc. Edinburgh 27: 248. 1918.

Calyx lobes at least $1.8 \times$ as long as calyx tube.

• Alpine meadows; 2400–4000 m. SW Gansu, Qinghai, W Sichuan.

55. *Gentiana oreodoxa* Harry Smith, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 99. 1926.

山景龙胆 shan jing long dan

Gentiana sinoornata I. B. Balfour var. *punctata* C. Marquand.

Perennials 3–5 cm tall. Stems ascending, simple, glabrous, with several shoots not flowering. Basal rosette leaves poorly developed; leaf blade lanceolate to linear-elliptic, 0.8–2.5 cm \times 2–2.5 mm, base connate for 2–4 mm, margin smooth or scabrous, apex acuminate, midvein distinct. Stem leaves incurved, larger and more crowded toward apex, uppermost surrounding calyx; leaf blade 0.8–1.5 cm \times 0.8–1.5 (–2) mm, base obtuse and connate for 2–3 mm, margin smooth, apex acuminate, midvein distinct. Flowers terminal, solitary, sessile. Calyx tube narrowly obconic, 5–7 mm; lobes green, linear, 6–13 mm, margin smooth or scabrous, apex acuminate, midvein distinct. Corolla pale blue, with pale yellow-white base and dark blue streaks and spots, obconic, 3–3.8(–4.5) cm; lobes ovate-triangular, 3–4 mm, margin entire, apex obtuse and mucronate; plicae ovate, 1.5–2 mm, margin denticulate, apex obtuse. Stamens inserted just below middle of corolla tube; filaments 8–10 mm; anthers narrowly ellipsoid, 2.5–3 mm. Style 2–3.5 mm; stigma lobes linear. Capsules ovoid-ellipsoid, 1.5–1.7 cm; gynophore to 2.5 cm. Seeds light brown, ellipsoid, 1–1.2 mm. Fl. and fr. Aug-Oct.

Grassland slopes, alpine meadows; 3000–4900 m. SE Xizang, NW Yunnan [Bhutan, NE Myanmar].

56. *Gentiana helophila* I. B. Balfour & Forrest in C. Marquand, Bull. Misc. Inform. Kew 1928: 60. 1928.

喜湿龙胆 xi shi long dan

Perennials 6–12 cm tall. Stems ascending, usually short branched, glabrous. Basal rosette leaves poorly developed; leaf blade lanceolate, 2–3 cm \times 1–2 mm, base connate for 2–4 mm, margin scabrous, apex acuminate, midvein distinct. Stem leaves larger and more crowded toward apex, uppermost surrounding calyx; leaf blade base connate for 2–3 mm, margin scabrous, apex acuminate, midvein distinct. Lower stem leaves ovate-lanceolate, 5–7 \times 1.5–2 mm; middle to upper leaves linear to linear-lanceolate, 2.5–4 cm \times 1–2 mm. Flowers terminal, solitary, sessile. Calyx tube narrowly obconic, 1.5–1.8 cm; lobes green, linear to linear-lanceolate, 1.3–1.5 cm, margin scabrous, apex acuminate, midvein distinct. Corolla blue-purple, with pale yellow-white base, with blue streaks and indistinct spots, narrowly obconic, 7–7.5 cm; lobes ovate-triangular, 8–9 mm, margin entire, apex acute; plicae triangular, 2.5–3 mm, margin entire, apex acute. Stamens inserted at basal part of corolla tube; filaments 1.2–1.4 cm; anthers narrowly ellipsoid, 3–3.5 mm. Ovary ovoid-ellipsoid, 1.5–1.7 cm; gynophore 2.7–3 cm. Style 4–5 mm; stigma lobes oblong. Fl. Aug-Nov.

• Wet meadows; ca. 3100 m. NW Yunnan.

57. *Gentiana futtereri* Diels & Gilg in Futterer, Durch Asien, Bot. Repr. 3: 14. 1903.

青藏龙胆 qing zang long dan

Perennials 5–10 cm tall. Stems ascending, simple, glabrous. Basal rosette leaves poorly developed; leaf blade linear-lanceolate, 1–2 cm \times 2–2.5 mm, base connate for 2–4 mm, margin scabrous, apex acuminate, midvein distinct. Stem leaves larger, more crowded toward apex, uppermost surrounding calyx; leaf blade base obtuse and connate for 2–3 mm, margin scabrous, apex acuminate. Lower stem leaves narrowly oblong, 3–6 \times 1.5–2 mm; middle to upper leaves linear, 0.6–2 cm \times 1.5–2 mm. Flowers terminal, solitary, sessile. Calyx tube tubular to narrowly obconic, 1–1.4 cm; lobes green, linear, 0.6–1.4 cm, margin scabrous, apex acuminate, midvein distinct. Corolla dark blue, with pale yellow-white base and dark blue streaks and spots, tubular-campanulate to funnelform, 5–6 cm; lobes ovate-triangular, 6–7.5 mm, margin entire, apex acute; plicae broadly ovate, 4–5 mm, margin denticulate, apex obtuse. Stamens inserted at middle of corolla tube; filaments 7–11 mm; anthers narrowly ellipsoid, 2.5–3 mm. Style 4–5 mm; stigma lobes oblong. Capsules ellipsoid, 1.5–1.8 cm; gynophore to 2.5 cm, slender. Seeds light brown, broadly ellipsoid to subglobose, 0.8–1 mm. Fl. and fr. Jul-Oct.

• Alpine meadows, forests; 2800–3400 m. SW Gansu, SE Qinghai.

58. *Gentiana sinoornata* I. B. Balfour, Trans. & Proc. Bot. Soc. Edinburgh 27: 253. 1918.

类华丽龙胆 lei hua li long dan

Perennials 10–15 cm tall. Stems ascending, usually short branched, with several shoots not flowering, glabrous. Basal rosette leaves poorly developed; leaf blade narrowly triangular, 4–6 × 2–5 mm, base connate for 2–4 mm, margin scabrous, apex acute. Stem leaves incurved, larger and more crowded toward apex, uppermost surrounding calyx; leaf blade ± lanceolate, base connate for 2–3 mm, margin scabrous, apex acute, midvein distinct. Lower to middle stem leaves 7–10 × 2–2.5 mm; upper leaves 1–3.5 cm × 2–3 mm. Flowers terminal, solitary, sessile. Calyx tube narrowly obconic, 1.3–1.5 cm; lobes green, linear-lanceolate to lanceolate, 1.3–1.5 cm, margin scabrous, apex acute, midvein distinct. Corolla pale blue, usually pale yellow-white at base, with dark blue streaks and indistinct blue spots, obconic or obconic-tubular, 5–6 cm; lobes ovate, 7–8 mm, margin entire, apex obtuse; plicae ovate, 2–3 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube; filaments 1–1.2 cm; anthers narrowly ellipsoid, 3–3.5 mm. Style 6–7 mm; stigma lobes linear. Capsules ovoid-ellipsoid, 2.5–2.7 cm; gynophore to 2.5 cm. Seeds light brown, ellipsoid, 0.8–1 mm. Fl. and fr. May–Oct.

2800–4400 m. S and W Sichuan, E Xizang, NW Yunnan [Myanmar].

- 1a. Stem leaf blades linear-lanceolate to lanceolate; corolla narrowly obconic 58a. var. *sinoornata*

IV. Sect. *Frigida* Kusnezow, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 61. 1893.

高山龙胆组 gao shan long dan zu

Perennials. Roots long, rarely short, ± fleshy. Rhizomes stout, rarely slender, fleshy, sometimes short but conspicuous. Stems branching sympodially, with 1 to few basal rosettes and 1 to few flowering stems. Stems sheathed basally by black membranous remnants of old leaf bases. Base of basal leaves long connate. Seeds coated with a membranous lamella forming spongy, complex hexagonal pits.

Nineteen species: North America, Asia, Europe; 17 species in China.

59. *Gentiana wilsonii* C. Marquand, Bull. Misc. Inform. Kew 1928: 59. 1928.

川西龙胆 chuan xi long dan

Perennials 12–30 cm tall. Rhizomes short. Stems 1 or 2, erect, simple, glabrous. Basal leaves in 1–3 erect rosettes; petiole 1–3 cm, membranous; leaf blade linear-lanceolate to linear-elliptic, 2.5–11 × 0.5–1.4 cm, base narrowed, apex acuminate to obtuse, veins 1–3. Stem leaves 1–3 pairs; petiole to 2 cm, shorter or absent toward apex; leaf blade linear-oblong or narrowly elliptic, 2–4 cm × 3–15 mm, base narrowed, apex acuminate to obtuse, veins 1–3. Inflorescences terminal clusters, sometimes also in few-flowered subapical axillary clusters, axillary clusters rarely on pedunclelike branches. Flowers sessile. Calyx tubular to narrowly obconic, 1–1.2 cm, tube sometimes split on 1 side; lobes spreading to reflexed, subulate to triangular, 1–2(–3) mm, unequal. Corolla pale blue, unspotted, tubular-funnelform, (2–)3.5–5.5 cm; lobes ovate, 3–3.5 mm, apex obtuse; plicae triangular, 2–2.5 mm, base oblique, margin entire, apex obtuse. Stamens inserted just below middle of

- 1b. Stem leaf blades elliptic-lanceolate; corolla obconic-tubular 58b. var. *gloriosa*

58a. *Gentiana sinoornata* var. *sinoornata*

类华丽龙胆 (原变种) lei hua li long dan (yuan bian zhong)

Gentiana ornata (Wallich ex G. Don) Grisebach var. *veitchii* Irving.

Stem leaf blades linear-lanceolate to lanceolate. Corolla narrowly obconic.

- Grassland slopes, wet meadows on river banks, alpine meadows, scrub, forests; 2800–4400 m. W Sichuan, E Xizang, NW Yunnan.

58b. *Gentiana sinoornata* var. *gloriosa* C. Marquand, Bull. Misc. Inform. Kew 1928: 57. 1928.

瘦华丽龙胆 shou hua li long dan

Stem leaf blades elliptic-lanceolate. Corolla obconic-tubular.

Wet meadows on river banks, alpine meadows, scrub meadows; 3000–4300 m. SW Sichuan, NW Yunnan [Myanmar].

corolla tube; filaments 1–1.3 cm; anthers ellipsoid, 2.5–3 mm. Style 1.5–2 mm; stigma lobes semiobovate. Capsules narrowly ellipsoid to ovoid-ellipsoid, 1.5–1.7 cm; gynophore to 2 cm. Seeds light brown, subglobose, 1–1.2 mm. Fl. and fr. Jul–Sep.

- Grassland slopes, scrub, forests; 2800–4000 m. SW Sichuan, SE Xizang, NW Yunnan.

Gentiana wilsonii is similar to *G. microdonta*. Although T. N. Ho treats them as distinct, J. S. Pringle considers *G. wilsonii* as a synonym of *G. microdonta*.

60. *Gentiana subuliformis* S. W. Liu in T. N. Ho & S. W. Liu, Bull. Nat. Hist. Mus. London (Bot.) 23: 59. 1993.

钻萼龙胆 zhuan e long dan

Perennial 12–20 cm tall. Rhizomes short. Stems erect. Leaves mostly basal; petiole 0.5–2 cm; leaf blade narrowly elliptic to oblong, rarely oblong-spatulate, 1.5–3.5 cm × 5–9 mm, base attenuate, apex obtuse to subrounded, veins 3 and

abaxially distinct. Stem leaves 1 or 2 pairs, similar to basal leaves, sessile or short petiolate; leaf blade 2–3.5 × ca. 1.2 cm. Inflorescences terminal subcapitate clusters. Flowers numerous. Calyx tubular, ca. 1 cm, often split on 1 side; lobes spreading to recurved, subulate, 1–2 mm. Corolla dark blue, unspotted, tubular, 2.3–2.5 cm; lobes ovate, 1.5–2 mm, apex obtuse; plicae short, truncate, margin entire or denticulate. Stamens inserted at basal part of corolla tube; filaments subulate, ca. 9 mm; anthers linear, ca. 1.5 mm. Gynophore present; style short; stigma linear.

- Alpine meadows; ca. 4800 m. SE Xizang.

Gentiana subuliformis is similar to *G. atuntsiensis* and *G. wilsonii*. The relationship of these three species to *G. microdonta* and other closely related species needs further study.

61. *Gentiana atuntsiensis* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 121. 1913.

阿墩子龙胆 a dun zi long dan

Gentiana trichotoma Kusnezow var. *brevicaulis* C. Marquand.

Perennials 5–25 cm tall. Rhizomes to 15 cm. Stems 1–3 or more, erect, simple, glabrous. Basal leaves in 2–5 erect rosettes; petiole 2–7 cm, membranous; leaf blade oblong, narrowly elliptic, or oblanceolate, 3–8 cm × 4–13 mm, base narrowed, apex obtuse to rounded, veins 3. Stem leaves 3 or 4 pairs; petiole to 2 cm, shorter toward stem base and absent toward apex; leaf blade spatulate to oblanceolate, 2.5–3.5 cm × 5–10 mm, both ends obtuse. Inflorescences terminal clusters of (3–)5–10 flowers, sometimes also few-flowered axillary clusters, axillary clusters rarely on pedunclelike branches. Flowers sessile or subsessile. Calyx purple, narrowly obconic, 8–10 mm, outside sometimes papillate, tube entire or rarely slightly split on 1 side; lobes spreading to reflexed, subulate to triangular, 2–3 mm, unequal. Corolla dark blue, rarely pale yellow-white with blue spots basally, funnellform, 2.3–3.5 cm; lobes ovate, 3.5–5 mm, margin denticulate, apex obtuse; plicae obliquely triangular to truncate, 1–1.5 mm, margin denticulate. Stamens inserted at middle of corolla tube; filaments 8–10 mm; anthers narrowly ellipsoid, 2.5–3.5 mm. Style 4–5 mm; stigma lobes ovate. Capsules cylindrical to ovoid-ellipsoid, 1.5–2 cm; gynophore 1–1.5 cm, slender. Seeds light brown, broadly ellipsoid to subglobose, 1.5–2 mm. Fl. and fr. Jun–Nov.

- Alpine meadows, scrub, forests; 2700–4800 m. SE Xizang, NW Yunnan.

Gentiana atuntsiensis is similar to *G. microdonta*. Although T. N. Ho treats them as distinct, J. S. Pringle considers *G. atuntsiensis* as a synonym of *G. microdonta*.

62. *Gentiana handeliana* Harry Smith, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 98. 1926.

斑点龙胆 ban dian long dan

Gentiana handeliana var. *brevispala* C. Marquand; *G. stictantha* C. Marquand.

Perennials 10–15 cm tall. Rhizomes short. Stems purple,

2 or 3, erect, simple, papillate, densely toward apex. Basal leaves in 2–5 erect rosettes; petiole 2–5 cm, membranous; leaf blade oblong, narrowly elliptic, or oblanceolate, 2–7 × 0.5–2.3 cm, base narrowed, apex obtuse to rounded, veins 3–5. Stem leaves 2 or 3 pairs; petiole to 1 cm, absent apically; leaf blade narrowly elliptic, lanceolate, or oblanceolate, 1.5–2.5 cm × 2–5 mm, base narrowed, apex obtuse, veins 1–3. Inflorescences terminal clusters, sometimes also in axillary whorls. Flowers sessile. Calyx narrowly obconic, 0.9–1.1 cm; tube sometimes split on 1 side, outside papillate; lobes spreading to reflexed, subulate to triangular, 1–2(–3) mm, unequal, ciliolate, apex obtuse. Corolla pale yellow to yellow, rarely white, with distinct dark blue spots, tubular-funnelform, 2.5–3 cm; lobes ovate, 3–4 mm, apex obtuse to rounded; plicae triangular to obliquely truncate, 1–1.5 mm, margin entire. Stamens inserted at basal part of corolla tube; filaments 0.8–1.2 cm; anthers narrowly ellipsoid, 2.5–3.5 mm. Style linear, 3.5–4 mm; stigma lobes semiorbicular. Capsules ovoid-ellipsoid, 0.8–1.2 cm; gynophore to 1.8 cm. Seeds light brown, broadly ellipsoid to subglobose, 1.5–1.7 mm. Fl. and fr. Jul–Nov.

Alpine meadows; 3500–4600 m. SE Xizang, NW Yunnan [NE Myanmar].

63. *Gentiana phyllopoda* H. Léveillé, Bull. Acad. Int. Géogr. Bot. 25: 21. 1915.

叶柄龙胆 ye bing long dan

Perennials 20–30 cm tall. Rhizomes to 15 cm. Stems 1–3, erect, simple, glabrous. Basal leaves in 1–4 erect rosettes; petiole 3–6 cm, membranous; leaf blade linear-lanceolate to linear-elliptic, 3.5–8.5 × 0.8–1.5 cm, base narrowed, apex acuminate to obtuse, veins 3 and abaxially distinct. Stem leaves 2 or 3 pairs; petiole to 2 cm, shorter or absent toward apex; leaf blade narrowly elliptic-lanceolate to elliptic, 3.5–5 × 0.7–1.3 cm, base narrowed, apex acuminate to obtuse, veins 1–3. Inflorescences terminal clusters, sometimes also in axillary whorls. Flowers sessile. Calyx narrowly obconic, 0.8–1.2 cm, outside papillate; tube spathe-like, split on 1 side; lobes spreading to reflexed, subulate, 1–1.5 mm, apex acute. Corolla pale yellow, with distinct dark blue spots, tubular to tubular-funnelform, 2.5–3 cm; lobes broadly ovate, 3–4 mm, margin entire, apex rounded; plicae triangular to obliquely truncate, 1–1.5 mm, margin denticulate, apex obtuse. Stamens inserted at basal part of corolla tube; filaments 1–1.2 cm; anthers ellipsoid, 1.5–2 mm. Style 1.5–2 mm; stigma lobes semiorbicular. Capsules ovoid-ellipsoid, 1–1.2 cm; gynophore 1–1.2 cm. Seeds light brown, ellipsoid to ovoid-ellipsoid, 1–1.2 mm. Fl. and fr. Jul–Aug.

- Alpine meadows; 2600–3800 m. SW Sichuan, NE Yunnan.

64. *Gentiana apiata* N. E. Brown, Bull. Misc. Inform. Kew 1914: 187. 1914.

太白龙胆 tai bai long dan

Gentiana tsinlingensis H. Limpricht.

Perennials 10–25 cm tall. Rhizomes short. Stems 1–3, erect, simple, glabrous. Basal leaves in 1–4 erect rosettes; petiole 2–5 cm, membranous; leaf blade linear-lanceolate

to linear-elliptic, 1.5–8 cm × 4–7 mm, base narrowed, apex acuminate to obtuse, vein 1. Stem leaves 2–4 pairs; petiole to 2.5 cm, shorter to absent toward apex; leaf blade narrowly elliptic to lanceolate, 2–3.5 cm × 3–6 mm, both ends attenuate, vein 1. Inflorescences large terminal clusters, sometimes also in few-flowered subapical axillary clusters on pedunclelike branches. Flowers sessile. Calyx narrowly obconic, 1–1.5 cm, tube entire; lobes spreading to reflexed, linear to narrowly triangular, 3.5–5.5 mm, subequal, apex acuminate. Corolla yellow, with dark blue spots, funnellform, 2–3 cm; lobes ovate, 3–3.5 mm, margin denticulate, apex rounded; plicae triangular to obliquely truncate, 1–1.5 mm, margin denticulate. Stamens inserted at basal part of corolla tube; filaments 6–9 mm; anthers narrowly ellipsoid, 2.5–3.5 mm. Style 1.5–2(–3) mm; stigma lobes linear. Capsules ovoid-ellipsoid, 1.1–1.5 cm; gynophore to 1.7 cm. Seeds light brown, ellipsoid, 2–2.5 mm. Fl. and fr. Jun–Aug.

- Hillsides; 1900–3400 m. Shaanxi (Taibai Shan).

65. *Gentiana microdonta* Franchet in F. B. Forbes & Hemsl., J. Linn. Soc., Bot. 26: 130. 1890.

小齿龙胆 xiao chi long dan

Gentiana trichotoma Kusnezow var. *albescens* C. Marquand.

Perennials 25–35 cm tall. Rhizomes to 15 cm. Stems 1 or 2, erect, simple, densely papillate. Basal leaves in 1 or more erect rosettes; petiole 2–2.5 cm, membranous; leaf blade narrowly elliptic, elliptic, or oblong, 2.5–3.5 × 0.8–1.8 cm, base narrowed, apex obtuse, veins 1–3. Stem leaves 3 or 4 pairs; petiole 0.5–1.5 cm, shorter to absent toward apex; leaf blade oblong, oblanceolate, or elliptic, 2–4 × 0.4–1.5 cm, base narrowed, apex obtuse to rounded, veins 1–3. Cymes axillary or terminal, forming a narrow panicle, cymes sometimes on pedunclelike branches; peduncles to 4.5 cm. Pedicel 0.5–2.5 cm, densely papillate. Calyx narrowly obconic, 7–10 mm; tube spathe-like, split on 1 side; lobes erect, subulate, 1–1.5 mm. Corolla dark blue, unspotted, narrowly funnellform, 2.2–2.5(–3.2) cm; lobes ovate, 3–4 mm, margin entire, apex obtuse; plicae triangular to obliquely truncate, 1.5–2 mm, margin denticulate, apex obtuse. Stamens inserted at middle of corolla tube; filaments 7–11 mm; anthers ellipsoid, 2–2.5 mm. Style 2–2.5 mm; stigma lobes semi-orbicular. Capsules ovoid-ellipsoid, 1–1.2 cm; gynophore 8–10 mm. Seeds light brown, ellipsoid to subglobose, 1–1.2 mm. Fl. and fr. Jul–Nov.

- Alpine meadows, forests; 2600–4200 m. NW Yunnan.

The two syntypes of *Gentiana microdonta* belong to different taxa. The lectotype, *Delavay s.n.* from Dali, Yunnan, corresponds to the original description, whereas *Faber 46* from Emei Shan (Sichuan) belongs to *G. omeiensis*.

66. *Gentiana wasenensis* C. Marquand, Bull. Misc. Inform. Kew 1931: 80. 1931.

瓦山龙胆 wa shang long dan

Perennials 10–25 cm tall. Rhizomes to 10 cm. Stems 1 or

2, erect, simple, glabrous. Basal leaves in 2 or 3 erect rosettes; petiole 1.5–2.5 cm, membranous; leaf blade linear-lanceolate to linear-elliptic, 3–7 × 0.7–1.5 cm, base narrowed, apex acuminate to obtuse, veins 1–3. Stem leaves 2 or 3 pairs; petiole 0.7–2 cm, shorter to absent toward apex; leaf blade linear-lanceolate to oblanceolate, 2–3 cm × 3–11 mm, base narrowed, apex acuminate to obtuse, vein 1. Inflorescences terminal clusters, sometimes also in few-flowered axillary whorls. Flowers sessile. Calyx narrowly obconic, 7.5–9 mm, tube entire or rarely split on 1 side; lobes erect, subulate, 1–1.5 mm, subequal. Corolla pale blue, unspotted, narrowly funnellform, 2.3–2.8 cm; lobes ovate, 3–3.5 mm, apex obtuse; plicae obliquely truncate, margin erose. Stamens inserted at basal part of corolla tube; filaments 1–1.2 cm; anthers narrowly ellipsoid, 3–4 mm. Style 1–2 mm; stigma lobes semi-orbicular. Capsules ovoid-ellipsoid, 9–10 mm; gynophore to 1.5 cm. Seeds light brown, ellipsoid, 1.2–1.5 mm. Fl. and fr. Jul–Sep.

- Hillsides; 2900–3600 m. N Sichuan.

Gentiana wasenensis is similar to *G. microdonta*. Although T. N. Ho recognizes both as distinct species, J. S. Pringle suggests that perhaps *G. wasenensis* should be recognized at the infraspecific level.

67. *Gentiana striolata* T. N. Ho, Acta Phytotax. Sin. 23: 51. 1985.

多花龙胆 duo hua long dan

Perennials 10–40 cm tall. Rhizomes to 10 cm. Stems 1–3, erect, simple, densely papillate. Basal leaves in 1–4 erect rosettes; petiole 2–3.5 cm, membranous; leaf blade spatulate, narrowly elliptic, or elliptic, 4–7 × 0.8–1.4 cm, base narrowed, apex obtuse to rounded, veins 3–5. Stem leaves 4–7 pairs; lower leaves with petiole 0.6–2 cm; leaf blade oblong to narrowly elliptic, 3.5–4.5 × 0.8–1.4 cm, base narrowed, apex obtuse, veins 3; upper leaves usually folded; petiole less than 5 mm, completely connate; leaf blade linear-lanceolate to lanceolate, 1.5–5 cm × 3–9 mm, apex acuminate, vein 1. Inflorescences axillary or terminal clusters, subapical axillary clusters rarely on pedunclelike branches. Flowers sessile. Calyx tubular to narrowly obconic, 1.2–1.6 cm, tube entire; lobes erect, subulate, 1–1.5 mm, subequal. Corolla pale blue, with pale yellow base and blue streaks and spots, funnellform, (4–)5–5.5 cm; lobes ovate, 4–4.5 mm, margin entire, apex obtuse; plicae triangular to obliquely truncate, 1.2–1.5 mm, apex obtuse and 2-cleft or erose. Stamens inserted at middle of corolla tube; filaments 1.2–1.4 cm; anthers narrowly ellipsoid, 2.5–3 mm. Style 2–3 mm; stigma lobes linear. Capsules ovoid-ellipsoid, 2.2–2.5 cm; gynophore to 2 cm. Seeds light brown, ellipsoid to subglobose, 1.5–2 mm. Fl. and fr. Jul–Sep.

- Alpine meadows, scrub meadows, moist slopes; 3700–4600 m. SW Sichuan.

68. *Gentiana omeiensis* T. N. Ho, Acta Phytotax. Sin. 23: 49. 1985.

峨眉龙胆 e mei long dan

Perennials 30–40 cm tall. Rhizomes to 15 cm. Stems 2–4, erect, simple, subglabrous. Basal leaves in 1–3 erect rosettes; petiole 4–8 cm, membranous; leaf blade elliptic-lanceolate, narrowly elliptic, or elliptic, 5.5–12 × 1–1.5 cm, base narrowed, apex acuminate to obtuse, veins 3. Stem leaves 2–4 pairs; petiole 1–4.5 cm, shorter to absent toward apex; leaf blade spatulate, rarely narrowly elliptic, 4–7.5 × 1–2 cm, base narrowed, apex obtuse to rounded, veins 1–3. Inflorescences axillary or terminal clusters, subapical axillary clusters rarely on pedunclelike branches. Flowers sessile. Calyx obconic, 1.1–1.3 cm; tube spathe-like, split on 1 side; lobes erect, subulate, 1–1.5 mm. Corolla blue, sometimes with pale yellow base, unspotted, tubular-campanulate, 3.5–4 cm; lobes ovate, 4.5–5.5 mm, apex obtuse to rounded and erose; plicae triangular to obliquely truncate, 1–1.5 mm. Stamens inserted at basal part of corolla tube; filaments 1.3–1.6 cm; anthers narrowly ellipsoid, 3–3.5 mm. Style 2–2.5 mm; stigma lobes semiorbicular. Capsules narrowly ellipsoid, 1.3–1.5 cm; gynophore 1–2 cm. Seeds light brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jul-Sep.

• Hillsides; 1100–3200 m. S Sichuan (Emei Shan).

Gentiana omeiensis is similar to *G. microdonta*. Although T. N. Ho recognizes both as distinct, J. S. Pringle considers that perhaps *G. omeiensis* should be recognized at the infraspecific level.

69. *Gentiana algida* Pallas, Fl. Ross. 1(2): 107. 1789.

高山龙胆 gao shan long dan

Gentiana algida var. *sibirica* Kusnezow; *G. frigida* Haenke var. *algida* (Pallas) Ledebour; *G. romanzovii* Ledebour ex Bunge.

Perennials 8–20 cm tall. Rhizomes short. Stems 1 or 2, erect, simple, subglabrous. Basal leaves in 1–3 erect rosettes; petiole 1–3.5 cm; leaf blade usually folded, linear-elliptic to lanceolate, 2–5.5 cm × 3–5 mm, base narrowed, apex obtuse, veins 1–3. Stem leaves 1–3 pairs; petiole 5–10 mm; leaf blade narrowly elliptic to ovate-lanceolate, 1.8–2.8 cm × 4–8 mm, both ends obtuse, veins 1–3. Flowers solitary, rarely in terminal 2- or 3(–8)-flowered cymes, mostly sessile or subsessile, only basal axillary flowers occasionally pedicellate. Calyx obconic to campanulate, 2–2.2 cm, tube entire or slightly split on 1 side; lobes erect, ovate to triangular, 5–6 mm, apex obtuse. Corolla pale yellow to pale yellow-green, with blue stripes, sometimes with blue spots in limbs, tubular-campanulate to funnelform, 4–5 cm; lobes ovate to triangular, 5–6 mm, apex obtuse; plicae obliquely truncate, margin entire or indistinctly denticulate. Stamens inserted at middle of corolla tube; filaments 1.3–1.6 mm; anthers narrowly ellipsoid, 2.5–3.2 mm. Style 4–6 mm; stigma lobes linear. Capsules ovoid-ellipsoid, 2–3 cm; gynophore to 4.5 cm. Seeds light brown, broadly ellipsoid to subglobose, 1.4–1.6 mm. Fl. and fr. Jul-Sep.

Grassy hillsides, stony hillsides, alpine meadows; 1200–4200 m. Xinjiang, Xizang [Bhutan, Japan, Kazakhstan, Kyrgyzstan, Korea, Mongolia, E Russia, Sikkim; North America].

70. *Gentiana himalayaensis* T. N. Ho in T. N. Ho & S. W. Liu, Bull. Nat. Hist. Mus. London (Bot.) 23: 57. 1993.

喜马拉雅龙胆 xi ma la ya long dan

Gentiana nubigena Edgeworth var. *parviflora* C. B. Clarke (1883), not *G. parviflora* Gilg (1896).

Perennials 4–7 cm tall. Rhizomes short, slender. Stems 1 or 2, ascending to erect, simple, glabrous. Basal leaves in 1 or more erect rosettes; petiole 0.5–1.5 cm; leaf blade oblong, narrowly elliptic, elliptic, or rarely ovate, 1.5–2(–3) cm × 2–7 mm, base narrowed, apex acute to obtuse, veins 3. Stem leaves 2 or 3 pairs; petiole to 1 cm; leaf blade narrowly elliptic to oblong, 1.5–3 cm × 2–4 mm, base narrowed, apex obtuse, vein 1. Flowers terminal, solitary, sessile or subsessile. Calyx tubular, 1.2–1.4 cm; lobes erect, lanceolate to oblong, 4–8 mm, unequal, margin ciliate, apex acute. Corolla dark blue, tubular to tubular-funnelform, 1.5–2 cm; lobes semiorbicular, 1.5–2 mm, margin denticulate, apex rounded; plicae obliquely truncate, margin denticulate. Stamens inserted at basal part of corolla tube; filaments 1–1.2 cm; anthers narrowly ellipsoid, ca. 2.5 mm. Capsules ellipsoid, 1.7–2 cm; gynophore to 2 cm. Fl. and fr. Aug-Oct.

Grassy and stony hillsides; 4000–4200 m. S and SE Xizang [Bhutan, Nepal, Sikkim].

71. *Gentiana nubigena* Edgeworth, Trans. Linn. Soc. London 20: 85. 1846.

云雾龙胆 yun wu long dan

Gentiana algida Pallas var. *nubigena* (Edgeworth) Kusnezow; *G. przewalskii* Maximowicz.

Perennials 3–10(–17) cm tall. Rhizomes short. Stems 1 or 2, erect, simple, papillate at first, glabrescent. Basal leaves in 1–4 erect rosettes; petiole 1–3 cm, membranous; leaf blade sometimes folded, narrowly elliptic, lanceolate, or spatulate, 2–6 cm × 2–11 mm, base narrowed, apex obtuse to rounded, glabrous or papillate when young, veins 1–3 and prominent. Stem leaves 1–3 pairs; petiole 5–10 mm; leaf blade narrowly elliptic to elliptic-lanceolate, 1.5–3 cm × 3–7 mm, apex obtuse; veins 1–3, abaxially prominent. Inflorescences terminal, 1–3-flowered clusters. Flowers sessile or subsessile. Calyx obconic, 1.5–2.7 cm, tube entire; lobes erect, unequal, usually narrowly oblong, 2–8.5 mm, apex obtuse. Corolla dark blue to blue-purple, with pale yellow-white base and dark blue streaks, tubular-campanulate, 3.5–6 cm; lobes ovate, 3–4.5 mm, margin entire or denticulate, apex obtuse; plicae obliquely truncate, margin erose. Stamens inserted at basal part of corolla tube; filaments 1.2–2.2 cm; anthers linear to narrowly ellipsoid, 2–3.5 mm. Style 3–6 mm; stigma lobes linear. Capsules ovoid-ellipsoid, 2–3 cm; gynophore to 3 cm. Seeds light brown, broadly ellipsoid to subglobose, 1.6–2 mm. Fl. and fr. Jul-Sep.

Bog meadows, alpine meadows and scrub, rocky places in high mountains; 3000–5300 m. Gansu, Qinghai, Xizang [Bhutan, NW India, Kashmir, Nepal, Sikkim].

Most material labeled as *Gentiana przewalskii* is correctly placed in *G. algida*.

72. *Gentiana erectosepala* T. N. Ho, Acta Phytotax. Sin. 23: 47. 1985.

直萼龙胆 zhi e long dan

Perennials 8–20 cm tall. Rhizomes short. Stems 2–6,

erect, simple, glabrous. Basal leaves in 1–4 erect rosettes; petiole 2–4 cm, membranous; leaf blade oblong to spatulate, 3–6.5 × 0.6–1.4 cm, base narrowed, apex obtuse to rounded, veins 3. Stem leaves 2–4 pairs; petiole to 1 cm; leaf blade narrowly elliptic to oblanceolate, 2–4.5 cm × 5–7 mm, base narrowed, apex obtuse, veins 1–3. Cymes axillary or terminal, forming a lax panicle, cymes sometimes on pedunclelike branches. Pedicel 7–12 mm at anthesis but elongated to 2.5 cm in fruit. Calyx obconic, 1.5–1.8 cm, tube entire; lobes erect, linear to linear-lanceolate, 3.5–7 mm, margin ciliolate. Corolla pale yellow or white, with blue stripes and streaks, obconic, 2.5–2.8 cm; lobes ovate, 3–3.5 mm, margin erose, apex rounded; plicae very short, obliquely truncate, margin erose. Stamens inserted at basal part of corolla tube; filaments 8–10 mm; anthers ellipsoid, 2–3 mm. Style 4–6 mm; stigma lobes oblong. Capsules ovoid-ellipsoid, 1.3–1.5 cm; gynophore 1.7 cm. Seeds light brown, broadly ellipsoid to subglobose, 1.2–1.5 mm. Fl. and fr. Aug-Sep.

- Mountains; 3600–4600 m. SE Xizang.

73. *Gentiana purdomii* C. Marquand, Bull. Misc. Inform. Kew 1928: 55. 1928.

岷县龙胆 min xian long dan

Perennials 4–25 cm tall. Rhizomes to 15 cm. Stems 1–3, erect, simple, glabrous. Basal leaves in 2–4 erect rosettes; petiole 2–3.5 cm, membranous; leaf blade usually folded, linear, linear-elliptic, or rarely narrowly oblong, 2–6 cm × 2–9 mm, base narrowed, apex acuminate to obtuse, vein 1. Stem leaves 2–4 pairs; petiole 6–10 mm; leaf blade narrowly elliptic to lanceolate, 1–3 cm × 3–6 mm, apex obtuse. Cymes axillary or terminal, forming racemelike cymes. Pedicel ca. 4 cm, unequal, slender. Calyx obconic, 1.4–1.7 cm, tube entire; lobes lanceolate to narrowly oblong, 2.5–8 mm, subequal, apex obtuse. Corolla pale yellow, with pale blue stripes and streaks, tubular-campanulate to funnellform, (3–)3.5–5 cm; lobes ovate, 3–3.5 mm, margin denticulate, apex acute; plicae obliquely truncate, margin denticulate. Stamens inserted at middle of corolla tube; filaments 0.9–1.1 cm; anthers narrowly ellipsoid, 3–3.5 mm. Style 3–4 mm; stigma lobes linear. Capsules ovoid-ellipsoid, 1.8–2.5 cm; gynophore to 2 cm. Seeds light brown, broadly ellipsoid to subglobose, 1.5–2 mm. Fl. and fr. Jul-Oct.

- Alpine meadows, rocky places in high mountains; 2700–5300 m. SW Gansu, Qinghai, NW Sichuan, NE Xizang.

74. *Gentiana trichotoma* Kusnezow, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 61. 1893.

三歧龙胆 san qi long dan

Perennials 15–35 cm tall. Rhizomes to 15 cm. Stems 1–3, erect, simple, glabrous. Basal leaves in 2–5 erect rosettes; petiole 1.5–5 cm, membranous; leaf blade linear, narrowly elliptic, or oblanceolate, 2–8 cm × 3–13 mm, base narrowed, apex obtuse, veins 3. Stem leaves 3–5 pairs; petiole to 2.5 cm, shorter to absent toward apex; leaf blade lanceolate, narrowly elliptic, or elliptic, base narrowed, apex obtuse, veins 1–3.

Cymes axillary or terminal, 3-branched, forming a panicle, subapical axillary cymes sometimes on pedunclelike branches. Pedicel 0.5–5 cm. Calyx obconic, 1.5–2 cm, tube entire; lobes erect to rarely slightly spreading, linear-triangular to narrowly elliptic, 2–6 mm, unequal, apex obtuse. Corolla pale blue, sometimes pale yellow-white at base, with dark blue streaks in tube, narrowly funnellform to funnellform, 4–5 cm; lobes ovate, 3–4.5 mm, margin entire, apex obtuse; plicae obliquely truncate, margin denticulate. Stamens inserted at middle of corolla tube; filaments 1.3–1.5 cm; anthers narrowly ellipsoid, 3–4 mm. Style 2–2.5 mm; stigma lobes semiorbicular. Capsules narrowly ellipsoid, 2–2.5 cm; gynophore 1.7–2.1 cm. Seeds brown, ellipsoid, 2–2.5 mm. Fl. and fr. Jul-Sep.

- 3000–4600 m. Qinghai, NW and W Sichuan, Xizang.

- 1a. Basal leaf blades oblanceolate to narrowly elliptic; flowers many ... 74a. var. *trichotoma*
- 1b. Basal leaf blades linear; flowers few 74b. var. *chingii*

74a. *Gentiana trichotoma* var. *trichotoma*

三歧龙胆 (原变种) san qi long dan (yuan bian zhong)

Gentiana phob Franchet.

Basal leaf blades oblanceolate to narrowly elliptic. Flowers many.

- Alpine meadows and scrub, forests; 3000–4600 m. Qinghai, NW and W Sichuan.

74b. *Gentiana trichotoma* var. *chingii* (C. Marquand) T. N. Ho, Novon 4: 372. 1994.

短茎三歧龙胆 duan jing san qi long dan

Gentiana chingii C. Marquand, Bull. Misc. Inform. Kew 1931: 83. 1931.

Basal leaf blades linear. Flowers few.

- Alpine meadows; 3300–3800 m. Qinghai, Xizang.

75. *Gentiana laxiflora* T. N. Ho in T. N. Ho & S. W. Liu, Bull. Nat. Hist. Mus. London (Bot.) 23: 56. 1993.

疏花龙胆 shu hua long dan

Perennials 10–15 cm tall. Rhizomes short. Stems 1–3, erect, simple, subglabrous. Basal leaves in 1–4 erect rosettes; petiole 2.5–4 cm, membranous; leaf blade linear-elliptic to narrowly oblong, 2.5–8 cm × 3–6 mm, base narrowed, apex acuminate to obtuse, vein 1. Stem leaves 2 or 3 pairs; petiole 0.5–1.5 cm, shorter toward apex; leaf blade linear to narrowly oblong, 2–3.5 cm × 2–4 mm, base narrowed, apex obtuse, vein 1. Cymes axillary or terminal, subapical axillary cymes sometimes on pedunclelike branches. Pedicel 0.5–2.1 cm, slender. Calyx narrowly obconic, 1–1.2 cm, tube entire; lobes erect to rarely slightly spreading, linear to triangular, 3–6 mm, apex acuminate. Corolla dark blue, with pale yellow-white base and blue streaks in tube, tubular to tubular-funnelform,

2.2–3(–3.5) cm; lobes ovate, 1.5–3 mm, margin entire, apex acute; plicae triangular to truncate, 1–1.5 mm, margin almost entire. Stamens inserted at basal part of corolla tube; filaments 8–10 mm; anthers ellipsoid, ca. 2 mm. Style 2–3 mm; stigma lobes oblong. Capsules ellipsoid, 1.5–2 cm; gynophore 2.1–

2.7 cm. Seeds light brown, ellipsoid to subglobose, 2–2.5 mm. Fl. and fr. Jul–Aug.

- Alpine meadows; 4100–4200 m. SE Xizang.

V. Sect. *Pneumonanthe* Gaudin, Fl. Helv. 2: 269. 1828.

龙胆草组 long dan cao zu

Perennials. Rhizomes horizontal to vertical, short, thick, ± fleshy. Stems branching sympodially, with 1 to few erect simple flowering stems but nonflowering basal rosette usually absent. Lowermost stem leaves scalelike. Bracts 2 per flower, well developed. Capsules broadly ellipsoid. Seeds linear to fusiform, winged at both ends; seed coat coarsely reticulate.

Thirty-eight species: North America, Asia, Europe; four species in China.

76. *Gentiana scabra* Bunge, Mém. Acad. Imp. Sci. Saint-Pétersbourg, Sér. 6, Sci. Math., Second Pt. Sci. Nat. 2: 543. 1835.

龙胆 long dan

Gentiana fortunei J. D. Hooker; *G. scabra* subsp. *australis* M. Y. Liou.

Perennials 30–60 cm tall. Stems apically papillate. Stem leaves sessile; lowermost leaves scalelike, 4–6 mm; middle to upper leaves linear-lanceolate, ovate-lanceolate, or ovate, 2–7 × (0.4–)2–3 cm, base rounded to subcordate, margin scabrous and revolute, apex acuminate to acute, veins 3–5. Upper leaves slightly smaller, shorter than flowers and surrounding their bases. Inflorescences 1- to many flowered, terminal or in axillary clusters, axillary clusters rarely on pedunclelike branches; bracts linear-lanceolate to lanceolate, 2–2.5 cm. Flowers sessile. Calyx tube 1–1.2 cm, entire; lobes spreading to erect, linear, 8–10 mm, margin scabrous, apex acute. Corolla blue-purple, sometimes with yellow-green spots in throat, tubular-campanulate to funnellform, 4–5 cm; lobes ovate to ovate-orbicular, 7–9 mm, apex rounded and apiculate; plicae obliquely and narrowly triangular, 3–4 mm, apex acute or slightly 2-cleft. Stamens inserted at middle of corolla tube; filaments 0.9–1.2 cm; anthers free, narrowly ellipsoid, 3.5–4.5 mm. Style 3–4 mm. Capsules 2–2.5 cm; gynophore to 1.5 cm. Seeds 1.8–2.5 mm. Fl. and fr. May–Nov.

River banks, grassland and roadside slopes, moist meadows, scrub, forest margins, forests; 400–1700 m. Fujian, Jiangsu, Zhejiang [Japan, Korea, E Russia].

Gentiana scabra var. *buergeri* (Miquel) Maximowicz occurs in Japan and differs from var. *scabra* in having calyx lobes linear-lanceolate and longer than tube.

77. *Gentiana uchiyamae* Nakai, Bot. Mag. (Tokyo) 23: 107. 1909.

朝鲜龙胆 chao xian long dan

Perennials 30–70 cm tall. Stems glabrous. Lower stem leaves scalelike, 1–3 cm; middle to upper leaves lanceolate, 5.5–15 × 1–1.5 cm, both ends narrowed, margin slightly revolute and smooth, veins 1–3 and prominent; upper leaves slightly smaller, longer than flower clusters but not surrounding them. Inflorescences of few- to many-flowered

terminal clusters, also in subapical, axillary clusters on short pedunclelike branches; bracts ovate-lanceolate, 2–3 cm × 4–7 mm. Flowers sessile. Calyx tube 1.4–1.6 cm, sometimes split on 1 side; lobes linear to narrowly triangular, (3.5–)8–10 mm, unequal, margin smooth, apex acuminate to obtuse. Corolla blue-purple, tubular-campanulate to funnellform, 4–5 cm; lobes ovate, 6–7 mm, apex obtuse; plicae oblique, broadly triangular to truncate, 1–1.5 mm, margin entire or denticulate. Stamens inserted at middle of corolla tube; filaments 0.9–1.2 cm; anthers narrowly ellipsoid, 3.5–4.5 mm. Style 3–4 mm. Capsules 1.7–2 cm; gynophore to 1.3 cm. Seeds 1.8–2.5 mm, broadly winged. Fl. and fr. Aug–Sep.

Steppes, clearings in forests. Jilin [Korea].

78. *Gentiana triflora* Pallas, Fl. Ross. 1(2): 105. 1789.

三花龙胆 san hua long dan

Perennials 35–80 cm tall. Stems glabrous. Stem leaf blades linear to linear-lanceolate, base obtuse to rounded, margin slightly revolute and smooth, apex acuminate to acute, veins 1–3 and prominent. Lowermost leaves pale purple, 1–1.2 cm; middle leaves 5–10 cm × 3–9(–20) mm; upper leaves slightly smaller, surrounding flowers. Inflorescences formed by crowded axillary or terminal clusters, few to many flowered; bracts 0.8–1.2 cm. Flowers sessile. Calyx tube 0.8–1.2 cm, usually split on 1 side; lobes irregular, linear to narrowly triangular, 4–8(–16) mm, margin slightly revolute, apex acute, vein 1. Corolla blue-purple, tubular-campanulate, 3.5–4.5 cm; lobes ovate-orbicular, 5–8 mm, margin entire or erose, apex obtuse to rounded; plicae triangular to truncate, 1–1.5 mm, oblique, margin entire. Stamens inserted at middle of corolla tube; filaments subulate, 7–10 mm; anthers narrowly ellipsoid, 4–4.5 mm. Style 2–3 mm. Capsules 1.5–1.8 cm; gynophore to 1 cm. Seeds 2–2.5 mm. Fl. and fr. Aug–Sep.

Meadows, forests; 600–1000 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol [Japan, Korea, Mongolia, E Russia].

Gentiana triflora var. *japonica* (Kusnezow) H. Hara occurs in Japan.

79. *Gentiana manshurica* Kitagawa, Bot. Mag. (Tokyo) 48: 103. 1934.

条叶龙胆 tiao ye long dan

Perennials 20–30 cm tall. Stems glabrous. Lower stem leaves pale purple, 5–8 mm; middle to upper leaves linear to linear-lanceolate, 3–10 cm × 3–9(–14) mm, base narrowed to obtuse, margin slightly revolute and smooth, apex acuminate to acute, veins 1–3; upper leaves slightly smaller, longer than but not surrounding flowers. Flowers terminal, solitary, sessile or subsessile, rarely also few in axils of upper leaves; bracts linear-lanceolate, 1.5–2 cm. Calyx tube 8–10 mm, entire; lobes linear to linear-lanceolate, 0.8–1.5 cm, margin slightly revolute, apex acute, vein 1. Corolla violet to blue-purple, tubular-campanulate, 4–5 cm; lobes ovate-

triangular, 7–9 mm, margin entire, apex acuminate; plicae obliquely ovate, 3.5–4 mm, margin irregularly denticulate, apex obtuse. Stamens inserted at basal part of corolla tube; filaments 0.9–1.2 cm; anthers narrowly ellipsoid, 3.5–4 mm. Style 2–3 mm. Capsules 1.5–1.8 cm; gynophore to 2 cm. Seeds 1.8–2.2 mm. Fl. and fr. Aug-Sep.

• Grassland slopes, wet meadows, roadsides; 100–1100 m. Anhui, Fujian, Guangdong, Guangxi, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi, Taiwan, Zhejiang.

VI. Sect. *Phyllocalyx* (Kusnezow) T. N. Ho, Bull. Bot. Res., Harbin 5(4): 14. 1985.

叶萼组 ye e zu

Gentiana sect. *Frigida* β *Phyllocalyx* Kusnezow, Trudy Imp. S.-Peterburgsk. Bot. Sada 15: 287. 1898.

Perennials. Stems branching sympodially, with short stolons. Calyx membranous, completely surrounded by upper pair of broad obovate obtuse leaves. Stigma lobes expanded, connate or contiguous, forming a discoid or funnellform structure but free after anthesis. Seeds with a discoid wing; seed coat alveolate, with simple, shallow, and hexagonal pits.

One species: Bhutan, China, India, Myanmar, Nepal, Sikkim.

80. *Gentiana phyllocalyx* C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 116. 1883.

叶萼龙胆 ye e long dan

Perennials 3–12 cm tall. Roots few, slender. Stolons to 5 cm. Stems ascending to erect, simple, glabrous. Leaves crowded toward base of stem. Stem leaves 3–5 pairs, widely spaced; petiole 5–8 mm; leaf blade obovate, 0.6–2.6 × 0.4–1.6 cm, base decurrent into petiole, apex rounded and emarginate, veins 1–3. Flowers terminal, solitary, sessile. Calyx pale yellow-green; tube broadly tubular, 3.5–4.5 mm; lobes linear to lanceolate, 3–4 mm, subequal, apex obtuse, veins

indistinct. Corolla blue, with dark blue stripes, broadly tubular to tubular-campanulate, 3–4.7 cm; lobes ovate to broadly ovate, 3–4 mm, margin entire or erose, apex obtuse; plicae horizontally truncate, margin erose. Stamens inserted at basal part of corolla tube; filaments 1.2–1.4 cm; anthers linear to ellipsoid, 2.5–5 mm. Style 4–5 mm, linear; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 2.3–2.5 cm; gynophore to 4.6 cm. Seeds compressed, orbicular, 1.4–1.6 mm. Fl. and fr. Jun-Oct.

Grassland and rocky slopes, stony pastures, scrub; 3000–5200 m. SE Xizang, NW Yunnan [Bhutan, India, N Myanmar, Nepal, Sikkim].

VII. Sect. *Isomeria* Kusnezow, Trudy Imp. S.-Petersburgsk. Obshch. Estetvoisp., Otd. Bot. 24(2): 198. 1894.

匍茎组 pu jing zu

Perennials, with stolons, without well-developed caudices, stout rhizomes, or persistent taproots. Stems branching sympodially; flowering stems arising singly from slender stolons, often creeping and rooting at lower nodes. Inflorescences terminal. Flowers usually sessile, solitary or in few-flowered clusters. Stigma lobes free, recurved, linear or oblong. Seed coat alveolate, with simple and shallow or spongy and complex hexagonal pits.

Eighteen species: North America, Asia; 16 species in China.

81. *Gentiana sikkimensis* C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 114. 1883.

锡金龙胆 xi jin long dan

Gentiana pseudosikkimensis C. Marquand ex Wilkie.

Perennials 3–10 cm tall. Stolons usually 10–15 cm, much branched. Stems ascending to erect, simple, glabrous. Leaf blade base narrowed, margin smooth or ciliolate, apex rounded, vein distinct abaxially. Basal leaves usually withered at anthesis, leaf blade suborbicular, 6–10 mm. Stem leaves mostly crowded around flowers; petiole 4–13 × 2–4.5 mm, slightly shorter to longer than leaf blade, conspicuously

broadened toward stem apex; leaf blade oblong to spatulate, 0.6–1.6 cm × 3.5–8 mm. Inflorescences 3–8-flowered. Calyx tube 6–8 mm, membranous; lobes linear to linear-lanceolate, 1.5–4(–5) mm, unequal, herbaceous, 1-veined, margin smooth or ciliolate, apex acute. Corolla blue, with dark blue streaks, tubular, 2–2.5 cm; lobes ovate, 2.8–3.2 mm, margin entire, apex obtuse; plicae obliquely triangular to truncate, 0.5–1 mm, margin entire or denticulate. Stamens inserted at middle of corolla tube; filaments 5–8 mm; anthers narrowly ellipsoid, 1.5–2 mm. Style 1.5–2 mm; stigma lobes oblong. Capsules ellipsoid, 1–1.2 cm; gynophore to 1.2 cm. Seeds light brown, ellipsoid to subglobose, 0.6–1 mm; seed coat with spongy complex pits. Fl. and fr. Aug-Nov.

Grassland slopes, scrub, forest margins, forests; 2700–5000 m. S and SE Xizang, NW Yunnan [Bhutan, E and NW India, NE Myanmar, Nepal, Sikkim].

82. *Gentiana elwesii* C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 115. 1883.

壶冠龙胆 hu guan long dan

Perennials 8–20 cm tall. Stolons to 5 cm, simple or few branched. Stems purple, erect, simple, papillate. Petiole 3–8 × 2–3 mm, slightly broadened toward stem apex; leaf blade oblong to elliptic, (0.6–)1–2 cm × (3–)5–8 mm, base narrowed, margin smooth or ciliolate, apex obtuse; vein 1, abaxially distinct. Lower to middle stem leaves widely spaced; upper leaves crowded and surrounding base of flowers. Inflorescences 3–8-flowered. Flowers in clusters, sessile or rarely lower pedunculate. Calyx tube narrowly obconic, 6–7 mm, membranous; lobes lanceolate, (0.7–)2.5–3 mm, unequal, margin smooth or ciliolate, apex acute, midvein indistinct. Corolla blue to blue-purple, urceolate, 2–2.6 cm; lobes ovate, 2–3 mm, margin entire, apex obtuse; plicae auricular to truncate, 1–1.5 mm, oblique, margin entire or denticulate. Stamens inserted at basal part of corolla tube; filaments 1.1–1.3 cm; anthers narrowly ellipsoid, 2–2.5 mm. Style 1–2 mm; stigma lobes oblong. Capsules ovoid-ellipsoid, 1.3–1.5 cm; gynophore to 8 mm, slender. Seeds light brown, ellipsoid to subglobose, 0.8–1 mm; seed coat with spongy complex pits. Fl. and fr. Sep.

Scrub slopes; ca. 4200 m. S and SE Xizang [Bhutan, NE India, Nepal, Sikkim].

83. *Gentiana chinensis* Kusnezow, Bull. Acad. Imp. Sci. Saint-Petersbourg 35: 350. 1894.

中国龙胆 zhong guo long dan

Perennials 5–15 cm tall. Stolons to 20 cm, much branched. Stems ascending, simple, papillate. Leaves widely spaced, uppermost crowded and surrounding base of flower cluster; petiole 3–4 mm, slightly broadened toward stem apex; leaf blade ovate-elliptic to ovate-orbicular, 0.6–1.5 cm × 3–7 mm, both ends obtuse, margin ciliolate; vein 1, abaxially distinct. Inflorescences 1–3(–5)-flowered. Calyx tube 7–10 mm, membranous; lobes linear, ovate, or triangular, 1.5–2(–4) mm, unequal, ciliolate, apex acute. Corolla blue, tubular, 3–3.5 cm; lobes ovate to triangular, 3–3.5 mm, margin entire or denticulate, apex acute; plicae obliquely triangular to truncate, 0.8–1.2 mm, margin entire or denticulate. Stamens inserted just below middle of corolla tube to base of lobes; filaments 0.9–1.1 cm; anthers narrowly ellipsoid, 1.5–2 mm. Style 4–5 mm; stigma lobes linear. Capsules narrowly ellipsoid to ovoid-ellipsoid, 1.3–1.5 cm; gynophore to 9–10 mm, slender. Seeds light brown, broadly ellipsoid to subglobose, 0.8–1 mm; seed coat with simple pits. Fl. and fr. Jul–Oct.

• Grassland slopes, rocky places, roadsides, forests; 2400–4500 m. W Hubei, SW Sichuan, NW Yunnan.

84. *Gentiana harrowiana* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 221. 1912.

扭果柄龙胆 niu guo bing long dan

Gentiana streptopoda I. B. Balfour & Forrest.

Perennials 3–6 cm tall. Stolons to 20 cm, much branched, somewhat woody. Stems ascending, simple, glabrous. Petiole 3–5 × 2–4 mm, conspicuously broadened toward stem apex, membranous; leaf blade basally narrowed, margin ciliolate, apex obtuse to rounded; vein 1, abaxially distinct. Lower stem leaves widely spaced; leaf blade elliptic to suborbicular, 8–14 × 4–5 mm; uppermost leaves crowded, surrounding base of flower cluster; leaf blade spatulate to obovate, 1.4–2.5 cm × 6–12 mm. Inflorescences (2–)4–8-flowered. Calyx tube narrowly obconic, 0.9–1.1 cm, membranous, slightly split on 1 side; lobes triangular, 2–4 mm, unequal, ciliolate, apex acute. Corolla blue, tubular, 2.6–3 cm; lobes ovate, 4–5 mm, margin entire or denticulate, apex obtuse; plicae obliquely triangular to truncate, 0.8–1 mm, margin entire or denticulate. Stamens inserted at middle of corolla tube; filaments 6.5–8 mm; anthers ellipsoid, 1–1.2 mm. Style 3–4 mm; stigma lobes linear. Capsules ellipsoid, 1.2–1.5 cm; gynophore to 3.7 cm. Seeds light brown, ellipsoid to subglobose, 0.6–0.8 mm; seed coat with spongy complex pits. Fl. and fr. Aug–Oct.

Grassland slopes; 3600–4500 m. NW Yunnan [NE Myanmar].

Gentiana harrowiana appears to intergrade with *G. chinensis*.

85. *Gentiana depressa* D. Don, Prodr. Fl. Nepal. 125. 1825.

平龙胆 ping long dan

Perennials 3–6 cm tall. Stolons to 15 cm, much branched. Stemless or stems very short, erect, simple. Stem leaves crowded and surrounding flowers; petiole 5–12 mm; leaf blade broadly oblong to ovate, 0.9–1.5 cm × 7–9 mm, membranous, margin scabrous, apex obtuse; vein 1, abaxially distinct. Flowers solitary. Calyx campanulate; tube 6–8 mm, membranous; lobes ovate to broadly oblong, 4–6 mm, herbaceous, base narrowed, margin scabrous and membranous. Corolla pale pinkish purple, broadly tubular to campanulate, throat sometimes slightly constricted, 2.5–3 cm; lobes ovate, 5–7 mm, margin entire, apex obtuse and cuspidate; plicae pale blue, triangular, 2–3 mm, margin entire, apex obtuse. Stamens inserted at basal part of corolla tube; filaments 8–10 mm; anthers ellipsoid, 2–3 mm. Style 6–8 mm; stigma lobes linear. Fl. Aug.

Steep banks, cliff faces; 3000–4500 m. S Xizang [Bhutan, India (Madras), Nepal, Sikkim].

Only var. *depressa* grows in China. *Gentiana depressa* var. *stenophylla* T. N. Ho occurs in Nepal.

86. *Gentiana amplicrater* Burkill, J. Proc. Asiat. Soc. Bengal 2: 312. 1906.

硕花龙胆 shuo hua long dan

Perennials 7–20(–25) cm tall. Stolons 3–5 cm, simple to 3-branched. Stems erect, simple, glabrous. Basal leaves withered at anthesis. Stem leaves with petiole 0.8–1.2 cm; leaf blade ovate-elliptic to ovate, 2–4 × 0.7–1.7 cm, base obtuse,

margin thick cartilaginous, apex obtuse; vein 1, abaxially distinct. Inflorescences (1- or) 2-4-flowered. Calyx obconic; tube 1.7-2.3 cm, membranous; lobes oblong to elliptic, 6-10 mm, subequal, margin cartilaginous, apex acute to obtuse and apiculate, midvein outside prominent. Corolla blue-purple, with pale yellow-green base and dark blue stripes, tubular-campanulate, 4.5-6 cm; lobes broadly ovate, 4-6 mm, margin entire, apex rounded; plicae ovate, 1.5-2.5 mm, margin denticulate or rarely entire, apex obtuse. Stamens inserted at basal part of corolla tube; filaments 1.2-1.4 cm; anthers narrowly ellipsoid, 2.5-3.5 mm. Style 4-5 mm; stigma lobes linear. Fl. and fr. Aug-Oct.

Bog meadows, seeps on slopes; 3900-4800 m. SE Xizang [India, Nepal].

87. *Gentiana confertifolia* C. Marquand, Bull. Misc. Inform. Kew 1928: 50. 1928.

密叶龙胆 mi ye long dan

Perennials 4-6 cm tall. Stolons to 15 cm, much branched. Stemless or stems very short, erect, simple. Basal leaves withered, persistent. Stem leaves crowded and surrounding flowers; petiole 4-8 mm; leaf blade linear-elliptic to lanceolate, 2-4 cm × 3-5 mm, base narrowed, margin distinctly cartilaginous, apex acuminate to obtuse, vein 1. Flowers solitary, rarely to 3 and crowded. Calyx obconic; tube membranous; lobes narrowly oblong to oblanceolate, 8-10 mm, margin distinctly cartilaginous, apex acute to obtuse, vein distinct inside. Corolla pale blue, broadly tubular to tubular-campanulate, 2.5-2.8 cm; lobes broadly ovate, 4-6 mm, margin entire, apex rounded and cuspidate; plicae broadly ovate to semiorbicular, 2-3 mm, margin entire, apex rounded. Stamens inserted at basal part of corolla tube, unequal; filaments 2-2.2 cm; anthers ellipsoid, 2-3 mm. Style 8-10 mm, linear; stigma lobes oblong. Fl. Apr.

• Sunny limestone cliffs; 3000-3400 m. NW Yunnan.

88. *Gentiana lacerulata* Harry Smith, Kew Bull. 15: 52. 1961.

撕裂边龙胆 si lie bian long dan

Perennials 3-5 cm tall. Stolons to 5 cm, simple or few branched. Stems erect, simple. Basal leaves withered, persistent. Stem leaves overlapping, crowded; petiole 3-6 mm; leaf blade obovate to truncate-flabelliform, 4-10 × 5.5-12 mm, base narrowed, margin broadly membranous and minutely lacerate, apex rounded to truncate and emarginate, midvein crested and minutely lacerate. Flowers solitary. Calyx broadly tubular; tube 0.8-1.3 cm, membranous; lobes broadly truncate-flabelliform, 4.5-5.5 mm, herbaceous, margin broad, membranous, and lacerulate, apex truncate and emarginate, midvein crested and lacerulate. Corolla blue-purple, tubular, 2.5-3.5 cm; lobes broadly ovate, 4.5-5.5 mm, margin erose, apex rounded and cuspidate; plicae ovate, 3-4 mm, margin erose. Stamens inserted at basal part of corolla tube; filaments ca. 1 cm; anthers ellipsoid, 2-3 mm. Style filiform, 1-1.2 cm; stigma lobes oblong. Fl. Sep.

Alpine meadows; 4200-4500 m. S and SE Xizang [Bhutan, NE India, Nepal, Sikkim].

89. *Gentiana urnula* Harry Smith, Kew Bull. 15: 51. 1961.

乌奴龙胆 wu nu long dan

Gentiana amoena C. B. Clarke var. *major* Burkill.

Perennials 4-6 cm tall. Stolons to 10 cm, much branched. Stems erect, simple. Basal leaves withered, persistent. Stem leaves overlapping, crowded; petiole 3-6 mm, membranous; leaf blade truncate-flabelliform, 0.7-1.7 cm × 5-10 mm, margin cartilaginous and smooth, apex truncate and emarginate, midvein cartilaginous and crested. Flowers solitary or to 3 and crowded. Calyx obconic; tube 5-6 mm, membranous; lobes 3-4 mm, similar to leaves. Corolla pale blue-purple, sometimes with pale yellow base, with blue streaks, urceolate, 2-3 cm; lobes broadly ovate, 2-3 mm, margin entire, apex rounded and cuspidate; plicae broadly ovate to subtruncate, 1-1.5 mm, margin entire or denticulate. Stamens inserted just below middle of corolla tube; filaments 6-8 mm; anthers ellipsoid, 2.5-3 mm. Style 0.9-1.1 cm; stigma lobes triangular. Capsules ovoid-ellipsoid, 1.5-1.8 cm; gynophore to 4 cm, slender. Seeds dark brown, ellipsoid, 2.3-2.5 mm; seed coat with simple pits. Fl. and fr. Aug-Oct.

Gravel slopes, alpine meadows, gravel zone on high mountains; 3900-5700 m. SW Qinghai, E Xizang [Bhutan, Nepal, Sikkim].

90. *Gentiana emodii* C. Marquand ex Sealy, Bot. Mag. 170: pl. 230. 1954.

扇叶龙胆 shan ye long dan

Gentiana amoena C. B. Clarke (1883), not Weddell (1859).

Perennials 3-5 cm tall. Stolons to 5 cm, much branched. Stems erect, simple. Basal leaves withered, persistent. Stem leaves overlapping, crowded; petiole 3-6 mm, membranous; leaf blade truncate-flabelliform, 5-7 × 3.5-5.5 mm, margin cartilaginous and ciliate, apex rounded to truncate and emarginate, midvein cartilaginous and crested. Flowers solitary, rarely to 3 and crowded. Calyx obconic; tube 4.5-5.5 mm, membranous; lobes 2-3 mm, similar to leaves. Corolla pale blue-purple, rarely white, with blue streaks, urceolate, 1.5-2 cm; lobes broadly ovate, 2.5-3 mm, margin entire, apex rounded and cuspidate; plicae broadly ovate, 2-2.5 mm, margin entire or denticulate, apex subtruncate. Stamens inserted; filaments 7-8 mm; anthers ellipsoid, 2-2.5 mm. Style 4-5 mm; stigma lobes linear. Capsules ovoid-ellipsoid, 1.5-1.8 cm; gynophore to 3.5 cm, slender. Seeds dark brown, ellipsoid, 1.3-1.5 mm; seed coat with simple pits. Fl. and fr. May-Oct.

Alpine meadows, gravel zone on high mountains; 4300-5700 m. S and SE Xizang [Bhutan, Sikkim].

91. *Gentiana stragulata* I. B. Balfour & Forrest in C. Marquand, Bull. Misc. Inform. Kew 1928: 61. 1928.

匙萼龙胆 chi e long dan

Perennials 5-7 cm tall. Stolons to 10 cm, much branched. Stems erect, simple, densely purple papillate. Leaves apically crowded into a rosette; petiole 3-7 mm, slender, abaxially ciliate and papillate; leaf blade oblong

spatulate, or rarely ovate, 5–7 × 2–4 mm, adaxially sometimes papillate, abaxially 1-veined, base contracted into a tongue, purple-ciliolate, apex obtuse to rounded. Flowers solitary or to 3 and crowded. Calyx tubular; tube outside ± purple papillate; lobes orbicular-spatulate, 5–7 mm, herbaceous, base contracted into a tongue, purple ciliolate, apex rounded, midvein prominent. Corolla blue, unspotted, tubular, 4.5–5.5 cm; lobes broadly ovate, 5–7 mm, margin entire or denticulate, apex acute; plicae broadly ovate, 1.5–2.5 mm, margin denticulate, apex obtuse to rounded. Stamens inserted just below middle of corolla tube; filaments 1.8–2.5 cm, unequal; anthers ellipsoid, 1.5–2.5 mm. Style 8–10 mm; stigma lobes linear. Capsules ellipsoid, 1.8–2 cm; gynophore to 3 cm. Seeds light brown, ellipsoid to subglobose, 0.8–1 mm; seed coat with spongy complex pits. Fl. and fr. May–Jun.

• Grassland slopes; 3000–4300 m. SE Xizang, NW Yunnan.

92. *Gentiana gilvostriata* C. Marquand, Bull. Misc. Inform. Kew 1931: 83. 1931.

黄条纹龙胆 huang tiao wen long dan

Gentiana gilvostriata var. *stricta* C. Marquand.

Perennials 1–7 cm tall. Stolons to 10 cm, much branched. Stems erect, simple, densely papillate. Leaves apically crowded into a rosette; petiole 3–6 mm, slender, abaxially ciliolate and papillate; leaf blade oblanceolate, spatulate, or obovate, 5–7 × 2–4 mm, base narrowed, margin smooth or ciliolate, apex rounded; vein 1, abaxially distinct. Flowers solitary or to 3 and crowded. Calyx obconic; tube 1–1.2 cm, membranous, outside sometimes papillate; lobes orbicular-spatulate, 2.5–3.5 mm, herbaceous, base contracted into a tongue, margin ciliolate, apex rounded, midvein indistinct. Corolla pale bright blue, with pale yellow base and blue stripes, streaks, and spots, campanulate, 3–3.5(–4.5) cm; lobes broadly ovate, 5–7 mm, margin entire or denticulate, apex acute; plicae broadly ovate, 1.5–2.5 mm, margin denticulate, apex obtuse to rounded. Stamens inserted just below middle of corolla tube; filaments 1.6–2 cm, unequal; anthers narrowly ellipsoid, 1.5–2.5 mm. Style 7–9 mm; stigma lobes linear. Capsules ellipsoid to ovoid-ellipsoid, 1.3–1.5 cm; gynophore to 2 cm. Seeds light brown, ellipsoid to subglobose, 0.8–1 mm; seed coat with spongy complex pits. Fl. and fr. Aug–Nov.

Grassland slopes, forests; 3000–3900 m. SE Xizang, NW Yunnan [Bhutan, NE India, NE Myanmar].

93. *Gentiana filistyla* I. B. Balfour & Forrest in C. Marquand, Bull. Misc. Inform. Kew 1928: 60. 1928.

丝柱龙胆 si zhu long dan

Gentiana filistyla var. *parviflora* C. Marquand.

Perennials 2–5 cm tall. Stolons 3–5 cm, usually few branched. Stems erect, simple, glabrous. Leaves crowded; petiole 3–5 mm, membranous; leaf blade spatulate to obovate, 4–8.5 × 2.5–5 mm, base narrowed, apex rounded; veins 1–3, abaxially distinct. Flowers solitary. Calyx tubular to narrowly

obconic, tube 8–11 mm; lobes lanceolate to narrowly oblong, 5–6 mm, apex subacute to obtuse, midvein indistinct. Corolla blue, unspotted, tubular to narrowly funnelform, (2.3–)3–4 cm; lobes broadly ovate, 3–4 mm, margin entire, apex rounded; plicae obliquely ovate to truncate, 1–1.5 mm, margin erose, apex obtuse to rounded. Stamens inserted at middle of corolla tube; filaments 1.3–1.5 cm; anthers narrowly ellipsoid, 2–3.5 mm. Style 1.1–1.4 cm, filiform, longer than ovary; stigma lobes oblong. Capsules ellipsoid, 1–1.2 cm; gynophore to 1 cm. Seeds light brown, subellipsoid to globose, 0.8–1 mm; seed coat with spongy complex pits. Fl. and fr. Jul–Sep.

Alpine meadows, grassland slopes, rocky places; 2900–4500 m. SE Xizang, NW Yunnan [NE Myanmar].

94. *Gentiana tubiflora* (Wallich ex G. Don) Grisebach, Gen. Sp. Gent. 277. 1838.

筒花龙胆 tong hua long dan

Ericala tubiflora Wallich ex G. Don, Gen. Hist. 4: 189. 1837; *Gentiana longistyla* T. N. Ho; *G. tubiflora* var. *longiflora* Turritt; *G. tubiflora* var. *namlaensis* C. Marquand.

Perennials 4–5 cm tall. Stolons 2–5 cm, simple to 3-branched. Stems erect, simple. Leaves crowded; petiole 3–5 mm; leaf blade oblong to elliptic, 6–9 × 2–3 mm, base narrowed, margin cartilaginous and ± ciliate, apex acute to obtuse and sometimes caudate; vein 1, abaxially indistinct. Flowers solitary. Calyx tubular to narrowly obconic, tube (0.8–)1.2–1.5 cm; lobes ovate to triangular, 4–7 mm, margin usually ± ciliate, apex acute and sometimes caudate, midvein indistinct. Corolla dark blue, unspotted, tubular, (2.5–)3.2–4.2 cm; lobes 4–6 mm, ovate, margin entire, apex obtuse; plicae obliquely truncate, 1–1.5 mm, margin erose. Stamens inserted at middle of corolla tube; filaments (4–)6–10 mm; anthers linear, 1.5–2.5 mm. Style filiform, 1.2–1.4 cm, longer than ovary; stigma lobes oblong. Capsules ellipsoid to ovoid-ellipsoid, 0.9–1.3 cm; gynophore to 4 cm. Seeds brown, ellipsoid, 0.7–1 mm; seed coat with simple pits.

Grassy hillsides, dry hillsides, alpine meadows; 4200–5300 m. S and SE Xizang [Bhutan, NW India, Nepal, Sikkim].

95. *Gentiana namlaensis* C. Marquand, J. Linn. Soc., Bot. 48: 205. 1929.

墨脱龙胆 mo tuo long dan

Gentiana monochroa T. N. Ho; *G. sherriffii* C. Marquand.

Perennials 3–5 cm tall. Stolons to 10 cm, much branched. Stems erect, simple. Leaves of stolons widely spaced; petiole completely connate; leaf blade linear to linear-lanceolate, 0.8–1.2 cm × 2–3 mm. Leaves of flowering stems crowded into a rosette; petiole 1–1.5 cm, membranous; leaf blade narrowly elliptic to ovate-elliptic, 1.2–2 cm × 2–5 mm, base narrowed, apex obtuse; veins 1–3, abaxially distinct. Flowers solitary. Calyx campanulate, tube 6–9 mm; lobes lanceolate to ovate, 2–7 mm, unequal, apex acute, midvein indistinct. Corolla clear blue, with pale yellow-white base and blue streaks and spots, campanulate, (1.6–)2–2.5 cm; lobes broadly ovate, 2.5–3.5 mm, margin entire, apex rounded;

plicae broadly ovate, 0.5–1 mm, margin entire, apex rounded to truncate. Stamens inserted at basal part of corolla tube; filaments 8–10 mm; anthers ellipsoid, 1.5–2 mm. Style 2–3 mm; stigma lobes oblong. Capsules ellipsoid to ovoid-ellipsoid, 1–1.2 cm; gynophore to 1 cm. Seeds light brown, ellipsoid to subglobose, 1–1.2 mm; seed coat with spongy complex pits. Fl. and fr. Aug.

• Alpine meadows; 4600–4900 m. SE Xizang.

96. *Gentiana wardii* W. W. Smith, Notes Roy. Bot. Gard. Edinburgh 8: 122. 1913.

矮龙胆 ai long dan

Perennials 3–5 cm tall. Stolons 1–3 cm, simple to 3-branched. Stems erect, simple. Leaves crowded into a rosette; petiole 3–5 mm; leaf blade spatulate to obovate, 4–11 × 3–6 mm, base narrowed, apex rounded; veins 1–3, abaxially distinct. Flowers solitary. Calyx obconic; tube 6–8 mm, membranous; lobes ovate, 2–3 mm, subequal, herbaceous, apex obtuse to rounded, midvein indistinct. Corolla blue, unspotted, campanulate, less than 1 cm or 2–3.5 cm; lobes broadly ovate, 1.5–2.5 mm, margin entire, apex rounded; plicae broadly ovate and 1–1.5 mm or triangular and 2–2.5 mm, margin entire or denticulate, apex obtuse. Stamens inserted at basal part of corolla tube; filaments 7–9 mm; anthers ellipsoid, 1.5–2 mm. Style 1.5–2.5 mm; stigma lobes oblong. Capsules ovoid-ellipsoid, 1.4–1.6 cm; gynophore to 1.7 cm. Seeds light brown, ellipsoid to subglobose, 1–1.3 mm; seed coat with spongy complex pits. Fl. and fr. Aug–Nov.

3000–4900 m. SW Sichuan, SE Xizang, NW Yunnan [Myanmar].

VIII. Sect. *Microsperma* T. N. Ho, Bull. Bot. Res., Harbin 5(4): 14. 1985.

微籽组 wei zi zu

Annuals. Capsule cylindrical to narrowly ellipsoid, wingless. Seed coat alveolate, with simple shallow hexagonal pits.

Ten species: Bhutan, SW China, Nepal; nine species in China.

97. *Gentiana lineolata* Franchet, Bull. Soc. Bot. France 31: 375. 1884.

四数龙胆 si shu long dan

Gentiana lineolata var. *verticillaris* F. B. Forbes & Hemsley.

Annuals 5–10 cm tall. Stems erect, with laxly spreading branches, densely papillate. Basal leaves withered at anthesis, similar to stem leaves. Stem leaves shorter than internodes; petiole 2–3 mm, densely papillate; leaf blade lanceolate to ovate, 6–12 × 2.5–4 mm, larger toward stem apex, margin ciliolate, apex acute, midvein prominent. Flowers terminal, solitary, sessile or subsessile, 4-merous. Calyx tubular, 1.3–1.6 cm; lobes ovate-triangular, 5–6 mm, margin densely ciliolate, apex acuminate and caudate, midveins strongly keeled and decurrent as conspicuous wings of calyx tube. Corolla purple, with blackish streaks, salverform, 2–3.5 cm;

1a. Corolla less than 1 cm 96b. var. *micrantha*
1b. Corolla 2–3.5 cm.

2a. Corolla 2–2.2(–2.6) cm; plicae broadly ovate, 1–1.5 mm 96a. var. *wardii*

2b. Corolla 3–3.5 cm; plicae triangular, 2–2.5 mm 96c. var. *emergens*

96a. *Gentiana wardii* var. *wardii*

矮龙胆 (原变种) ai long dan (yuan bian zhong)

Corolla 2–2.2(–2.6) cm; plicae broadly ovate, 1–1.5 mm.

• Alpine meadows, gravel slopes; 3500–4600 m. SE Xizang, NW Yunnan.

96b. *Gentiana wardii* var. *micrantha* C. Marquand, Bull. Misc. Inform. Kew 1937: 187. 1937.

小花矮龙胆 xiao hua ai long dan

Corolla less than 1 cm; plicae broadly ovate, 1–1.5 mm.

SE Xizang [Myanmar].

96c. *Gentiana wardii* var. *emergens* (C. Marquand) T. N. Ho, Novon 4: 372. 1994.

露萼龙胆 lu e long dan

Gentiana emergens C. Marquand, Bull. Misc. Inform. Kew 1931: 82. 1931.

Corolla 3–3.5 cm; plicae triangular, 2–2.5 mm.

• Grassland slopes, alpine meadows, gravel places on high mountains; 3000–4900 m. SW Sichuan.

lobes ovate-elliptic, 4–5 mm, margin entire, apex obtuse; plicae ovate to suborbicular, 2–2.5 mm, margin entire or denticulate, apex obtuse to subtruncate. Stamens inserted at basal part of corolla tube, unequal, 2 longer and 1–1.2 cm, 2 shorter and 6–8 mm; anthers narrowly ellipsoid, 1.2–1.5 mm. Style filiform, 8–9 mm; stigma lobes linear. Capsules ovoid-ellipsoid to narrowly ellipsoid, 1–1.2 cm; gynophore 0.9–1.1 cm, slender, often twisted. Seeds dark brown, ellipsoid, 0.6–0.8 mm. Fl. and fr. Aug–Dec.

• Grasslands, forest margins, forests; 600–4000 m. SW Sichuan, Yunnan.

98. *Gentiana praeclara* C. Marquand, Bull. Misc. Inform. Kew 1928: 54. 1928.

脊萼龙胆 ji e long dan

Annuals 3–12 cm tall. Stems erect, with laxly spreading

branches, densely papillate. Basal leaves withered at anthesis, similar to stem leaves. Stem leaves shorter than internodes; petiole 2–3 mm, densely papillate; leaf blade ovate-lanceolate to ovate, 0.6–2 cm × 2.5–9 mm, larger toward stem apex, margin ciliolate, apex acute, midvein prominent. Flowers terminal, solitary, sessile or subsessile, 4-merous. Calyx tubular, 2–2.7 cm; lobes ovate-triangular, 0.9–1.1 cm, margin densely ciliolate, apex acuminate and caudate, midvein strongly keeled and decurrent as conspicuous wings of calyx tube. Corolla blue-purple, with blackish streaks, salverform, 3.5–6 cm; lobes ovate-elliptic, 0.8–1.2 cm, margin entire, apex obtuse; plicae ovate to subtruncate, 1.5–2.5 mm, margin denticulate, apex obtuse to subtruncate. Stamens inserted at middle of corolla tube, unequal, 2 longer and 1.2–1.4 cm, 2 shorter and 8–10 mm; anthers narrowly ellipsoid, 2.5–3 mm. Style filiform, 1.2–1.4 cm, slightly shorter or as long as ovary; stigma lobes narrowly oblong. Capsules narrowly ellipsoid, 1.6–2 cm; gynophore 0.9–1.1 cm, slender. Seeds dark brown, ellipsoid to ovoid, 0.8–1 mm. Fl. and fr. Sep-Oct.

• Roadside slopes, meadows, forests; 1500–4200 m. SW Sichuan, NW Yunnan.

99. *Gentiana delavayi* Franchet, Bull. Soc. Bot. France 31: 377. 1884.

微籽龙胆 wei zi long dan

Annuals 3–12(–20) cm tall, densely purple papillate. Stems purple, erect, branched. Basal leaves usually withered at anthesis; petiole 3–5 mm; leaf blade narrowly elliptic to lanceolate, 1–1.5 cm × 4–6 mm, apex obtuse, veins 3. Stem leaves with petiole 5–10 mm; leaf blade narrowly elliptic to elliptic-lanceolate, 2–5 cm × 5–7 mm, larger toward stem apex, apex obtuse; veins 3–5, prominent. Inflorescences terminal clusters. Flowers sessile or subsessile, 5-merous. Calyx tube tinged purple, narrowly obconic, 8–10 mm; lobes oblanceolate, 8–11 mm, slightly unequal, margin densely ciliolate, apex obtuse, midvein prominent. Corolla dark blue to violet, with inconspicuous blackish streaks, funnellform, (1.5–)2.8–4 cm; lobes ovate-triangular, 5–6 mm, margin entire, apex acute; plicae ovate to subtruncate, 1.5–2.5 mm, margin denticulate, apex obtuse. Stamens inserted at middle of corolla tube, sometimes unequal; filaments 1.2–1.8 cm; anthers linear, 3–4 mm. Style filiform, 8–10 mm; stigma lobes triangular. Capsules narrowly ellipsoid to ovoid-ellipsoid, 1.5–1.8 cm; gynophore to 1.8 cm. Seeds brown, ellipsoid, 0.5–0.7 mm. Fl. and fr. Sep-Dec.

• Grassland slopes, roadsides, scrub; 1400–3900 m. SW Sichuan, NE and NW Yunnan.

100. *Gentiana picta* Franchet in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 131. 1890.

着色龙胆 zhuo se long dan

Annuals 10–15 cm tall. Stems erect, branched, glabrous. Basal leaves withered at anthesis. Stem leaves with petiole 2–3 mm, base broadened; leaf blade linear, 1–3 cm × 1–3 mm, apex acuminate, midvein indistinct. Inflorescences axillary or terminal clusters. Flowers sessile or subsessile, 5-merous.

Calyx tube with pale blue streaks, narrowly obconic, membranous, 6–8 mm; lobes linear, 7–12 mm, unequal, herbaceous, midvein indistinct. Corolla pale blue, with blackish streaks, broadly tubular, 2.5–3.2 cm; lobes ovate, 4–5 mm, margin entire, apex acute; plicae oblong, 2–2.5 mm, margin entire, apex obtuse to subtruncate. Stamens inserted at basal part of corolla tube, unequal; filaments 0.8–1.5 cm; anthers narrowly ellipsoid, 1–1.5 mm. Style linear, 3–4 mm, much shorter than ovary; stigma lobes linear. Capsules narrowly ellipsoid, 1.1–1.3 cm; gynophore to 4 cm. Seeds brown, ellipsoid to subglobose, 0.5–0.7 mm. Fl. and fr. Aug-Nov.

• River banks, grassland slopes; 2400–3000 m. SW Sichuan, C and NW Yunnan.

101. *Gentiana yunnanensis* Franchet, Bull. Soc. Bot. France 31: 376. 1884.

云南龙胆 yun nan long dan

Annuals 5–30 cm tall. Stems purple, erect, branched, densely papillate. Petiole equal or slightly longer than leaf blade, slender; leaf blade spatulate to obovate, 1–3.5 cm × 4–13 mm, base narrowed, margin scabrous, apex rounded, veins 1–3. Inflorescences elongated with terminal and many axillary clusters. Flowers sessile or subsessile, 5-merous. Calyx tube narrowly obconic, 6–9 mm; lobes narrowly elliptic, unequal, 3 larger and 8–10 mm, 2 smaller and 4–6 mm, base narrowed, margin scabrous, apex obtuse, midvein prominent. Corolla pale yellow-white to pale blue, with blackish streaks and spots, tubular, (1.5–)2.2–2.6 cm; lobes ovate, 3–5 mm, margin entire, apex obtuse; plicae broadly ovate, 0.7–1 mm, symmetric, margin slightly 2-cleft or denticulate. Stamens inserted at middle of corolla tube, usually exserted, unequal, 3 longer and 1–1.2 cm, 2 shorter and 7–9 mm; anthers ellipsoid, 1–1.5 mm. Style linear, 2–3 mm, much shorter than ovary; stigma lobes narrowly oblong. Capsules narrowly ellipsoid, 1.1–1.3 cm; gynophore 1.1–1.3(–3.5) cm, slender. Seeds brown, subglobose, 0.5–0.7 mm. Fl. and fr. Aug-Nov.

• Grassland slopes, roadsides, alpine meadows, scrub, forests; 2300–4400 m. Guizhou, SW and W Sichuan, SE Xizang, NE and NW Yunnan.

102. *Gentiana suborbisepala* C. Marquand, Bull. Misc. Inform. Kew 1928: 58. 1928.

圆萼龙胆 yuan e long dan

Annuals 6–15 cm tall. Stems purple, ascending, branches spreading to prostrate, densely papillate. Petiole equal or slightly longer than leaf blade, slender; leaf blade spatulate to obovate, 5–10(–15) × 3.5–7 mm, base narrowed, margin scabrous, apex rounded, veins 1–3. Inflorescences axillary or terminal clusters, 1–3-flowered. Flowers sessile or subsessile, 5-merous. Calyx tube narrowly obconic, 7–10 mm; lobes suborbicular, 6–8 mm, equal, base contracted into a tongue, margin scabrous, apex rounded, midvein prominent. Corolla pale yellow-white to pale blue, usually with blackish streaks and spots, tubular, less than 1.5(–2) cm or 2.5–3 cm; lobes ovate, 2.5–4 mm, symmetric, margin entire, apex obtuse; plicae broadly ovate, 1.5–2 mm, margin slightly 2-cleft or denticulate. Stamens inserted at middle of corolla

tube, usually exerted, unequal; filaments 5–8 mm; anthers narrowly ellipsoid, 1–1.5 mm. Style linear, 3.5–5.5 mm, much shorter than ovary; stigma lobes narrowly oblong. Capsules narrowly ellipsoid, 1.3–1.5 cm; gynophore to 3 cm, slender. Seeds brown, subglobose, 0.5–0.7 mm. Fl. and fr. Aug–Nov.

- 2200–4400 m. Guizhou, SW and W Sichuan, NE Yunnan.

1a. Corolla 2.5–3 cm 102a. var. *suborbisepala*
1b. Corolla less than 1.5(–2) cm 102b. var. *kialensis*

102a. *Gentiana suborbisepala* var. *suborbisepala*

圆萼龙胆 (原变种) *yuan e long dan* (*yuan bian zhong*)

Corolla 2.5–3 cm.

- Grassland slopes, wastelands, alpine meadows, scrub; 2200–4400 m. Guizhou, SW and W Sichuan, NE Yunnan.

102b. *Gentiana suborbisepala* var. *kialensis* (C. Marquand) T. N. Ho, *Novon* 4: 372. 1994.

卡拉龙胆 *ka la long dan*

Gentiana yunnanensis Franchet var. *kialensis* C. Marquand, *Bull. Misc. Inform. Kew* 1937: 166. 1937; *G. blinii* H. Léveillé.

Corolla less than 1.5(–2) cm.

- Grassland slopes; 3700–3800 m. Guizhou, SW and W Sichuan, NE Yunnan.

103. *Gentiana atropurpurea* T. N. Ho, *Bull. Bot. Res., Harbin* 4(1): 76. 1984.

黑紫龙胆 *hei zi long dan*

Annuals 3–5 cm tall. Stems purple, ascending, much branched with prostrate branches, densely papillate. Petiole 2.5–5 mm; leaf blade reniform to suborbicular, 1.5–3 × 2–4.5 mm, base rounded, margin smooth, apex rounded, midvein distinct. Flowers terminal, solitary, sessile or subsessile, 5-merous. Calyx tube narrowly obconic, 6–8 mm; lobes reniform to suborbicular, 1–2.5 mm, equal, base contracted into a tongue, margin scabrous, apex rounded, midvein distinct. Corolla dark purple, tubular, (0.8–)1–1.5 cm; lobes ovate, 1.5–2.5 mm, symmetric, margin entire, apex obtuse; plicae ovate, 1–1.5 mm, margin denticulate, apex obtuse. Stamens inserted at apical part of corolla tube, included in corolla, equal; filaments 1–2 mm; anthers ellipsoid, 0.4–0.5 mm. Style 1.2–1.5 mm, much shorter than ovary; stigma lobes subcapitate. Capsules narrowly ellipsoid, 6.5–7.5 mm; gynophore to 3 mm. Seeds brown, ellipsoid, 1–1.2 mm. Fl. and fr. Aug.

- Grassland slopes; 3200–3800 m. SW Sichuan.

104. *Gentiana vernayi* C. Marquand, *Hooker's Icon. Pl.* 34: t. 3330. 1937.

露蕊龙胆 *lu rui long dan*

Annuals 3–5 cm tall. Stems purple, erect, branched, glabrous or papillate. Petiole 2–4 mm; leaf blade suborbicular, 1.5–3 mm in diam., base abruptly contracted, margin cartilaginous and smooth, apex rounded, midvein distinct. Flowers terminal, solitary, sessile or subsessile, 5-merous. Calyx tube with distinct purple veins, tubular, 5–10 mm, membranous; lobes spreading to recurved, similar to leaves, 1.5–2.5 mm. Corolla clear pale blue, with pale yellow-white base, unspotted, salverform, rarely tubular, 1–2 cm; lobes ovate-elliptic, 2–5 mm, margin entire, apex obtuse; plicae extremely oblique, triangular to auricular, 1–1.5 mm, margin entire. Stamens inserted at apical part of corolla tube, usually exerted, equal; filaments 1.5–3.5 mm; anthers narrowly ellipsoid, 0.5–3 mm. Style usually exerted, linear, 4–7 mm, ± equaling ovary; stigma lobes narrowly oblong. Capsules narrowly ellipsoid, 7–10 mm; gynophore to 2.5 cm. Seeds black, subglobose, 0.8–1 mm. Fl. and fr. Jul–Sep.

Alpine meadows; 4200–5200 m. S and SE Xizang [Bhutan, Nepal].

105. *Gentiana tongolensis* Franchet, *Bull. Soc. Bot. France* 43: 490. 1896.

东俄洛龙胆 *dong e luo long dan*

Annuals 3–10 cm tall. Stems purple, much branched with prostrate branches, papillate. Petiole 3–6 mm, papillate; leaf blade suborbicular, 3–5 mm in diam., base abruptly contracted, margin cartilaginous and smooth, apex rounded, midvein distinct. Flowers terminal, solitary, sessile or subsessile, 5-merous. Calyx tube tubular, 6–9 mm, membranous, sometimes papillate; lobes spreading to recurved, similar to leaves, 2–4 mm. Corolla pale yellow, basally with blue spots, salverform, (1.4–)2–2.4 cm; lobes ovate-elliptic, 2–4.5 mm, margin entire, apex obtuse; plicae extremely oblique, triangular to auricular, 1–1.5 mm, margin entire. Stamens inserted at middle of corolla tube, usually exerted, equal; filaments 7–9 mm; anthers narrowly ellipsoid, 0.7–1.2 mm. Style usually exerted, filiform, 4–7 mm, ± equal to ovary; stigma lobes linear. Capsules narrowly ellipsoid, 6–12 mm; gynophore to 7 mm. Seeds brown, ellipsoid, 0.8–1 mm. Fl. and fr. Aug–Sep.

- Meadows, roadside slopes; 3500–4800 m. W Sichuan, E Xizang.

IX. Sect. *Stenogyne* Franchet, *Bull. Soc. Bot. France* 31: 375. 1884.

狭蕊组 *xia rui zu*

Annuals, rarely perennials. Petioles of stem leaves 0.5–1 mm, entirely connate. Calyx keeled or winged. Plicae asymmetrical, very oblique. Style filiform, longer to slightly shorter than the ovary. Capsules cylindrical, wingless. Seeds triquetrous with three winged edges, rarely wingless or areolate; seed coat reticulate.

Fourteen species: Asia; 12 species in China.

106. *Gentiana villifera* H. W. Li in T. N. Ho, Bull. Bot. Res., Harbin 4(1): 75. 1984.

紫毛龙胆 *zi mao long dan*

Perennials 20–30 cm tall, densely white and purple pubescent. Stems purple, ascending to erect, slender, branched from base. Basal leaves sessile, oblong to subspatulate, 4–6 × 1–1.5 mm, apex acute. Stem leaves widely spaced; leaf blade ovate to cordate, 5–10 × 3–9 mm, shorter than internodes, base rounded, apex acute, vein 1. Flowers terminal, solitary, sessile. Calyx tube narrowly obconic, 6–9 mm, membranous, prominently 5-veined; lobes linear-lanceolate, 3–4 mm, apex acuminate, midvein outside prominent. Corolla purple, tubular, 3–4 cm; lobes ovate-triangular, 5–7 mm, margin entire, apex acute; plicae oblong, 5–6 mm, apex rounded and fringed. Stamens inserted at basal part of corolla tube, unequal, 2 longer and ca. 2.1 cm, 3 shorter and ca. 1.5 cm; anthers ellipsoid, 2–2.5 mm. Ovary narrowly ellipsoid, 1.3–1.5 cm; gynophore to 9 mm, stout. Style 1–1.2 cm; stigma lobes linear. Fl. and fr. Apr.

• Valleys; ca. 800 m. SE Sichuan.

107. *Gentiana alata* T. N. Ho in T. N. Ho & S. W. Liu, Bull. Nat. Hist. Mus. London (Bot.) 23: 57. 1993.

翅萼龙胆 *chi e long dan*

Gentiana kusnezowii Franchet (Nov 1896), not Gilg (May 1896).

Annuals 15–25 cm tall. Stems erect, branched or rarely simple, glabrous. Basal leaves withered at anthesis. Stem leaves widely spaced; leaf blade ovate to cordate, 3–7 × 3–6 mm, shorter than internodes, abaxially scabrous pubescent on veins, base rounded, margin serrulate, apex acute, veins 3. Flowers terminal, solitary, sessile. Calyx campanulate, 1.8–2.2 cm, broadly winged; lobes linear-triangular, 0.9–1.1 cm, apex acute, midvein outside strongly keeled and decurrent into wings of calyx tube. Corolla pale purple, broadly tubular to funnellform, 2.3–2.5 cm; lobes ovate, 6–8 mm, margin entire, apex obtuse; plicae triangular, ca. 2 mm, apex long fringed. Stamens inserted at basal part of corolla tube, unequal, 2 longer and 1.3–1.5 cm, 3 shorter and 5–6 mm; anthers narrowly ellipsoid, 2–2.5 mm. Style 1–1.2 cm; stigma lobes narrowly ellipsoid. Fl. and fr. Oct.

• Clearings in forests; 1200–2000 m. C Yunnan.

108. *Gentiana rhodantha* Franchet in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 133. 1890.

红花龙胆 *hong hua long dan*

Gentiana jankae Kanitz; *G. rhodantha* var. *wilsonii* C. Marquand.

Perennials 20–50 cm tall, with a short rhizome. Stems erect; branches spreading, glabrous. Basal leaves withered at anthesis; petiole 5–10 mm; leaf blade elliptic, ovate, or obovate, 2–4 × 0.7–2 cm, base narrowed, margin serrulate, apex acute, midvein distinct. Stem leaves widely spaced; leaf blade ovate-triangular, broadly ovate, or cordate, 1–3 × 0.5–2

cm, shorter than internodes, abaxially pubescent, base rounded, margin serrulate, apex acute; veins 3–5, prominent. Flowers terminal, solitary, sessile. Calyx tube tinged purple, narrowly obconic, 0.7–1.3 cm, membranous, narrowly winged; lobes linear-lanceolate, 5–10 mm, margin ciliolate, apex acuminate, midvein outside prominent, minutely hispid, decurrent into wings of calyx tube. Corolla pale purple, with blackish streaks, tubular to funnellform, 2.5–4.5 cm; lobes ovate to ovate-triangular, 5–9 mm, margin entire, apex acuminate to obtuse; plicae broadly triangular, 4–5 mm, apex long fringed. Stamens inserted at basal part of corolla tube, unequal; filaments 5–12 mm; anthers narrowly ellipsoid, 2.5–3 mm. Style 6–8 mm; stigma lobes linear. Capsules ellipsoid, 2–2.5 cm; gynophore to 2 cm. Seeds light brown, subglobose, ca. 1 mm in diam., broadly winged. Fl. and fr. Oct-Feb.

• Grasslands, alpine scrub, forests; 500–1800 m. Gansu, Guangxi, Henan, W Hubei, S Shaanxi, SW Sichuan, Yunnan.

109. *Gentiana striata* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 501. 1881.

条纹龙胆 *tiao wen long dan*

Gentiana schlechteriana H. Limpricht; *G. tricholoba* Franchet.

Annuals 10–30 cm tall. Stems purple, ascending to erect; branches few, spreading. Basal leaves withered at anthesis. Stem leaves widely spaced; leaf blade ovate-lanceolate, 1–3 cm × 5–12 mm, shorter than internodes, abaxially densely pubescent on midvein, base rounded, margin scabrous to ciliolate, apex acuminate to acute, veins 1–3. Flowers terminal, solitary, sessile. Calyx tubular, 1–1.3 cm; lobes linear to subulate, 8–11 mm, margin scabrous or ciliolate, apex acuminate, midvein outside minutely hispid, strongly keeled, decurrent into wings of calyx tube. Corolla pale yellow, with blackish streaks, tubular, 4–6 cm; lobes ovate, 5–7 mm, margin entire, apex acuminate with a caudate tip 1–2 mm; plicae obliquely truncate, margin denticulate. Stamens inserted at middle of corolla tube, unequal; filaments (0.2–)0.5–1.5 cm; anthers narrowly ellipsoid, 2.5–3 mm. Style 1–1.5 cm; stigma lobes linear. Capsules ellipsoid, 2–3.5 cm; gynophore 1.5–2 cm. Seeds brown, ellipsoid, 3–3.5 mm. Fl. and fr. Aug-Oct.

• Grassland and scrub slopes; 2200–3900 m. Gansu, Ningxia, Qinghai, W Sichuan.

110. *Gentiana souliei* Franchet, Bull. Soc. Bot. France 43: 491. 1896.

毛脉龙胆 *mao mai long dan*

Gentiana pterocalyx Franchet var. *flavoviridis* C. Marquand.

Annuals 10–40 cm tall. Stems erect; branches spreading, angled, pubescent along angles. Basal leaves withered at anthesis. Stem leaves widely spaced; leaf blade ovate-lanceolate to triangular, 1–2.6 cm × 8–11 mm, much shorter

than internodes, abaxially weakly pubescent on veins, base rounded, margin ciliolate, apex acute; veins 3–5, prominent. Flowers terminal, solitary, sessile. Calyx tube campanulate, 1–1.3 cm, membranous, broadly winged, pubescent along wings; lobes linear-lanceolate, 8–10 mm, margin ciliolate, apex acuminate, midvein outside strongly keeled and decurrent into wings of calyx tube. Corolla pale yellow to yellow, tubular to funnelform, 3–4.5 cm, tube puberulent along veins; lobes ovate, 5–8 mm, margin entire, apex slightly acuminate to subacute; plicae horizontally truncate, margin erose. Stamens inserted at basal part of corolla tube, unequal; filaments 0.7–1.8 cm; anthers narrowly ellipsoid, 2.5–3 mm. Style 1–1.3 cm; stigma lobes linear. Capsules ellipsoid, 2.5–3 cm; gynophore to 5 mm. Seeds dark brown, ellipsoid, 2–2.5 mm. Fl. and fr. Sep-Dec.

• Grassland slopes, *Abies* forests; 3200–3900 m. W Sichuan, NW Yunnan.

111. *Gentiana leptoclada* I. B. Balfour & Forrest, Notes Roy. Bot. Gard. Edinburgh 4: 71. 1907.

蔓枝龙胆 man zhi long dan

Gentiana hapalocaula C. Marquand.

Annuals 20–35 cm tall. Stems ascending to erect; branches spreading, angled, glabrous. Basal leaves withered at anthesis. Stem leaves widely spaced; leaf blade broadly ovate to cordate, 0.5–1.6 × 0.6–1.6 cm, shorter than internodes, base rounded to cordate, margin serrulate, apex acute, veins 3–5. Flowers terminal, solitary, sessile. Calyx narrowly obconic, 1.2–1.5 cm; tube membranous, angled, smooth, papillate to puberulent along angles; lobes subulate, 2–3 mm, apex acuminate, midvein prominent, minutely hispid outside, and decurrent into angles of calyx tube. Corolla pale blue to blue, tubular to funnelform, 2.5–3.2 cm; lobes lanceolate to ovate, 0.9–1.1 cm, margin entire, apex acuminate to acute; plicae lanceolate, 3–4 mm, margin denticulate, apex acuminate. Stamens inserted at basal part of corolla tube, unequal; filaments 1–1.2 cm; anthers narrowly ellipsoid, 2–2.5 mm. Style 9–10 mm; stigma lobes linear. Capsules ellipsoid, 2–2.5 cm; gynophore to 2 cm. Seeds dark brown, ellipsoid, 0.8–1 mm, wingless.

• Forests; 2100–3000 m. NW Yunnan.

112. *Gentiana primuliflora* Franchet, Bull. Soc. Bot. France 31: 375. 1884.

报春花龙胆 bao chun hua long dan

Annuals 5–20 cm tall. Stems ascending to erect, slender; branches spreading, papillate to pubescent. Basal leaves sessile, elliptic, 0.8–1.2 cm × 2–4 mm, margin serrulate, apex obtuse, veins 3. Stem leaves widely spaced; leaf blade ovate to cordate, 3–10 × 2–8 mm, shorter than internodes, base rounded, margin serrulate, apex acute; veins 3–5, prominent. Flowers terminal, solitary, sessile or subsessile. Calyx tubular, 5–7 mm; tube membranous, angled; lobes subulate, 1.5–2 mm, midvein prominent outside and decurrent into angles of calyx tube. Corolla violet, salverform, 1–1.8(–2) cm; tube 2.5–3.5 mm wide but with abruptly expanded limb 7–10 mm

wide; lobes ovate, 5–7 mm, margin entire, apex obtuse; plicae triangular, 2.5–3 mm, margin erose, apex obtuse. Stamens inserted at middle of corolla tube, unequal or equal; filaments 5–8 mm, linear; anthers narrowly ellipsoid, 1–2 mm. Style 5–6 mm; stigma lobes linear. Capsules ellipsoid, 1.4–1.6 cm; gynophore ca. 2 mm. Seeds brown, ellipsoid to ovoid, 0.5–1 mm, wingless. Fl. and fr. Sep-Oct.

• Grassland slopes, forests; 1800–3900 m. SW Sichuan, C and NW Yunnan.

113. *Gentiana expansa* Harry Smith in Handel-Mazzetti, Symb. Sin. 7: 951. 1936.

盐丰龙胆 yan feng long dan

Annuals 20–40 cm tall. Stems erect, slender, angled, papillate along angles; branches few, short. Basal leaves withered at anthesis. Stem leaves widely spaced; leaf blade broadly ovate to cordate, 5–10 × 4–8 mm, shorter than internodes, abaxially papillate on veins, base subcordate, margin serrulate, apex acute; veins 3–5, abaxially distinct. Flowers terminal, solitary, sessile. Calyx tubular, 8–10 mm; tube membranous, angled, minutely hispid along angles; lobes narrowly ovate to triangular, 1.5–2 mm, apex acuminate, midvein prominent outside and decurrent into angles of calyx tube. Corolla purple, salverform, 1.5–2 cm; tube 3–3.5 mm wide but with an abruptly expanded limb 8–10 mm wide; lobes lanceolate, 6–8 mm, margin entire, apex acute; plicae lanceolate, 4–6 mm, margin denticulate. Stamens inserted at basal part of corolla tube, unequal; filaments 8–10 mm; anthers narrowly ellipsoid, 1.5–2 mm. Ovary ellipsoid, 5–7 mm; gynophore ca. 3 mm. Style 4–6 mm; stigma lobes linear. Fl. and fr. Jul-Nov.

• Grassland and gravel slopes, forest margins; 1100–2100 m. C and NW Yunnan.

114. *Gentiana pterocalyx* Franchet in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 132. 1890.

翼萼龙胆 yi e long dan

Annuals 15–35 cm tall. Stems erect, stout; branches few, short spreading, 4-angled. Basal leaves usually withered at anthesis. Stem leaves very widely spaced; leaf blade broadly ovate to cordate, (0.7–)1.3–2.5 × 0.7–1.8 cm, shorter than internodes, base rounded, margin serrulate and ciliolate, apex acute; veins 3, prominent, abaxially pubescent. Flowers terminal, solitary, sessile. Calyx tube obconic, 1–1.2 cm, membranous, broadly winged, purple and white pubescent along wings; lobes lanceolate to ovate-lanceolate, 5–9 mm, apex acuminate, midvein outside keeled and decurrent into wings of calyx tube. Corolla blue to blue-purple, tubular, 3–4 cm; lobes ovate, 8–11 mm, margin entire, apex obtuse; plicae oblong, 1–2 mm, margin denticulate, apex rounded. Stamens inserted at basal part of corolla tube, unequal; filaments 1.5–1.7 cm; anthers ellipsoid, 2.5–3 mm. Style 0.8–1.2 cm; stigma lobes linear. Capsules ellipsoid, 2–2.5 cm; gynophore (0.5–) 1–1.5 cm. Seeds brown, ellipsoid to subglobose, 2.5–3 mm. Fl. and fr. Aug-Nov.

• Grassland slopes; 1700–3500 m. W Guizhou, SW Sichuan, N Yunnan.

115. *Gentiana eurycolpa* C. Marquand, Bull. Misc. Inform. Kew 1931: 71. 1931.

滇东龙胆 dian dong long dan

Annuals 10–20 cm tall. Stems ascending to erect, with spreading branches, 4-angled. Basal leaves withered at anthesis. Stem leaves widely spaced; leaf blade broadly ovate to cordate, 7–12 × 4–5 mm, usually shorter than internodes, base rounded, margin serrulate and ciliolate, apex acute, veins 3, prominent, and abaxially pubescent. Flowers terminal, solitary, sessile. Calyx tube tubular, 0.9–1.1 cm, membranous, narrowly and distinctly winged, ± minutely hispid along wings; lobes spreading, lanceolate to narrowly elliptic, 5–6 mm, base narrowed, apex acute, midvein decurrent outside into wings of calyx tube. Corolla pale purple, tubular, 3.5–4.5 cm; lobes ovate-elliptic, 8–10 mm, margin entire, apex subacuminate; plicae oblong, 3.5–4.5 mm, margin short lacinate. Stamens inserted at basal part of corolla tube, unequal; filaments 1.5–1.8 cm; anthers ellipsoid, 2–2.5 mm. Fl. and fr. Aug–Nov.

• Grassland slopes; 2400–3000 m. Guizhou, NE Yunnan.

116. *Gentiana gentilis* Franchet, Bull. Soc. Bot. France 43: 491. 1896.

高贵龙胆 gao gui long dan

Annuals 10–30 cm tall. Stems erect, slender, branches short, angled, minutely hispid along angles. Basal leaves withered at anthesis. Stem leaves widely spaced; leaf blade broadly ovate to cordate, 5–10 × 3–6 mm, shorter than internodes, abaxially densely minute hispid on veins, toward stem apex adaxially hispidulous on veins, base rounded, margin ciliolate, apex acute, veins 3. Flowers terminal, solitary, sessile. Calyx tube 7–10 mm, obconic, membranous, winged, minutely hispid along wings; lobes linear to subulate,

3–5 mm, margin ciliolate, apex acuminate, midvein minutely hispid outside, keeled, and decurrent into wings of calyx tube. Corolla purple, tubular, 2.2–3 cm; lobes ovate, 6–8 mm, margin entire, apex obtuse; plicae oblong, 4–6 mm, margin erose, apex rounded. Stamens inserted at basal part of corolla tube, unequal; filaments 0.8–1.6 cm; anthers ellipsoid, 2–2.5 mm. Style 1–1.2 cm; stigma lobes linear. Capsules ellipsoid, 1.3–1.5 cm; gynophore 8–10 mm. Seeds brown, ellipsoid, 1.3–1.5 mm. Fl. and fr. Oct.

• Woodland margins, forests; 2000–2700 m. C Yunnan.

117. *Gentiana serra* Franchet, Bull. Soc. Bot. France 31: 376. 1884.

锯齿龙胆 ju chi long dan

Gentiana pulchra Harry Smith.

Annuals 15–40 cm tall. Stems ascending to erect, branched with spreading branches, angled, scabrous to papillate along angles. Basal leaves withered at anthesis. Stem leaves widely spaced; leaf blade ovate to cordate, 6–10 × 4–8 mm, shorter than internodes, abaxially scabrous on veins, base rounded to cordate, margin serrulate and ciliolate, apex acute, veins 3. Flowers terminal, solitary, sessile. Calyx tube narrowly obconic, 8–10 mm, membranous, winged, minutely hispid along wings; lobes subulate to linear, 4–5 mm, margin ciliolate, apex acuminate, midvein minutely hispid outside, keeled, and decurrent into wings of calyx tube. Corolla blue-purple, tubular to tubular-funnelform, 2.5–3 cm; lobes ovate, 5–7 mm, margin entire, apex obtuse; plicae oblong, 2–4 mm, margin denticulate, apex rounded. Stamens inserted at basal part of corolla tube, unequal; filaments 6–12 mm; anthers ellipsoid, 1.5–2 mm. Style 1–1.2 cm; stigma lobes linear. Capsules ellipsoid, 1.2–1.5 cm; gynophore 5–7 mm. Seeds brown, ellipsoid, 1–1.5 mm. Fl. and fr. Sep–Oct.

• Meadows, forest margins, forests; 2400–4400 m. NW Yunnan.

X. Sect. *Dolichocarpa* T. N. Ho, Bull. Bot. Res., Harbin 5(4): 16. 1985.

柱果组 zhu guo zu

Annuals. Flowers terminal, solitary, small. Plicae symmetrical. Capsules cylindrical to narrowly oblong, apex obtuse, wingless. Seeds wingless at maturity, rarely winged when young; seed coat minutely reticulate.

Fourteen species: America, Asia, Europe; 12 species in China.

Some authors question the separation of this section from sect. *Chondrophyllae*.

118. *Gentiana gyirongensis* T. N. Ho, Bull. Bot. Res., Harbin 4(1): 79. 1984.

吉隆龙胆 ji long long dan

Annuals 2–3.5 cm tall. Stems ascending to erect, branched from base, glabrous. Basal leaves with petiole 1–2 mm; leaf blade ovate to ovate-orbicular, 3–4 × 1.4–1.6 mm,

margin cartilaginous and smooth, apex obtuse to rounded and cuspidate, midvein distinct. Stem leaves with petiole tube 1.5–3 mm; leaf blade linear to linear-lanceolate, 4–6 × 1–1.2 mm, larger toward apex, margin narrowly membranous and smooth, apex acuminate, midvein prominent. Pedicel 2–3 mm, surrounded by upper leaves, glabrous. Calyx tubular to narrowly obconic, 1.1–1.4 cm; lobes triangular, 2–2.5 mm, narrow, apex acute, midvein prominent. Corolla dark blue,

blackish in throat, salverform to funnellform, 1.8–2 cm; lobes ovate, 2.5–3 mm, margin entire, apex obtuse; plicae ovate, 2–2.5 mm, margin serrulate, apex obtuse. Stamens inserted at apical part of corolla tube, equal; filaments 1.2–1.5 mm; anthers ellipsoid, 1–1.2 mm. Ovary ellipsoid, 6–7 mm; gynophore ca. 4 mm. Style 2–2.5 mm; stigma lobes semiorbicular. Capsules cylindrical to narrowly ellipsoid. Fl. and fr. Aug–Sep.

Scrub on shady slopes; ca. 4500 m. SW Xizang [Nepal].

119. *Gentiana tetrasticha* C. Marquand, Hooker's Icon. Pl. 34: t. 3330. 1937.

四列龙胆 si lie long dan

Annuals 2–3 cm tall. Stems ascending to erect, 2–5-branched from base, glabrous. Leaves overlapping, 4-ranked; petiole tube 0.8–1.2 mm, papillate on margin and abaxially; leaf blade ovate, 3–7 × 1.5–2 mm, margin cartilaginous and ciliolate, apex acute, midvein prominent. Flowers sessile. Calyx tubular, 7–10 mm; lobes triangular, 2–2.5 mm, margin narrowly membranous and smooth, apex obtuse, midvein prominent. Corolla blue-purple, tubular, 1.2–1.7 cm; lobes ovate-orbicular, 2–2.5 mm, margin entire, apex rounded; plicae oblong to broadly ovate, 1.5–2 mm, margin erose, apex obtuse. Stamens inserted at basal part of corolla tube, equal; filaments 1.5–2.5 mm; anthers narrowly ellipsoid, 1.5–2 mm. Ovary ellipsoid, 3–4 mm; gynophore 1–1.5 mm. Style 0.8–1 mm; stigma lobes broadly oblong. Fl. Aug–Sep.

Alpine meadows; 4200–5300 m. S Xizang [Sikkim].

120. *Gentiana stellata* Turrill, Bull. Misc. Inform. Kew 1922: 153. 1922.

珠峰龙胆 zhu feng long dan

Annuals 1.5–3.5 cm tall. Stems ascending to erect, branched from base, glabrous. Leaves widely spaced; petiole 2–3 mm; leaf blade lanceolate, ovate-lanceolate, or ovate, 2–9 × 0.5–2.5 mm, shorter to slightly longer than internodes, margin narrowly membranous, apex acute to obtuse, midvein abaxially distinct. Flowers sessile. Calyx 1.4–1.6 cm, tubular; lobes triangular, 3–4 mm, margin narrowly membranous and smooth, apex acute, midvein strongly keeled and decurrent into conspicuous wings of calyx tube. Corolla purple, salverform; tube 2–2.5 cm, narrow; limb to 5 mm in diam.; lobes ovate-elliptic to ovate, 4–5 mm, margin entire, apex obtuse; plicae ovate, 1–3.5 mm, margin serrulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 2–3 mm; anthers narrowly ellipsoid, 1.5–2.5 mm. Style 2.5–3 mm; stigma lobes semiorbicular. Capsules narrowly ellipsoid; gynophore ca. 6 mm. Fl. and fr. Aug–Sep.

High mountain; 4000–6000 m. SE Xizang [Bhutan, NW India, Nepal].

Gentiana stellata var. *acuminata* (C. B. Clarke) T. N. Ho occurs in the W Himalayas of NW India. It has calyx 4.5–5 mm with acuminate lobes 2.5–3 mm, and corolla 7–9 mm with a limb 1.5–2 mm in diam. and lobes 1.5–2 mm.

Gentiana stellata is somewhat intermediate between *G. tetrasticha* and *G. gyirongensis* but differs by the ovate lower leaves, ovate-lanceolate upper leaves, and stamens inserted at middle of the corolla tube.

121. *Gentiana nanobella* C. Marquand, Bull. Misc. Inform. Kew 1928: 53. 1928.

钟花龙胆 zhong hua long dan

Gentiana aphrosperma Harry Smith.

Annuals 4–8 cm tall. Stems ascending to erect, branched from base, papillate. Leaves usually widely spaced; petiole tube 2–2.5 mm, papillate on margin and abaxially; leaf blade suborbicular, 5–8 × 3–4 mm, shorter than internodes, margin cartilaginous and smooth or ciliolate, apex rounded and cuspidate, midvein abaxially distinct. Pedicel 6–8 mm, surrounded by upper leaves, sometimes papillate. Calyx tubular to narrowly obconic, 1–1.2 cm; lobes triangular, 2–3 mm, margin narrowly membranous and smooth, apex acute and cuspidate, midvein strongly keeled and decurrent into conspicuous wings of calyx tube. Corolla dark blue to blue-purple, sometimes with greenish yellow base, outside tinged blackish, inside with short blackish stripes in throat, tubular to narrowly funnellform, 2–2.2 cm; lobes ovate, 3–5 mm, margin entire, apex obtuse; plicae ovate, 2.5–4 mm, margin erose, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 5.5–6.5 mm; anthers ellipsoid, 1.2–2 mm. Style 1.2–2 mm; stigma lobes oblong. Capsules cylindrical to narrowly ellipsoid, 1–1.2 cm; gynophore to 7 cm. Seeds light brown, ellipsoid, 1–1.2 mm, edges several, irregular, and spongy. Fl. and fr. Aug–Oct.

• Grassland slopes; 2700–4300 m. W Sichuan, SE Xizang, NW Yunnan.

122. *Gentiana crenulatotruncata* (C. Marquand) T. N. Ho, Fl. Reipubl. Popularis Sin. 62: 163. 1988.

圆齿褶龙胆 yuan chi zhe long dan

Gentiana prostrata Haenke var. *crenulatotruncata* C. Marquand, J. Linn. Soc., Bot. 48: 205. 1929; *G. prostrata* var. *bilobata* C. Marquand.

Annuals 2–3.5 cm tall. Stems ascending to erect, branched from base, papillate. Leaves widely spaced; petiole tube 1–1.5 mm, margin ciliolate; leaf blade obovate, 3.5–5 × 2.5–4.5 mm, ± equal to internodes, margin cartilaginous and smooth or ciliolate, apex rounded, midvein abaxially prominent. Flowers sessile or subsessile. Calyx tubular, 6.5–11 mm; lobes triangular, 1.5–2 mm, margin entire and narrowly membranous, apex acute, midvein strongly keeled and decurrent into conspicuous wings of calyx tube. Corolla deep blue to purple, salverform, 1.3–2.2 cm, tube narrowly tubular but limb abruptly expanded and 5–7 mm in diam.; lobes ovate-elliptic to ovate, 2.5–3 mm, margin smooth, apex obtuse; plicae oblong, 2–2.5 mm, margin erose, apex truncate. Stamens inserted at middle of corolla tube, equal; filaments

1–2.5 mm; anthers narrowly ellipsoid, 1.5–1.7 mm. Style 1.5–2 mm; stigma lobes oblong. Capsules narrowly ellipsoid, 8–10 mm; gynophore to 7 mm. Seeds light brown, ellipsoid, 0.6–0.8 mm. Fl. and fr. Aug–Sep.

- Alpine meadows; 4600–5300 m. Qinghai, SE Xizang.

123. *Gentiana prostrata* Haenke in Jacquin, *Collectanea* 2: 66. 1789.

匍地龙胆 pu di long dan

Annuals 3–7 cm tall. Stems ascending to erect, branched from base, glabrous or papillose. Petiole tube 1–1.5 mm; leaf blade spatulate to obovate, (2–)4–7 × (1–)1.5–3.5 mm, margin smooth to papillate, apex rounded, midvein distinct. Pedicel 4–7 mm, surrounded by upper leaves to rarely exserted. Calyx tubular, 0.8–1.4 cm; lobes triangular, 2–3 mm, margin narrowly membranous and smooth, apex acute, midvein strongly keeled and decurrent into conspicuous wings of calyx tube. Corolla blue, basally greenish yellow, tubular, (1–)1.5–2 cm; lobes ovate-elliptic to ovate, 2.5–3(–4.5) mm, margin entire, apex obtuse; plicae ovate, 2–2.5(–3.5) mm, margin erose, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 2–5 mm; anthers narrowly ellipsoid, 1.2–2 mm. Style 1.5–2 mm; stigma lobes oblong. Capsules narrowly ellipsoid, 0.9–1.1 cm; gynophore to 1.5 (–4.2) cm. Seeds brown, ellipsoid, 0.5–0.7 mm, winged on 1 side.

2000–4700 m. W Qinghai, N Xinjiang, S and SW Xizang [Kazakhstan, Kyrgyzstan, Mongolia, Nepal, Russia, Tajikistan; North America, C Europe].

Gentiana prostrata is variable in leaf margins and the ratio between calyx and corolla length. The calyx length increases and the amount of stem papillae decreases from the Himalayas to Kashmir and C Asia. Of the three varieties included in the species, two occur in China. *Gentiana prostrata* var. *prostrata* grows in North America, N and W Asia, and Europe.

- 1a. Stems not papillate 123a. var. *karelinii*
1b. Stems papillate 123b. var. *ludlowii*

123a. *Gentiana prostrata* var. *karelinii* (Grisebach) Kusnezow, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 15: 368. 1904.

新疆龙胆 xin jiang long dan

Gentiana karelinii Grisebach in A. de Candolle, *Prodr.* 9: 106. 1845; *G. longipes* Turczaninow; *G. variabilis* Ruprecht.

Stems glabrous. Leaf margin smooth or less papillate. Calyx usually 3/4 as long as corolla.

Slopes, roadsides, valleys, alpine meadows; 2000–3100 m. N Xinjiang [Kazakhstan, Kyrgyzstan, Mongolia, Russia, Tajikistan].

123b. *Gentiana prostrata* var. *ludlowii* (C. Marquand) T. N. Ho, *Novon* 4: 371. 1994.

短蕊龙胆 duan rui long dan

Gentiana ludlowii C. Marquand, *Bull. Misc. Inform. Kew* 1937: 189. 1937.

Stems and leaf margin papillate. Calyx usually 1/2 as long as corolla.

Roadside slopes, alpine meadows; 3500–4700 m. W Qinghai, S and SE Xizang [Nepal].

124. *Gentiana pudica* Maximowicz, *Bull. Acad. Imp. Sci. Saint-Petersbourg* 26: 497. 1880.

偏翅龙胆 pian chi long dan

Annuals 3–12 cm tall. Stems ascending to erect, branched from base, glabrous. Petiole tube 3–4 mm; leaf blade obovate, 4.5–9 × 1.2–3.5 mm, shorter than internodes, margin narrowly membranous and smooth or ciliolate, apex rounded and mucronate with a recurved tip, midvein abaxially distinct. Pedicel 1–2.5 cm, exserted from upper leaves, glabrous. Calyx tubular to narrowly obconic, 1–1.2 cm; lobes triangular, 2.5–3 mm, margin narrowly membranous and smooth, apex acute, midvein strongly keeled and decurrent into conspicuous wings of calyx tube. Corolla dark blue to blue-purple, with greenish yellow base, tubular to narrowly funnellform, 2–2.6 cm, 6–8 mm in diam. at throat; lobes ovate-elliptic to ovate, 4–5 mm, margin entire, apex obtuse; plicae oblong, 2.5–3.5 mm, margin serrulate, apex truncate. Stamens inserted at middle of corolla tube, equal; filaments 4–5 mm; anthers narrowly ellipsoid, 1.5–1.7 mm. Style 1.5–2 mm; stigma lobes semiorbicular. Capsules narrowly ellipsoid, 8–10 mm; gynophore to 7 mm. Seeds brown, ellipsoid, 1–1.2 mm, sometimes winged when young. Fl. and fr. Jun–Sep.

- River banks, grassland slopes, alpine meadows; 2200–5000 m. Gansu, Qinghai, Shaanxi, N Sichuan.

125. *Gentiana producta* T. N. Ho, *Bull. Bot. Res., Harbin* 4(1): 80. 1984.

伸梗龙胆 shen geng long dan

Annuals 6–12 cm tall. Stem ascending to erect, branched from base, glabrous. Leaves widely spaced; petiole tube 1–2 mm; leaf blade obovate, 5–8 × 2–3 mm, shorter than internodes, margin narrowly membranous and smooth or ciliolate, apex rounded, veins indistinct. Pedicel 1.7–4 cm, exserted from upper leaves, glabrous. Calyx narrowly obconic, 9–10 mm; lobes triangular, 1.5–1.7 mm, margin narrowly membranous and smooth, apex acute, midvein strongly keeled and decurrent into conspicuous wings of calyx tube. Corolla blue to blue-purple, with short blackish streaks in throat, narrowly tubular, 1.8–2 cm; lobes ovate-elliptic, 3–3.5 mm, margin entire, apex obtuse; plicae broadly oblong, 2–2.5 mm, margin lacinate, apex truncate. Stamens inserted at middle of corolla tube, equal; filaments 3–4.5 mm; anthers linear-ellipsoid, 1.4–1.6 mm. Style 1.5–2 mm; stigma lobes semiorbicular. Capsules linear-ellipsoid, 1–1.3 cm; gynophore to 5 mm. Seeds brown, linear-ellipsoid, 1–1.2 mm. Fl. and fr. Sep.

- Slopes. W Sichuan.

126. *Gentiana clarkei* Kusnezow, Trudy Imp. S.-Peterburgsk. Bot. Sada 15: 419. 1904.

西域龙胆 xi yu long dan

Gentiana hyalina T. N. Ho; *G. pygmaea* C. B. Clarke (1883), not Regel & Schmalhausen (1812).

Annuals 1.5–3 cm tall. Stems ascending to erect, branched from base, glabrous. Leaves widely spaced; petiole tube 2–3 mm; leaf blade spatulate to obovate, 2.5–4.5 × 1–1.5 mm, shorter than internodes, base narrowed, margin membranous and smooth, apex rounded, midvein abaxially indistinct. Pedicel 2–6 mm, exserted from upper leaves, glabrous. Calyx tubular to narrowly obconic, 7–9 mm; lobes triangular, 1–1.2 mm, margin narrowly membranous and smooth, apex acute, midvein strongly keeled and decurrent into conspicuous wings of calyx tube. Corolla blue, tubular, 1.2–1.5 cm, 1.5–2 mm in diam. at throat; lobes ovate, 1.5–2 mm, margin entire, apex obtuse; plicae ovate, 1.2–1.5 mm, margin serrulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 1–1.5 mm; anthers narrowly ellipsoid, 0.8–1 mm. Style 0.5–0.7 mm; stigma lobes semiorbicular. Capsules cylindrical to narrowly ellipsoid, 8–10 mm, valves membranous and transparent; gynophore to 1.8 cm. Seeds light brown, ellipsoid, 0.8–1 mm. Fl. and fr. Aug–Sep.

• Alpine meadows; 4600–5300 m. Qinghai, W Xizang.

127. *Gentiana caeruleogrisea* T. N. Ho, Bull. Bot. Res., Harbin 4(1): 77. 1984.

蓝灰龙胆 lan hui long dan

Annuals 6–12 cm tall. Stems ascending to erect, branched from base, glabrous. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade ovate to suborbicular, 4–6 × 3.5–5 mm, margin narrowly membranous and smooth, apex rounded, veins 1–3. Stem leaves widely spaced; petiole tube 1.5–5 mm with increasing connate length toward apex; leaf blade 2–6 × 1–2.5 mm, shorter than internodes, spatulate toward stem base but linear to elliptic from middle to stem apex, margin indistinctly membranous and smooth, apex acuminate, obtuse, or rounded, veins indistinct. Pedicel 0.3–1.7 cm, exserted from upper leaves, glabrous. Calyx narrowly obconic, 6.5–7.5 mm; lobes lanceolate, 0.7–1 mm, margin narrowly membranous and smooth, apex acute, midvein strongly keeled and decurrent into conspicuous wings of calyx tube. Corolla outside with blue-gray stripes, inside white or pale blue, tubular to narrowly funnelliform, 1.1–1.3 cm; lobes ovate, 1.5–3.5 mm, margin entire, apex obtuse; plicae broadly ovate, 1.5–2 mm, margin denticulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 1.2–1.7 mm; anthers narrowly ellipsoid, 0.8–1 mm. Style 0.5–0.7 mm; stigma lobes semiorbicular. Capsules cylindrical to narrowly ellipsoid, 7.5–8.5 mm; gynophore 1.5–2 mm, slender. Seeds brown to dark brown, ellipsoid, 1–1.2 mm. Fl. and fr. Aug–Sep.

• Alpine meadows; 3600–4300 m. Gansu, Qinghai, Xizang.

128. *Gentiana micans* C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 112. 1883.

亮叶龙胆 liang ye long dan

Gentiana sororcula Burkill.

Annuals 3–6 cm tall. Stems branched from base, with many short branches crowded into a dense tuft, glabrous. Basal leaves withered at anthesis; petiole 0.5–1.5 mm; leaf blade ovate to ovate-orbicular, 4–7 × 2–3 mm, margin cartilaginous, apex obtuse and mucronate; veins 1–3, prominent. Stem leaves crowded, folded; petiole tube 1–2 mm; leaf blade subulate, 0.8–1.2 cm × 1.5–2 mm, subleathery, rigid, glossy, margin basal half broadly membranous and ciliolate, apical half cartilaginous and smooth, apex acute, midvein abaxially prominent. Flowers few, sessile. Calyx narrowly obconic, (0.8–)1.1–1.5 cm, tube membranous; lobes subulate, 6–11 mm, as long as or longer than tube, subleathery, rigid, glossy, margin basal half broadly membranous and ciliolate, apical half cartilaginous and smooth, apex acuminate and apiculate, midvein prominent. Corolla pale blue, tubular, (1.1–)1.5–2 cm; lobes ovate, (3–)4–6 mm, margin entire, apex obtuse and mucronate; plicae oblong, 1.5–2 mm, margin entire or 2-cleft with both segments denticulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments (2.5–)4–8 mm; anthers linear, 1–1.2 mm. Style 1–1.5 mm; stigma lobes broadly oblong. Capsules obovoid-ellipsoid, 6–7 mm; gynophore to 2.5 cm, slender. Seeds dark brown, ellipsoid, 0.5–0.7 mm. Fl. and fr. May–Sep.

Alpine meadows; 4300–4800 m. SE Xizang [Bhutan, Nepal, Sikkim].

Gentiana micans var. *latifolia* T. N. Ho is endemic to Bhutan.

129. *Gentiana haynaldii* Kanitz, Pl. Exped. Szechenyi in As. Centr. Coll. 39. 1891.

钻叶龙胆 zuan ye long dan

Gentiana rockhillii Hemsley; *G. scariosa* I. B. Balfour & Forrest.

Annuals 3–10 cm tall. Stems ascending to erect, branched from base, glabrous. Basal leaves, withered at anthesis; petiole 0.5–1.5 mm; leaf blade lanceolate to ovate, 2.5–7 × 1.5–2.5 mm, margin cartilaginous, apex acute, midvein prominent. Stem leaves with petiole tube 1–2 mm; leaf blade subulate, 0.7–1.5(–5) cm × 1.5–2 mm, longer toward apex, subleathery, rigid, glossy, margin basal half broadly membranous and ciliolate, apical half cartilaginous and smooth, apex acuminate, midvein abaxially prominent. Flowers few, sessile. Calyx narrowly obconic, 1.3–1.7 cm, tube membranous; lobes subulate, 7–9 mm, subleathery, rigid, glossy, margin basal half broadly membranous and ciliolate, apical half cartilaginous and smooth, apex acuminate and apiculate, midvein prominent. Corolla pale blue, with blue-gray short streaks in throat, tubular, (2–)2.5–3 cm; lobes ovate, 3–5 mm, margin entire or indistinctly crenulate, apex acuminate to obtuse; plicae ovate, 2.5–4 mm, margin entire or

erose, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 2.5–4 mm; anthers narrowly ellipsoid, 1.2–2 mm. Style 1.5–2 mm; stigma lobes ovate-orbicular. Capsules ellipsoid, 1.1–1.3 cm; gynophore to 4 cm, slender. Seeds light brown, ellipsoid to ovoid-ellipsoid, 0.5–0.7 mm. Fl. and fr.

Jul-Nov.

• Grassland slopes, alpine meadows, shady forest slopes; 2100–4200 m. SW Qinghai, W Sichuan, SE Xizang, NW Yunnan.

XI. Sect. Chondrophyllae Bunge, Nouv. Mém. Soc. Imp. Naturalistes Moscou 1(7): 207. 1829.

小龙胆组 xiao long dan zu

Annuals, rarely perennials. Flowers terminal, solitary, small. Plicae usually symmetrical. Capsules narrowly obovoid to obovoid, conspicuously winged; wing strong and broad at apex but gradually narrowed toward base. Seed coat minutely reticulate.

Some 156 species: N Africa (Morocco), America, Asia, Australia, Europe; 117 species in China.

130. *Gentiana myrioclada* Franchet, Bull. Soc. Bot. France 43: 487. 1896.

多枝龙胆 duo zhi long dan

Annuals 10–15 cm tall. Stems ascending, slender, 3 or 4 × dichotomously branched from base. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade lanceolate to obovate, 1–2 cm × 4–6 mm, margin cartilaginous and smooth, apex acute to obtuse, veins 3–5. Stem leaves widely spaced, recurved, folded; petiole tube 0.5–0.7 mm; leaf blade broadly ovate, 3.5–4.5 × 1–1.5 mm, much shorter than internodes, base cordate, apex acute, veins 1–3. Flowers many. Pedicel 0.7–1.5 cm. Calyx narrowly obconic, 3.5–4 mm; lobes filiform to filiform-subulate, 1.5–2 mm, base 0.5–1 mm wide, apex acuminate. Corolla blue, obconic to narrowly so, 5.5–7 mm; lobes ovate-orbicular, 1.5–2 mm, margin entire, apex obtuse to rounded; plicae truncate, margin irregularly crenulate. Stamens inserted just below middle of corolla tube, equal; filaments 1.2–1.5 mm; anthers ovoid, 0.3–0.8 mm. Style 0.6–0.8 mm; stigma lobes linear. Capsules obovoid, 3–4 mm; gynophore 2–5 mm. Seeds brown, ellipsoid, 1–1.2 mm. Fl. and fr. Aug-Sep.

• 2000–2500 m. E Sichuan.

1a. Plants almost entirely glabrous

..... 130a. var. *myrioclada*

1b. Plants densely hispidulous 130b. var. *wuxiensis*

130a. *Gentiana myrioclada* var. *myrioclada*

多枝龙胆 (原变种) duo zhi long dan (yuan bian zhong)

Plants almost entirely glabrous. Fl. and fr. Aug-Sep.

• Hillsides; 2000–2500 m. E Sichuan.

130b. *Gentiana myrioclada* var. *wuxiensis* T. N. Ho & S. W. Liu in T. N. Ho, Novon 4: 370. 1994.

无锡龙胆 wu xi long dan

Plants densely hispidulous. Fl. and fr. Aug.

• Hillsides; ca. 2500 m. E Sichuan.

131. *Gentiana microphyta* Franchet in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 130. 1890.

小叶龙胆 xiao ye long dan

Annuals 1.5–8 cm tall. Stems ascending to erect, weak, 2 or 3 × dichotomously branched from base or rarely simple, glabrous. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade ovate-elliptic, 5–9 × 2–4 mm, abaxially glabrous, adaxially densely and minutely papillate, apex obtuse, midvein distinct. Stem leaves spreading; petiole tube 0.5–0.7 mm; leaf blade ovate, 3–5 × 2–3 mm, much shorter than internodes, abaxially glabrous, adaxially densely and minutely papillate, base rounded, apex acute, midvein distinct. Flowers 1 or few. Pedicel 3–8 mm, slender, glabrous. Calyx tubular to narrowly obconic, 2–3 mm; lobes filiform to filiform-subulate, 1–1.5 mm, base 0.5–1 mm wide, apex acuminate. Corolla outside pale blue, inside white, narrowly obconic, 4–6 mm; lobes ovate, 1.5–2 mm, margin entire, apex obtuse; plicae ovate, 1–1.5 mm, margin entire, apex acute. Stamens inserted at middle of corolla tube, equal; filaments 1–1.2 mm; anthers ellipsoid, 0.5–0.7 mm. Style 0.8–1 mm; stigma lobes linear. Capsules obovoid, 2–3 mm; gynophore 1–2 mm. Fl. and fr. Aug.

Hillsides; ca. 4000 m. NW Yunnan [NE Myanmar].

132. *Gentiana stellulata* Harry Smith in Handel-Mazzetti, Symb. Sin. 7: 968. 1936.

星状龙胆 xing zhuang long dan

Annuals 4–10 cm tall. Stems ascending to erect, weak, 2 or 3 × dichotomously branched from base and with few branches, glabrous. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade ovate-elliptic, ovate, or ovate-orbicular, 0.8–1.3 cm × 4–7 mm, abaxially glabrous, adaxially densely and minutely papillate, margin ciliolate, apex obtuse, veins 3–5. Stem leaves spreading; petiole tube 0.5–0.7 mm, abaxially papillate; leaf blade elliptic-lanceolate to sometimes ovate-lanceolate, 3.5–5 × 2–3 mm, much shorter than internodes, abaxially glabrous, adaxially densely and minutely papillate, base rounded to cordate, margin ciliolate, apex acute, midvein distinct. Flowers few to many. Pedicel 5–10 mm, glabrous. Calyx tubular to narrowly obconic, 3–3.5 mm; lobes filiform to filiform-subulate, 1.5–2.2 mm, base 0.5–1 mm wide, apex

acuminate. Corolla blue-gray or outside with blue-gray broad stripes and inside white, narrowly obconic, 6–7 mm; lobes ovate, 3–4 mm, margin entire, apex obtuse; plicae deeply 2-cleft, segment margins entire, serrulate, or sometimes few lacinate. Stamens inserted just below middle of corolla tube, equal; filaments 1–1.5 mm; anthers ovoid, 0.5–0.8 mm. Style 0.6–0.8 mm; stigma lobes linear. Capsules obovoid, 2–3 mm; gynophore 2–5 mm. Fl. and fr. Jun-Sep.

- 3200–4000 m. NW Yunnan.

- 1a. Corolla outside with blue-gray broad stripes, plicae segments serrulate to sometimes few lacinate 132a. var. *stellulata*
1b. Corolla outside without blue-gray broad stripes, plicae segments entire 132b. var. *dichotoma*

132a. *Gentiana stellulata* var. *stellulata*

星状龙胆 (原变种) xing zhuang long dan (yuan bian zhong)

Corolla outside with blue-gray broad stripes, inside white; plicae segments serrulate to sometimes few lacinate.

- Grassland slopes; 3300–4000 m. NW Yunnan.

132b. *Gentiana stellulata* var. *dichotoma* Harry Smith in Handel-Mazzetti, Symb. Sin. 7: 968. 1936.

歧伞星状龙胆 qi san xing zhuang long dan

Corolla blue-gray; plicae segments entire.

- Grassland slopes; 3200–3300 m. NW Yunnan.

133. *Gentiana epichysantha* Handel-Mazzetti, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 57: 173. 1920.

齿褶龙胆 chi zhe long dan

Gentiana dentiformis T. N. Ho.

Annuals 5–10 cm tall. Stems purple, ascending to erect, 2 or 3 × dichotomously branched from base or rarely simple, glabrous. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade ovate-triangular, 6–10 × 2.5–3.5 mm, abaxially glabrous, adaxially densely and minutely papillate, apex acute, veins 1–3, distinct, and slender. Stem leaves spreading; petiole tube 0.5–0.7 mm, papillate on margin and abaxially; leaf blade ovate-lanceolate to ovate-triangular, 3–6 × 1.5–2.5 mm, much shorter than internodes, abaxially glabrous, adaxially densely and minutely papillate, base cordate, apex acute; veins 1–3, distinct, slender. Flowers (1 or) few to many. Pedicel 0.5–1.5 cm, glabrous. Calyx campanulate, 5–5.5 mm; lobes filiform to filiform-subulate, 2.5–3 mm, base 1–1.5 mm wide, apex acuminate, midvein prominent. Corolla white or pale yellow-green, outside with blue-gray stripes, campanulate, 0.9–1.2 cm; lobes ovate, 1.5–2 mm, margin entire, apex obtuse; plicae ovate, 1.2–1.8 mm, margin deeply few dentate, apex obtuse. Stamens inserted at basal part of corolla tube, equal; filaments 2.5–3.5 mm; anthers ellipsoid, 0.5–0.7 mm. Style 1.5–2 mm; stigma lobes linear. Capsules narrowly obovoid to obovoid, 5–6 mm; gynophore to 6 mm.

Seeds light brown, ovoid, 1.5–1.7 mm. Fl. and fr. Aug-Oct.

- Pine forests; 3700–3900 m. NW Yunnan.

134. *Gentiana divaricata* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 19. 1984.

叉枝龙胆 cha zhi long dan

Annuals 3–4 cm tall. Stems ascending to erect, 3 or 4 × divaricate from base, glabrous. Basal leaves withered at anthesis; petiole 4–7 mm; leaf blade broadly ovate, 3–9 × 2.5–5 mm, abaxially glabrous, adaxially densely and minutely papillate, base rounded to cordate, margin cartilaginous and smooth, apex acute; veins 1–3, distinct, slender. Stem leaves spreading, much shorter than internodes. Flowers few. Pedicel 3–10 mm, glabrous. Calyx obconic, 3.5–5.5 mm; lobes filiform-subulate, 1–2 mm, base 0.5–1 mm wide, margin cartilaginous and smooth, apex acuminate, midvein prominent. Corolla pale blue, narrowly obconic, 1.1–1.4 cm; lobes ovate-elliptic, 3.5–4 mm, margin entire, apex obtuse; plicae oblong, 2.5–3 mm, margin clavate fringed with expanded tips. Stamens inserted at middle of corolla tube, equal; filaments 3–3.5 mm; anthers ellipsoid, 0.6–0.8 mm. Ovary ellipsoid, 2.5–3 mm; gynophore 4–5 mm, stout. Style 2–3 mm; stigma lobes linear. Fl. Jul.

- Shady forest slopes; ca. 2300 m. SW Sichuan.

135. *Gentiana oligophylla* Harry Smith, Bull. Misc. Inform. Kew 1937: 130. 1937.

少叶龙胆 shao ye long dan

Annuals 8–12 cm tall. Stems erect, 2–4 × dichotomously branched from base, glabrous. Basal leaves withered at anthesis; petiole 3–10 mm, slender, glabrous; leaf blade ovate-lanceolate to ovate-elliptic, 0.9–2 cm × 4–7 mm, abaxially glabrous, adaxially densely and minutely papillate, apex obtuse, veins 1–3. Stem leaves spreading; petiole tube 1–1.3 mm, papillate on margin and abaxially; leaf blade linear-lanceolate to ovate-triangular, 5–8 × 1.5–2 mm, much shorter than internodes, abaxially glabrous, adaxially densely and minutely papillate, base cordate, apex acute, midvein distinct. Flowers few to many. Pedicel purple, 0.4–1.7 cm, glabrous. Calyx obconic, 4–5.5 mm; lobes filiform-subulate, 2–2.5 mm, base 0.8–1.2 mm wide, apex acuminate, midvein prominent. Corolla outside pale blue-gray, inside white, obconic, 8–10 mm; lobes ovate-orbicular, 2–2.5 mm, base slightly narrowed, margin entire, apex obtuse to rounded; plicae margin clavate fringed with expanded tips. Stamens inserted just below middle of corolla tube, equal; filaments 2.5–3 mm; anthers ellipsoid, 0.5–0.7 mm. Style 0.5–1 mm; stigma lobes oblong. Capsules narrowly obovoid to obovate, 3.5–4.5 mm; gynophore to 5 mm. Seeds light brown, ellipsoid, 1.3–1.5 mm. Fl. and fr. May-Aug.

- Grassland and roadside slopes, forest margins; 1800–2800 m. Guizhou, Hubei, Hunan, E Sichuan.

The separation between *Gentiana oligophylla* and *G. deltoidea* is not clear.

136. *Gentiana deltoidea* Harry Smith in Handel-Mazzetti,

Symb. Sin. 7: 966. 1936.

三角叶龙胆 san jiao ye long dan

Annuals 4–6 cm tall. Stems ascending to erect, weak, 1 or 2 × dichotomously branched from base or rarely simple, glabrous. Basal leaves withered at anthesis; petiole 1–2 mm, papillate adaxially and on margins; leaf blade ovate to ovate-triangular, 4–10 × 2.5–4 mm, abaxially glabrous, adaxially densely and minutely papillate, margin densely ciliate, apex acute, veins 1–3, distinct, and slender. Stem leaves spreading; petiole tube 1–1.5 mm, papillate on margin and abaxially; leaf blade ovate-triangular to triangular, 2.5–5 × 2–2.5 mm, much shorter than internodes, abaxially glabrous, adaxially densely and minutely papillate, base rounded to cordate, margin ciliate, apex acute; veins 1–3, distinct, slender. Flowers few. Pedicel 0.9–2 cm, glabrous. Calyx campanulate, 5.5–6 mm; lobes filiform-subulate, 1.5–3 mm, base 1–1.5 mm wide, apex acuminate, midvein prominent. Corolla blue, campanulate, 9–10 mm; lobes ovate to ovate-orbicular, 2.5–3.5 mm, margin erose-undulate, apex obtuse; plicae ovate, 2–2.5 mm, margin clavate fringed with expanded tips. Stamens inserted at basal part of corolla tube, equal; filaments 2–3 mm; anthers ellipsoid, 0.5–0.7 mm. Style 0.8–1 mm; stigma lobes oblong. Capsules obovoid, 3.5–4 mm; gynophore to 4 mm. Seeds brown, ellipsoid, 1.3–1.6 mm. Fl. and fr. Jul–Aug.

• Grassland slopes; 3300–3700 m. SW Sichuan, NW Yunnan.

137. *Gentiana recurvata* C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 110. 1883.

外弯龙胆 wai wan long dan

Annuals (3–)9–22 cm tall. Stems ascending to erect, 3 or 4 × dichotomously branched from base, glabrous. Basal leaves withered at anthesis; petiole 2–4 mm; leaf blade ovate-elliptic to ovate, 5–12(–15) × 3–7 mm, abaxially glabrous, adaxially densely and minutely papillate, apex acute to obtuse; veins 1–3, distinct, slender. Stem leaves spreading; petiole tube 0.5–1 mm; leaf blade lanceolate, narrowly elliptic, or ovate, (3–)5–11 × 1.5–4 mm, much shorter than internodes, abaxially glabrous, adaxially densely and minutely papillate, base rounded to cordate, apex acuminate to acute, midvein distinct. Flowers few to many. Pedicel 0.7–1.6 cm, glabrous. Calyx narrowly obconic, 4–5.5 mm; lobes filiform-subulate, 1.5–2 mm, base 0.5–1 mm wide, apex acuminate, midvein prominent. Corolla blue-purple, obconic to narrowly so, 1–1.4 cm; lobes ovate-elliptic to ovate, 3.5–4 mm, margin entire, apex obtuse; plicae ovate-oblong, 2–2.5 mm, margin clavate fringed with expanded tips. Stamens inserted at middle of corolla tube, equal; filaments 1.5–2.5 mm; anthers ellipsoid, 0.7–0.9 mm. Style 1–1.5 mm; stigma lobes oblong. Capsules narrowly obovoid to obovoid, 4–5 mm; gynophore to 1.4 cm. Seeds light brown, ellipsoid to ovoid-ellipsoid, 1.2–1.5 mm. Fl. and fr. Aug–Oct.

Meadows; 3000–4000 m. SE Xizang, NW Yunnan [NE Myanmar, E Nepal, Sikkim].

138. *Gentiana mairei* H. Léveillé, Bull. Acad. Int. Géogr. Bot. 25: 22. 1915.

寡流苏龙胆 gua liu su long dan

Annuals 8–15 cm tall. Stems purple, ascending to erect, 2 or 3 × dichotomously branched from base, glabrous. Basal leaves withered at anthesis; petiole 1.5–3 mm; leaf blade ovate-elliptic to ovate, 0.7–1.5 cm × 3–7 mm, abaxially glabrous, adaxially densely and minutely papillate, margin ciliolate, apex acute; veins 1–3, distinct, slender. Stem leaves spreading; petiole tube 1–1.5 mm, papillate on margin and abaxially; leaf blade ovate-lanceolate to ovate-triangular, 5.5–11 × 2.5–4 mm, much shorter than internodes, abaxially glabrous, adaxially densely and minutely papillate, base rounded to cordate, margin ciliolate, apex acute; veins 1–3, distinct, slender. Flowers few to many. Pedicel 5–11 mm, to 3 cm in fruit, glabrous. Calyx obconic, 5–5.5 mm; lobes filiform-subulate, 2–2.5 mm, base 1–1.5 mm wide, apex acuminate, midvein prominent. Corolla outside with blue-gray stripes, inside pale blue with blackish short lines in throat, sometimes white or pale yellow, obconic, 0.8–1.2 cm × ca. 5 mm, to 8 mm in diam. in fruit; lobes ovate-orbicular, 2.5–3 mm, margin entire, apex subrounded; plicae ovate-oblong, 2–2.5 mm, with a fringe of usually 8–10 filaments. Stamens inserted at basal part of corolla tube, equal; filaments 3–3.5 mm; anthers ellipsoid, 0.7–1 mm. Style 0.7–1.5 mm; stigma lobes linear. Capsules obovoid, 4.5–5.5 mm; gynophore to 1.3 cm. Seeds light brown, ellipsoid, 1.3–1.5 mm. Fl. and fr. May–Sep.

• Bogs, alpine meadows, scrub meadows, forests; 2400–4000 m. SW Sichuan, NE Yunnan.

139. *Gentiana panthaica* Prain & Burkill, J. Proc. Asiat. Soc. Bengal 2: 313. 1906.

流苏龙胆 liu su long dan

Gentiana reynieri H. Léveillé; *G. robustior* Burkill ex Diels.

Annuals 4–30 cm tall. Stems ascending to erect, 2–4 × dichotomously branched from base, glabrous. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade ovate-elliptic to ovate, 0.9–2 cm × 4–10 mm, abaxially glabrous, adaxially densely and minutely papillate, apex acute; veins 1–3, distinct, slender. Stem leaves spreading; petiole tube 1–1.5 mm, papillate on margin and abaxially; leaf blade lanceolate, narrowly elliptic, or ovate-triangular, 6–8 × 2.5–3.5 mm, much shorter than internodes, abaxially glabrous, adaxially densely and minutely papillate, base rounded to cordate, margin ciliolate, apex acuminate to acute; veins 1–3, distinct, slender. Flowers few to many. Pedicel 3–12 mm, glabrous. Calyx obconic, 4.5–7 mm; lobes filiform to filiform-subulate, 1.5–3 mm, base 1–1.5 mm wide, apex acuminate, midvein prominent. Corolla pale blue, outside with blue-gray stripes, obconic, (0.8–)1–1.4 cm; lobes ovate, 2.5–3.5 mm, margin entire or indistinctly denticulate, apex obtuse; plicae ovate, 2–2.5 mm, fringed usually with 15–20 filaments. Stamens inserted just below middle of corolla tube, equal; filaments 3–4 mm; anthers ellipsoid, 0.6–1 mm. Style 0.7–1.2 mm; stigma lobes oblong. Capsules narrowly obovoid to obovoid, 4–5

mm; gynophore to 8 mm. Seeds light brown, ellipsoid, 1.3–1.5 mm. Fl. and fr. May–Aug.

• River banks, roadsides, grassland slopes, scrub, forest margins, forests; 1600–3800 m. Guangxi, Guizhou, Hunan, Jiangxi, Sichuan, Yunnan.

140. *Gentiana qiujiangensis* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 17. 1984.

侏江龙胆 qiu jiang long dan

Perennials 4–10 cm tall, with long stolons. Stems ascending to erect, simple, glabrous. Basal leaves many, in a rosette. Petiole 2–3.5 mm; leaf blade spatulate, oblong, or suborbicular, 6–9 × 2.5–4 mm, abaxially glabrous, adaxially densely and minutely papillate, base narrowed, apex rounded; veins 1–3, distinct, slender. Stem leaves few, widely spaced, much shorter than internodes. Flowers few. Pedicel 0.5–1.5 cm, glabrous. Calyx tubular, 8–9 mm; lobes filiform to filiform-subulate, 1.2–1.5 mm, base 0.5–0.8 mm wide, margin narrowly membranous, apex acuminate, midvein prominent. Corolla blue-purple, salverform, 2.2–2.6 cm; lobes ovate-oblong, 5–6 mm, margin entire, apex obtuse; plicae oblong, 2.5–3 mm, margin filiformly fringed. Stamens inserted at apical part of corolla tube, equal; filaments 2–2.5 mm; anthers ellipsoid, 1–1.2 mm. Ovary ellipsoid, 3.5–4.5 mm. Style 1.5–2 mm; stigma lobes oblong. Fl. Aug.

• Alpine bogs and meadows; ca. 3900 m. NW Yunnan.

141. *Gentiana lacunculata* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 18. 1984.

条叶龙胆 tiao ye long dan

Perennials 3–4 cm tall, with short stolons. Stems ascending to erect, simple, glabrous. Petiole 1.5–3 mm; leaf blade elliptic to ovate-elliptic, 3.5–6 × 1.5–2 mm, abaxially glabrous, adaxially densely and minutely papillate, base narrowed, apex obtuse, veins indistinct. Basal leaves withered at anthesis. Stem leaves spreading, much shorter than internodes. Pedicel 1–3 mm, glabrous. Calyx tubular, 6–7 mm; lobes filiform to filiform-subulate, 2–2.5 mm, base 0.8–1 mm wide, margin narrowly membranous, apex acuminate, midvein prominent. Corolla bright blue to blue-purple, with pale yellow-green base, funnelform, 1.2–1.5 cm; lobes 2.5–3 mm, suborbicular, base distinctly narrowed, margin erose, apex rounded; plicae broadly oblong, 0.7–1 mm, margin lacinate. Stamens inserted at apical part of corolla tube, equal; filaments 1.5–2 mm; anthers ellipsoid, 0.7–1 mm. Ovary ellipsoid, 3.5–4 mm; gynophore 2.5–3 mm, stout. Style 1.5–2 mm; stigma lobes linear. Fl. Aug.

• Alpine meadows; 3900–4300 m. SE Xizang.

142. *Gentiana muscicola* C. Marquand, Bull. Misc. Inform. Kew 1937: 189. 1937.

藓生龙胆 xian sheng long dan

Perennials 3–6 cm tall, with long slender stolons. Stems erect, simple, glabrous. Petiole 2–2.5 mm; leaf blade ovate, 4–5 × 3–4 mm, abaxially glabrous, adaxially densely and minutely papillate, base rounded to cordate, margin narrowly

membranous, apex acute; veins 1–3, slender. Pedicel 2–3 mm, glabrous. Calyx tubular, 4.5–5.5 mm; lobes filiform to filiform-subulate, 1.5–2 mm, base 0.8–1.2 mm wide, margin narrowly membranous, apex acuminate, midvein prominent. Corolla purple, funnelform, 1–1.1 cm; lobes ovate-lanceolate to ovate-triangular, 2.5–3.5 mm, margin entire, apex obtuse; plicae ovate, 0.7–1 mm, margin lacinate. Stamens inserted at apical part of corolla tube, equal; filaments 2–2.5 mm; anthers ellipsoid, 0.6–0.8 mm. Ovary ellipsoid, 2.5–3 mm; gynophore ca. 2 mm, stout. Style 3–4 mm; stigma lobes linear. Fl. Jul.

Among mosses on stones or under forests; 2700–3200 m. SE Xizang, NW Yunnan [NE Myanmar].

143. *Gentiana exquisita* Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 251. 1965.

丝瓣龙胆 si ban long dan

Perennials 10–20 cm tall, with short slender stolons. Stems ascending to erect, slender, simple or few branched, glabrous. Basal leaves withered at anthesis. Petiole 1.5–2.5 mm; leaf blade ovate-lanceolate to ovate, 3–6 × 1.5–3 mm, abaxially glabrous, adaxially densely and minutely papillate, base rounded to cordate, apex acuminate, veins 1–3, distinct, and slender. Stem leaves spreading, much shorter than internodes. Flowers few. Pedicel slender, 1–3 cm, glabrous. Calyx narrowly obconic, 5–6 mm; lobes filiform to filiform-subulate, 2–3 mm, base 1–1.5 mm wide, margin narrowly membranous, apex acuminate, midvein prominent. Corolla violet, inside with dark blue spots, obconic, 1.2–1.5 × 0.9–1 cm; lobes linear, 1.5–1.8 mm, base ca. 1 mm, margin entire, apex obtuse; plicae broadly oblong, 1.5–1.8 × 3–4 mm, slightly 2-cleft, margin of both segments filiform fringed. Stamens inserted at basal part of corolla tube, equal; filaments 4–5 mm; anthers narrowly ellipsoid, 0.8–1 mm. Ovary ellipsoid, 3–3.5 mm; gynophore ca. 4.5 mm, slender. Style 0.8–1 mm; stigma lobes oblong. Fl. Sep.

Grassland slopes; 3300–4000 m. NW Yunnan [NE Myanmar].

144. *Gentiana formosa* Harry Smith, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 104. 1926.

美丽龙胆 mei li long dan

Perennials 3–8 cm tall, with short slender stolons. Stems ascending to erect, simple or few branched, glabrous. Petiole tube 1–1.5 mm; leaf blade elliptic toward stem base but others ovate, 4–7 × 3–5 mm, larger toward stem apex, abaxially glabrous, adaxially densely and minutely papillate, base rounded to cordate, apex acute to obtuse; veins 1–3, distinct, slender. Basal leaves withered at anthesis. Stem leaves spreading, much shorter than internodes. Flowers 1 to few. Pedicel 5–6 mm, glabrous. Calyx obconic, 4.5–5.5 mm; lobes filiform to filiform-subulate, 2.5–3 mm, base 1–1.5 mm wide, margin narrowly membranous, apex acuminate, midvein prominent. Corolla white or pale blue, tubular-campanulate to obconic, (1–)1.2–1.5 cm; lobes ovate, 2–2.5 × 2.5–3 mm, margin entire, apex obtuse; plicae ovate, 2–2.5 × 3–4 mm, margin filiform fringed. Stamens inserted at basal part of corolla tube, equal; filaments 4–5 mm; anthers ellipsoid, 0.8–1 mm. Ovary ellipsoid, 2–2.5 mm; gynophore 4.5–6.5 mm,

slender. Style 0.7–1.2 mm; stigma lobes oblong. Fl. Jul-Sep.

• Grassland slopes, forests; 2700–4200 m. SE Xizang, NW Yunnan.

145. *Gentiana grata* Harry Smith, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 103. 1926.

长流龙胆 chang liu long dan

Perennials 8–25 cm tall, with short slender stolons. Stems erect, slender, few branched, glabrous. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade ovate-elliptic to ovate, 6–8 × 3–4.5 mm, abaxially glabrous, adaxially densely and minutely papillate, apex obtuse; veins 1–3, distinct, slender. Stem leaves spreading; petiole tube 0.5–1 mm; leaf blade narrowly elliptic, ovate-elliptic, or ovate, 3–7 × 1–2.5 mm, much shorter than internodes, base rounded to cordate, margin ciliolate, apex acute; veins 1–3, distinct, slender, abaxially glabrous, adaxially densely and minutely papillate. Flowers few. Pedicel 0.5–1.5 cm, glabrous. Calyx tubular, 3–4 mm; lobes filiform-subulate, 1–1.5 mm, base 0.5–1 mm wide, apex acuminate, midvein prominent. Corolla pale blue to blue, tubular to narrowly obconic, 1.2–1.4 cm; lobes ovate-elliptic to ovate, 2.5–3.5 mm, margin entire, apex obtuse; plicae ovate, 1.5–3 mm, deeply 2-cleft, margin of both segments filiform fringed. Stamens inserted at middle of corolla tube, equal; filaments 2–3 mm; anthers ellipsoid, 0.8–1 mm. Style 1.5–2 mm; stigma lobes oblong. Capsules narrowly obovoid to obovoid, 4–5 mm; gynophore to 1.2 cm. Seeds light brown, ellipsoid to ovoid, 1–1.2 mm. Fl. and fr. Aug-Sep.

Grassland slopes, meadow bogs; 2900–4100 m. SE Xizang, NW Yunnan [NE Myanmar].

146. *Gentiana burmensis* C. Marquand, Bull. Misc. Inform. Kew 1928: 49. 1928.

缅甸龙胆 mian dian long dan

Perennials 4–7 cm tall, with long slender stolons. Stems ascending to erect, simple or few branched, glabrous. Petiole 1.5–2 mm; leaf blade ovate-elliptic, ovate, or ovate-orbicular, 4–6 × 2.5–3.5 mm, abaxially glabrous, adaxially densely and minutely papillate, base rounded to cordate, margin narrowly membranous, apex obtuse; veins 1–3, distinct, slender. Basal leaves withered at anthesis. Stem leaves spreading, usually shorter than internodes. Flowers 1 to few. Pedicel 4–6 mm, glabrous. Calyx tubular, 3.5–4.5 mm; lobes narrowly triangular, 1–1.5 mm, base 0.5–1 mm wide, margin narrowly membranous, apex acute, midvein prominent. Corolla purple, narrowly obconic to obconic, 1.2–1.5 cm; lobes ovate-lanceolate to ovate, 2.5–3.5 mm, margin entire, apex obtuse; plicae 2.5–3.5 mm, deeply 2-cleft, margin of both segments filiform fringed. Stamens inserted at middle of corolla tube, equal; filaments 3.5–4 mm; anthers ellipsoid, 0.7–0.9 mm. Ovary ellipsoid, ca. 3 mm; gynophore ca. 3.5 mm, stout. Style 3–4 mm; stigma lobes linear. Fl. Aug.

Sandy places, sunny gravel slopes, forests; 3900–4200 m. SE Xizang, NW Yunnan [N Myanmar].

147. *Gentiana delicata* Hance, J. Bot. 21: 324. 1883.

黄山龙胆 huang shan long dan

Gentiana heterostemon Harry Smith var. *chingii* (C. Marquand) Harry Smith, *G. pedicellata* (Wallich ex D. Don) Grisebach var. *chingii* C. Marquand.

Annuals 4–10 cm tall. Stems purple, erect, rigid, simple or few branched from base, densely papillate. Basal leaves with petiole 1–2 mm; leaf blade broadly elliptic to ovate, 6–10 × 0.5–6 mm, margin narrowly membranous and ciliolate, apex obtuse and apiculate, midvein distinct. Stem leaves with petiole tube 0.5–1 mm, adaxially papillate; leaf blade linear-lanceolate, oblong, or elliptic, 6–10 × 0.5–6 mm, shorter than internodes, margin narrowly membranous and ciliolate, apex acuminate to obtuse, midvein distinct. Flowers few. Pedicel purple, 2–6 mm, rigid, densely papillate. Calyx narrowly obconic, 6.5–7.5 mm; lobes filiform to filiform-subulate, 3–4 mm, margin narrowly membranous, apex acuminate, midvein distinct. Corolla outside pale yellow-green, inside pale blue, obconic, 1.2–1.8 cm; lobes ovate, 2–2.5 mm, margin entire, apex obtuse; plicae broadly ovate, 1–1.5 mm, margin denticulate, apex truncate. Stamens inserted at middle of corolla tube, equal; filaments 4.5–5 mm; anthers linear, 2–2.5 mm. Style 3–4.5 mm; stigma lobes linear. Capsules narrowly obovoid, 6–7 mm; gynophore to 1.5 cm. Seeds light brown, ovoid-ellipsoid, 1.2–1.4 mm. Fl. and fr. May-Jul.

• Roadsides, hillsides, wet places; 400–2100 m. Anhui (Huang Shan).

148. *Gentiana rubicunda* Franchet, Bull. Soc. Bot. France 31: 373. 1884.

深红龙胆 shen hong long dan

Annuals 8–15 cm tall. Stems erect, simple or few branched from middle, glabrous. Basal leaves with petiole 2–3 mm, adaxially papillate; leaf blade ovate-elliptic, ovate, or ovate-orbicular, 1–2.5 cm × 4–10 mm, margin ciliolate, apex obtuse to rounded; veins 1–3, distinct, slender. Stem leaves widely spaced; petiole tube 1–1.5 mm, adaxially papillate; leaf blade lanceolate, ovate-elliptic, ovate, or obovate-orbicular, 0.4–2.2 cm × 2–7 mm, shorter than internodes, margin ciliolate, apex obtuse, veins 1–3. Flowers 1 to few. Pedicel (0.3–)1–1.5 cm, glabrous. Calyx narrowly obconic; lobes filiform to filiform-subulate, margin smooth, apex acuminate, midvein distinct. Corolla purple, 1.5–6 cm; tube outside usually with blackish short lines and spots, narrowly obconic; lobes ovate, margin entire, apex obtuse; plicae ovate, margin entire, erose, or 2-cleft. Stamens inserted at middle of corolla tube, equal; filaments 0.7–1.5 cm; anthers narrowly ellipsoid, 2.5–4 mm. Style 1.5–2.5 mm; stigma lobes linear. Capsules narrowly obovoid, 7–9 mm; gynophore to 4(–5.5) cm. Seeds brown, ellipsoid, 1–1.3 mm. Fl. and fr. Mar-Oct.

• 500–3300 m. SE Gansu, Guizhou, Hubei, Hunan, Sichuan, Yunnan.

1a. Stem leaf blades obovate-orbicular

..... 148d. var. *samolifolia*

- 1b. Stem leaf blades lanceolate, ovate-elliptic, or ovate.
 2a. Corolla 1.5–1.8 cm, plicae 2-cleft 148c. var. *biloba*
 2b. Corolla 2–6 cm, plicae entire or erose.
 3a. Corolla 2–3 cm 148a. var. *rubicunda*
 3b. Corolla 4.5–6 cm 148b. var. *purpurata*

148a. *Gentiana rubicunda* var. *rubicunda*

深红龙胆 (原变种) shen hong long dan (yuan bian zhong)

Gentiana bodinieri H. Léveillé.

Stem leaf blades lanceolate, ovate-elliptic, or ovate. Corolla 2–3 cm; plicae entire or erose.

• Along streams, roadsides, cliffs, valleys, grassland slopes, wastelands, forests; 500–3300 m. SE Gansu, Guizhou, Hubei, Hunan, Sichuan, Yunnan.

148b. *Gentiana rubicunda* var. *purpurata* (Maximowicz ex Kusnezow) T. N. Ho, Fl. Reipubl. Popularis Sin. 62: 178. 1988.

大花深红龙胆 da hua shen hong long dan

Gentiana purpurata Maximowicz ex Kusnezow, Bull. Acad. Imp. Sci. Saint-Pétersbourg, sér. 4, 2: 506. 1892.

Stem leaf blades lanceolate, ovate-elliptic, or ovate. Corolla 4.5–6 cm; plicae entire or erose.

• Roadsides, hillsides, wastelands; 2400–2700 m. Sichuan.

148c. *Gentiana rubicunda* var. *biloba* T. N. Ho, Fl. Reipubl. Popularis Sin. 62: 178. 1988.

二裂深红龙胆 er lie shen hong long dan

Gentiana bellidifolia Franchet (1896), not J. D. Hooker (1844).

Stem leaf blades lanceolate, ovate-elliptic, or ovate. Corolla 1.5–1.8 cm; plicae 2-cleft.

• E Sichuan.

148d. *Gentiana rubicunda* var. *samolifolia* (Franchet) C. Marquand, Bull. Misc. Inform. Kew 1937: 172. 1937.

小繁缕叶龙胆 xiao fan lu ye long dan

Gentiana samolifolia Franchet, Bull. Soc. Bot. France 43: 485. 1896.

Stem leaf blades obovate-orbicular. Corolla 1.5–2 cm.

• W Hubei, E Sichuan.

149. *Gentiana itzershanensis* Liu & Kuo, Bull. Exp. Forest Natl. Taiwan Univ. 114: 181. 1974.

伊泽山龙胆 yi ze shan long dan

Annuals 15–20 cm tall. Stems purple, erect, rigid, few

branched from middle, slightly 4-angled, papillate. Basal leaves with petiole 1–2 mm; leaf blade lanceolate to ovate-elliptic, 1.8–2 cm × 6–8 mm, margin indistinctly cartilaginous, apex acute and apiculate, midvein distinct. Stem leaves widely spaced; petiole tube 1.5–2 mm; leaf blade lanceolate to ovate-elliptic, 1.2–1.5 cm × 4–5 mm, shorter than internodes, margin indistinctly cartilaginous, apex acute and apiculate, midvein distinct. Flowers few, subsessile. Calyx campanulate, 1.4–1.6 cm; lobes filiform-subulate, 9–10 mm, margin ciliolate, apex acuminate and apiculate, midvein distinct. Corolla blue, tubular-campanulate, 1.8–2.2 cm; lobes broadly ovate, 3.5–4 mm, margin entire, apex acute; plicae ovate-oblong, 2–3 mm, 2- or 3-dentate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 5–7 mm; anthers ellipsoid, 2.5–3 mm. Style 3–4.5 mm; stigma lobes linear. Capsules narrowly obovoid, 7–8 mm; gynophore to 1.5 cm. Seeds brown, ovoid-ellipsoid, 1.2–1.4 mm. Fl. and fr. Jul–Oct.

• Grassland slopes; ca. 3300 m. Taiwan.

150. *Gentiana baoxingensis* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 21. 1984.

宝兴龙胆 bao xing long dan

Annuals 3–4 cm tall. Stems purple, ascending, few branched from base, glabrous. Basal leaves with petiole 0.7–1 mm; leaf blade ovate, 4–6 × 3–4 mm, margin hirsute, apex acute and apiculate, veins 1–3. Stem leaves widely spaced, shorter than internodes; petiole tube 0.5–0.7 mm; leaf blade ovate, 2.5–3.5 × 2–3 mm, margin hirsute, apex acute and apiculate, midvein distinct. Flowers few to many. Pedicel purple, 5–10 mm, glabrous. Calyx purple, narrowly obconic, 4–5 mm, coarsely papillate; lobes filiform to filiform-subulate, 1.5–2 mm, margin hirsute, apex acuminate, midvein distinct. Corolla purple, with numerous blackish short lines in throat, obconic, 9–10 mm; lobes 1.2–1.5 mm, ovate, margin entire, apex obtuse; plicae triangular to broadly ovate, 1–1.2 mm, margin entire or denticulate, apex obtuse. Stamens inserted just above to middle of corolla tube, equal; filaments 1–1.2 mm; anthers ellipsoid, 0.8–1 mm. Ovary ellipsoid, 1.5–2 mm; gynophore ca. 1.5 mm. Style 0.8–1 mm; stigma lobes narrowly oblong. Fl. Aug.

• Grassland slopes; ca. 4000 m. W Sichuan.

151. *Gentiana filisepala* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 21. 1984.

丝萼龙胆 si e long dan

Annuals 10–20 cm tall. Stems ascending, much branched from base, glabrous. Basal leaves with petiole 1–2 mm; leaf blade spatulate to ovate-orbicular, 1–1.5 × 0.6–1.3 cm, margin almost smooth, apex obtuse to rounded, veins 1–3. Stem leaves widely spaced; petiole tube 0.5–1 mm; leaf blade ovate, 5–8 × 3–3.5 mm, shorter than internodes, margin almost smooth, apex obtuse, veins 1–3. Flowers many. Pedicel 1–1.5 cm, glabrous. Calyx with blackish short lines in tube, narrowly obconic, 7–9 mm; lobes filiform to filiform-subulate, 3.5–4.5 mm, margin smooth, apex acuminate,

midvein distinct. Corolla purple, with numerous blackish short lines in throat, obconic, 1.7–2 cm; lobes ovate, 2.5–3 mm, margin entire, apex obtuse; plicae broadly oblong, 1.5–2 mm, margin erose, apex truncate. Stamens inserted at middle of corolla tube, equal; filaments 3.5–4 mm; anthers narrowly ellipsoid, 1.3–1.5 mm. Style 2.5–3 mm; stigma lobes linear. Capsules narrowly obovoid, 9–10 mm; gynophore to 1.5 cm. Seeds brown, ellipsoid, 1.1–1.3 mm. Fl. and fr. Jun–Aug.

- Roadsides, hillsides; 3000–3300 m. W Sichuan.

152. *Gentiana flavomaculata* Hayata, Icon. Pl. Formos. 6: Suppl. 49. 1917.

黄花龙胆 huang hua long dan

Gentiana flavescens Hayata (1908), not Schur (1866).

Annuals 4–8 cm tall. Stems ascending, branched from base, densely papillate. Basal leaves with petiole 0.5–1 mm; leaf blade ovate-elliptic, 0.7–1.7 cm × 3–5 mm, margin ciliolate, apex acuminate to obtuse and apiculate, midvein distinct. Stem leaves widely spaced; petiole tube 0.5–1 mm, margin ciliolate; leaf blade lanceolate to ovate, 5–8 × 2–5 mm, shorter than internodes, margin ciliolate, apex acute and apiculate, midvein distinct. Flowers few to many. Pedicel 2–3 mm, to 8 mm in fruit, densely papillate. Calyx campanulate, 5–6 mm; lobes 2–2.5 mm, filiform to filiform-subulate, margin ciliolate, apex acuminate, midvein distinct. Corolla pale yellow or white, with pale purple base and yellow spots in throat, tubular-campanulate to narrowly obconic, 1.2–1.5 cm; lobes ovate, 2.5–3 mm, margin entire, apex obtuse and mucronate; plicae 2.5–3 mm, ovate, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 4.5–5.5 mm; anthers ellipsoid, 1–2 mm. Style 1.5–2 mm; stigma lobes linear. Capsules narrowly obovoid to obovoid, 5–6 mm; gynophore to 1.2 cm, stout. Seeds brown, ellipsoid, 0.6–0.9 mm. Fl. and fr. Aug–Oct.

- Grassland slopes; 1800–3000 m. Taiwan.

153. *Gentiana vandellioides* Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 137. 1890.

母草叶龙胆 mu cao ye long dan

Annuals 6–10 cm tall. Stems ascending, 2–4 × dichotomously branched from base, glabrous. Basal leaves with petiole 2–3 mm; leaf blade spatulate to ovate, 8–10 × 5–6.5 mm, base narrowed, margin smooth or ciliolate, apex acute to obtuse, midvein distinct. Stem leaves widely spaced; petiole tube 0.5–1 mm; leaf blade broadly ovate to subcordate, 6.5–12 × 3.5–6 mm, shorter than internodes, base rounded, margin ciliolate, apex acute; veins 3–5, distinct, slender. Flowers few to many. Pedicel 0.8–1.5 cm, glabrous. Calyx narrowly obconic, 4.5–5.5 mm, tube membranous; lobes purple, filiform to filiform-subulate, 2–2.5 mm, margin smooth or ciliolate, apex acuminate, midvein distinct. Corolla pale blue, narrowly obconic, 1.2–1.5 cm; lobes ovate-orbicular, 1.5–2 mm, apex obtuse; plicae ovate, 1.2–1.8 mm, margin entire or 2-cleft. Stamens inserted just below middle of corolla tube, equal; filaments 4–5 mm; anthers ellipsoid, 1–1.5 mm. Style 0.5–1 mm; stigma lobes linear. Capsules narrowly obovoid, 4–5 mm; gynophore to 1.8 cm. Seeds light

brown, narrowly ellipsoid, 1.3–1.5 mm. Fl. and fr. Jul–Sep.

- 1100–3500 m. W Hubei, S Shaanxi, E Sichuan.

1a. Corolla plicae entire 153a. var. *vandellioides*

1b. Corolla plicae 2-cleft 153b. var. *biloba*

153a. *Gentiana vandellioides* var. *vandellioides*

母草叶龙胆 (原变种) mu cao ye long dan (yuan bia zhong)

Corolla plicae entire, apex acute.

- Roadsides, forest margins, forests; 1100–3500 m. W Hubei, S Shaanxi, E Sichuan.

153b. *Gentiana vandellioides* var. *biloba* Franchet, Bull. Soc. Bot. France 43: 486. 1896.

二裂母草叶龙胆 er lie mu cao ye long dan

Corolla plicae deeply 2-cleft.

- Grassland slopes, gravel places; 1600–2600 m. E Sichuan.

154. *Gentiana tatakensis* Masamune, Trans. Nat. Hist. Soc. Taiwan 33: 110. 1943.

塔塔卡龙胆 ta ta ka long dan

Biennials 2–8 cm tall. Stems purple, ascending, simple or few branched from base, densely papillate. Basal leaves with petiole 2.5–3 mm; leaf blade linear-elliptic to narrowly elliptic, 1.3–1.7 cm × 2–3.5 mm, margin ciliolate, apex acuminate, midvein distinct. Stem leaves widely spaced; petiole tube 0.7–1 mm, abaxially papillate; leaf blade lanceolate, elliptic, or ovate, 3–8 × 1.5–2.5 mm, shorter than internodes, margin ciliolate, apex obtuse, midvein distinct. Flowers few to many. Pedicel purple, 2–7 mm, densely papillate. Calyx narrowly obconic, 5–6 mm; lobes filiform to filiform-subulate, 1.5–2 mm, margin smooth, apex acuminate, midvein distinct. Corolla pale purple, narrowly obconic, 8–10 mm; lobes ovate, 2.5–2.7 mm, margin entire, apex obtuse; plicae ovate, 1–1.2 mm, margin entire or 2-cleft, apex obtuse. Stamens inserted just below middle of corolla tube, equal; filaments 3.5–4 mm; anthers ellipsoid, 0.8–1 mm. Style 0.5–0.7 mm; stigma lobes oblong. Capsules narrowly obovoid, 5–6 mm; gynophore to 1.3 cm. Seeds light brown, ellipsoid to ovoid, 0.7–0.9 mm. Fl. and fr. Apr.

- Grassland slopes; 1400–2400 m. Taiwan.

155. *Gentiana yiliangensis* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 22. 1984.

弈良龙胆 yi liang long dan

Annuals 7–12 cm tall. Stems erect, 3–5 × dichotomously branched from base, glabrous. Petiole tube 0.5–1 mm; leaf blade lanceolate, 6–11 × 1–2.5 mm, margin ciliolate, apex acute, midvein distinct. Flowers many. Pedicel 5–7 mm, almost glabrous. Calyx campanulate, 5–6 mm; lobes filiform to filiform-subulate, 2–2.5 mm, base 0.8–1 mm wide, margin narrowly membranous, apex acute, midvein distinct. Corolla

pale yellow-white, pale blue in throat, narrowly obconic, 8–10 mm; lobes ovate, 1.5–2 mm, margin entire, apex obtuse; plicae triangular, 1–1.5 mm, margin entire, apex acute. Stamens inserted at middle of corolla tube, equal; filaments 1.8–2 mm; anthers ellipsoid, 0.7–0.9 mm. Style 0.8–1 mm; stigma lobes oblong. Capsules narrowly obovoid to obovoid, 3.5–4.5 mm; gynophore to 8 mm. Seeds light brown, ellipsoid to ovoid, 0.9–1.1 mm. Fl. and fr. Jul-Sep.

- Roadsides under forests; ca. 1800 m. NE Yunnan.

156. *Gentiana kwangsiensis* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 23. 1984.

广西龙胆 *guang xi long dan*

Perennials 3–6 cm tall, with developed slender stolons. Stems prostrate to ascending, slender, branched from base, papillate. Leaves linear-elliptic, 6–12 × 1–2 mm, longer than internodes, subleathery, margin cartilaginous and smooth or ciliolate, apex obtuse and apiculate, midvein prominent. Basal leaves withered at anthesis; petiole 0.5–1.5 mm. Stem leaves recurved, folded; petiole tube 1–2 mm. Flowers few, subsessile. Calyx narrowly obconic, (5–)9–10 mm, tube membranous; lobes subulate, (3–)5–6 mm, subleathery, margin cartilaginous and ciliolate, apex acuminate and apiculate, midvein prominent. Corolla purple, outside with yellow-green stripes, tubular-funnelform, (0.9–)1.2–1.8 cm; lobes ovate, (1.5–)2–3 mm, margin entire, apex obtuse; plicae oblong, 1–2 mm, margin denticulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments (3–)4–5 mm; anthers narrowly ellipsoid, 1.2–1.5 mm. Style 1.5–2 mm; stigma lobes oblong. Capsules narrowly ellipsoid, 3–5 mm; gynophore to 6 mm, slender. Seeds dark brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jun-Oct.

- Grassland slopes, gravelly areas; 1300–1700 m. Fujian, Guangdong, Guangxi.

157. *Gentiana asterocalyx* Diels, Notes Roy. Bot. Gard. Edinburgh 5: 220. 1912.

星萼龙胆 *xing e long dan*

Annuals 7–15 cm tall. Stems erect, branched from base, with spreading branches, densely papillate. Leaves crowded; leaf blade subulate to lanceolate, 0.8–1.2 cm × 1.5–2.5 mm, longer than internodes, longer toward stem apex, subleathery, rigid, glossy, margin basal half broadly membranous and ciliolate, apical half cartilaginous and smooth, apex acuminate; veins 1–3, abaxially prominent. Basal leaves withered at anthesis; petiole 0.5–1.5 mm. Stem leaves spreading; petiole tube 1–2 mm. Flowers few, subsessile. Calyx tube tubular, 7–9 mm, membranous, with 15 prominent longitudinal veins; lobes spreading rigidly, needlelike, as long as tube, subleathery, glossy, base narrowed, margin basal half broadly membranous and ciliolate, apical half cartilaginous and smooth, apex acuminate and apiculate, veins 1–3 and prominent. Corolla blue-purple, with pale yellow-white base, tubular-funnelform, 1.8–2 cm; lobes ovate-elliptic, 4–5 mm, margin entire, apex obtuse; plicae oblong, 2.5–3 mm, margin denticulate, subtruncate. Stamens inserted at middle of corolla tube, equal; filaments 3–4 mm; anthers narrowly ellipsoid, 1–1.5 mm. Style 3–4 mm; stigma lobes linear. Capsules

narrowly obovoid, 8–9 mm; gynophore to 2.5 cm, stout. Seeds light brown, ellipsoid, 1.1–1.3 mm. Fl. and fr. Jul-Aug.

- Grasslands on limestone; 3000–3200 m. NW Yunnan.

158. *Gentiana asparagoides* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 26. 1984.

天冬叶龙胆 *tian dong ye long dan*

Annuals 4–7 cm tall. Stems ascending, slender, few branched from base, glabrous. Basal leaves with petiole 0.5–1.5 mm; leaf blade ovate-elliptic to ovate, 3.5–4.5 × 2–2.5 mm, margin cartilaginous and ciliolate, apex acute and apiculate, midvein prominent. Stem leaves spreading, folded; petiole tube 1–1.5 mm; leaf blade linear to linear-lanceolate, 2.5–3.5 × 0.7–1.2 mm, shorter than internodes, margin narrowly membranous and ciliolate, apex acuminate and apiculate, midvein abaxially prominent. Flowers few. Pedicel 2–12 mm, glabrous. Calyx 7–8 mm, narrowly obconic; lobes linear-lanceolate, 3.5–5 mm, as long as or longer than tube, margin narrowly membranous, apex acuminate and apiculate, midvein distinct. Corolla blue-purple, with yellow-green base, and with blue-gray stripes, narrowly funnelform, 1.1–1.4 cm; lobes ovate, 1.5–2 mm, margin entire, apex obtuse; plicae ovate, 1.2–1.8 mm, margin entire or denticulate, apex obtuse. Stamens inserted at middle of corolla tube, unequal; filaments 3–4 mm; anthers subglobose, 0.5–0.6 mm. Style 1–2 mm; stigma lobes oblong. Capsules ellipsoid, ca. 6 mm; gynophore ca. 6 mm, slender. Seeds brown. Fl. and fr. Aug.

- Alpine bogs; 3500–3800 m. NW Yunnan.

159. *Gentiana linoides* Franchet in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 129. 1890.

亚麻状龙胆 *ya ma zhuang long dan*

Annuals 5–15 cm tall. Stems erect; branches few, from middle or apically, short, erect; flowering branches crowded together, or rarely simple, densely papillate. Petiole tube 1–2 mm; leaf blade linear-lanceolate, 0.8–1.2 cm × 1–3 mm, apex acute and apiculate; veins 1–3, prominent. Basal leaves withered at anthesis, margin cartilaginous. Stem leaves incurved, folded, margin broadly membranous. Flowers few. Pedicel 2–4 mm, densely papillate. Calyx narrowly obconic, 1–1.2 cm, tube membranous; lobes incurved, ovate-lanceolate, 5–6 mm, margin broad, apex acuminate and caudate, midvein prominent. Corolla blue-purple, with yellow-green base, tubular, 1.5–1.8 cm; lobes ovate, 3–5 mm, margin entire, apex obtuse; plicae ovate, 2–4 mm, margin entire or denticulate, apex obtuse. Stamens inserted just below middle of corolla tube, unequal; filaments 3.5–5.5 mm; anthers narrowly ellipsoid, 1.2–1.5 mm. Style 2–3 mm; stigma lobes oblong. Capsules narrowly obovoid, 8–9 mm; gynophore to 2 cm, slender. Seeds dark brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jul-Aug.

- Grassland slopes; 3000–4000 m. NW Yunnan.

160. *Gentiana syringea* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 24. 1984.

紫花龙胆 *zi hua long dan*

Annuals 3–5 cm tall. Stems ascending, branched from base, glabrous or papillate. Basal leaves with petiole 0.5–1.5 mm; leaf blade ovate to ovate-orbicular, 5–8 × 3–7.5 mm, margin cartilaginous and smooth, apex rounded and mucronate; veins 1–3, distinct. Stem leaves folded; petiole tube 1–2 mm; leaf blade narrowly oblong, rarely lanceolate or lower leaf blades spatulate, 4–6 × 1–2 mm, margin of lower stem leaf blades cartilaginous and of upper leaf blades membranous, apex acuminate to obtuse and apiculate, midvein abaxially prominent. Flowers few. Pedicel 5–10 mm, papillate. Calyx narrowly obconic, 6.5–8 mm; lobes triangular, 2–2.5 mm, margin narrowly membranous, apex acute and apiculate, midvein prominent. Corolla purple, with blackish spots in throat and blackish stripes in tube, narrowly obconic, 1–1.3 (–1.6) cm; lobes ovate-elliptic, 2–3 mm, margin entire, apex obtuse; plicae ovate-elliptic, 1.5–2 mm, margin entire or denticulate, apex obtuse. Stamens inserted at basal part of corolla tube, equal; filaments 4.5–5 mm; anthers curved, ellipsoid, 0.8–1 mm. Style 1.5–2 mm; stigma lobes oblong. Capsules narrowly obovoid to obovoid, 4.5–5 mm; gynophore to 2 cm, slender. Seeds brown, narrowly ellipsoid, 1.2–1.3 mm. Fl. and fr. Jun-Aug.

• River banks, grassland slopes, alpine meadows; 2200–3900 m. S Gansu, S Qinghai, W Sichuan.

161. *Gentiana grumii* Kusnezow, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 63. 1893.

南山龙胆 *nan shan long dan*

Gentiana ivanoviczii C. Marquand.

Annuals 2.5–4 cm tall. Stems few branched from base, basally glabrous, apically papillate. Basal leaves withered at anthesis; petiole 0.5–1.5 mm; leaf blade ovate to ovate-orbicular, 6.5–10 × 3.5–6 mm, margin cartilaginous, apex rounded and mucronate, veins 1–3. Stem leaves folded; petiole tube 1–1.5 mm; leaf blade linear-lanceolate to lanceolate, 5–6 × 1–2 mm, margin narrowly membranous, apex acuminate to obtuse and apiculate, midvein abaxially prominent. Flowers few. Pedicel 2–5 mm, surrounded by leaves, papillate. Calyx 5–6 mm, narrowly obconic; lobes triangular, 1.5–2 mm, margin narrowly membranous, apex acute and apiculate, midvein prominent. Corolla blue, with yellow-green base, outside with blue-gray stripes, inside with blackish spots in throat, obconic, 1–1.2 (–1.4) cm; lobes ovate, 2–2.5 mm, margin entire, apex obtuse; plicae ovate, 1.5–2 mm, margin entire or denticulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 3–4 mm; anthers curved, ellipsoid, 1.3–1.5 mm. Style 1.5–2 mm; stigma lobes oblong. Capsules narrowly obovoid to obovoid, 3–4 mm; gynophore to 1.2 cm, slender. Seeds dark brown, narrowly ellipsoid, 1–1.2 mm. Fl. and fr. Jun-Jul.

• Bog meadows, wet meadows; 3200–3300 m. Qinghai.

162. *Gentiana heleonastes* Harry Smith, Bull. Misc. Inform. Kew 1937: 132. 1937.

针叶龙胆 *zhen ye long dan*

Annuals 5–15 cm tall. Stems ascending to erect, branched from base, glabrous. Basal leaves withered at anthesis; petiole tube 1–2 mm; leaf blade ovate to ovate-orbicular, 4.5–7 × 2.5–5 mm, margin cartilaginous, apex rounded and mucronate, veins 1–3. Stem leaves folded; leaf blade shorter than internodes, longer toward apex, margin narrowly membranous and smooth, apex sometimes recurved, midvein abaxially prominent. Lower stem leaves spatulate, 4–6 × 1.5–2 mm, apex rounded; middle to upper leaves needlelike, apex acuminate and apiculate. Flowers few. Pedicel 1.3–2 cm, exerted from uppermost leaves, glabrous. Calyx narrowly obconic, 7–9 mm; lobes linear-triangular, 2–3 mm, margin narrowly membranous and smooth, veins slender and distinct, apex acuminate and apiculate. Corolla outside blue-gray, inside white or pale blue-gray, tubular, 1.4–1.6 cm; lobes ovate to broadly ovate, 2.5–3.5 mm, margin erose to serrate, apex obtuse; plicae oblong, 1.5–2 mm, margin irregularly denticulate, apex obtuse to truncate. Stamens inserted at basal part of corolla tube, equal or unequal; filaments 2.5–3.5 mm; anthers ellipsoid, 0.8–1 mm. Style 1.5–2 mm; stigma lobes narrowly oblong. Capsules narrowly obovoid to obovoid, 6–7 mm; gynophore 4–10 mm, stout. Seeds light brown, narrowly ellipsoid, 1.3–1.6 mm. Fl. and fr. Jun-Sep.

• River banks, moist meadows, scrub meadows, bog meadows; 3200–4200 m. Qinghai, Sichuan.

163. *Gentiana aristata* Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg 26: 497. 1880.

刺芒龙胆 *ci mang long dan*

Annuals 3–10 cm tall. Stems ascending to erect, branched from base, glabrous. Basal leaves withered at anthesis; petiole 0.5–1.5 mm; leaf blade ovate-elliptic to ovate, 7–9 × 3–4.5 mm, margin cartilaginous, apex acute and awned, midvein prominent. Stem leaves folded; petiole tube 1.5–2.5 mm; leaf blade linear, 5–10 × 1.5–2 mm, longer toward apex, margin narrowly membranous, apex acuminate and awned, midvein abaxially prominent. Flowers few. Pedicel 0.5–2 cm, exerted from uppermost leaves, glabrous. Calyx narrowly obconic, 7–10 mm; lobes linear-lanceolate, 3–4 mm, margin narrowly membranous and smooth, apex acuminate and awned, midvein prominent. Corolla blue to pale purple, with yellow-green base and blue-gray stripes, obconic, 1.2–1.5 cm; lobes ovate-elliptic to ovate, 3–4 mm, margin entire, apex obtuse; plicae oblong, 1.5–2 mm, margin irregularly lacinate, apex truncate. Stamens inserted at middle of corolla tube, equal; filaments 3–4 mm; anthers curved, ellipsoid to reniform, 0.7–1 mm. Style 1.5–2 mm, cylindrical; stigma lobes narrowly oblong. Capsules narrowly obovoid to obovoid, 5–6 mm; gynophore to 2 cm, slender. Seeds light brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jun-Sep.

• River banks, bog meadows, alpine meadows, scrub meadows, steppes, forest clearings, sunny gravel places, valleys; 1800–4600 m. Gansu, Qinghai, Sichuan, Xizang.

164. *Gentiana tricolor* Diels & Gilg in Futterer, Durch Asien Bot. Rep. 3: 15. 1903.

三色龙胆 *san se long dan*

Annuals 3–5 cm tall. Stems purple, ascending to erect, branched from base, basally glabrous, apically papillate. Basal leaves withered at anthesis; petiole 2–3 mm; leaf blade obovate, 7–11 × 5–6.5 mm, margin cartilaginous, apex rounded and mucronate, midvein prominent. Stem leaves folded; petiole tube 2–2.5 mm; leaf blade linear, 4–7 × 1.5–2.5 mm, longer toward apex, margin narrowly membranous and smooth, apex acuminate and awned, midvein abaxially prominent. Flowers few. Pedicel purple, 2–5.5 mm, surrounded by leaves, papillate. Calyx obconic, 7–8 mm; lobes triangular to lanceolate, 2.5–3 mm, margin narrowly membranous and smooth, apex acute and awned, midvein prominent. Corolla pale blue to blue, with yellow-green base, tubular, 1.1–1.3 cm; lobes ovate-elliptic to ovate, 1.2–2 mm, margin entire, apex obtuse and sometimes mucronate; plicae ovate, 1.5–2 mm, margin entire or denticulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 4–5 mm; anthers curved, ellipsoid, 1–1.5 mm. Style 1.5–2 mm; stigma lobes oblong. Capsules narrowly obovoid to obovoid, 5–7 mm; gynophore to 1.5 cm, stout. Seeds dark brown, ellipsoid, 1.1–1.4 mm. Fl. and fr. Jun-Aug.

• Meadows on river banks, bog meadows, forests, roadsides; 2200–3200 m. Qinghai.

165. *Gentiana choanantha* C. Marquand, Bull. Misc. Inform. Kew 1931: 85. 1931.

反折花龙胆 fan zhe hua long dan

Gentiana crassuloides Franchet (Aug 1891), not Bureau & Franchet (Apr 1891).

Annuals 3–5 cm tall. Stems ascending to erect, branched from base, glabrous. Basal leaves withered at anthesis; petiole 0.5–1.5 mm; leaf blade ovate to ovate-orbicular, 4–8 × 2–5 mm, margin cartilaginous and ciliolate, apex rounded and mucronate, veins 1–3. Stem leaves folded; petiole tube 1.5–2.5 mm; lower leaf blades ovate to ovate-orbicular, 4–8 × 2–5 mm, margin cartilaginous and ciliolate, apex rounded and mucronate, veins 1–3; middle to upper leaf blades filiform-linear, 4–6 × 0.5–1 mm, longer toward stem apex, margin narrowly membranous and smooth, apex acuminate and awned, midvein abaxially prominent. Flowers few. Pedicel 3–7 mm, surrounded by leaves, glabrous. Calyx narrowly obconic, 5–6(–9) mm; lobes subulate to linear-triangular, 2–2.5(–3.5) mm, margin narrowly membranous, apex acuminate and awned, midvein prominent. Corolla purple, with yellow-green base, obconic, 8–10(–14) mm; lobes recurved, ovate-orbicular, 1.5–2 mm, margin entire, apex obtuse; plicae ovate, 1.5–1.7 mm, margin slightly 2-cleft or erose, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 4–5 mm; anthers curved, subreniform, 0.8–1 mm. Style 1.5–2 mm; stigma lobes oblong. Capsules narrowly obovoid, 4–5 mm; gynophore to 1.4 cm, stout. Seeds light brown, ellipsoid, 0.8–1 mm. Fl. and fr. Apr-Aug.

• Stream and river banks, bogs, alpine meadows, scrub meadows; 2700–4600 m. W Sichuan.

166. *Gentiana curvianthera* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 25. 1984.

弯药龙胆 wan yao long dan

Annuals 5–6 cm tall. Stems ascending to erect, branched from base, glabrous. Basal leaves withered at anthesis; petiole 0.5–1.5 mm; leaf blade elliptic, 5–8 × 3–4.5 mm, abaxially pubescent, adaxially glabrous, margin cartilaginous and ciliolate, apex acuminate and caudate, midvein prominent. Stem leaves folded; petiole tube 1–2 mm; leaf blade linear-lanceolate, 5–7 × 1.5–2 mm, longer toward apex, abaxially pubescent, adaxially glabrous, margin narrowly membranous and ciliolate, apex acuminate and caudate, midvein abaxially prominent. Flowers few. Pedicel 3–4 mm, surrounded by leaves, glabrous. Calyx narrowly obconic, 7–9 mm; lobes linear-lanceolate, 4–5 mm, margin narrowly membranous and smooth, apex acuminate and apiculate, midvein prominent. Corolla purple, with blue-gray stripes, obconic, 1.2–1.3 cm; lobes ovate, 2–2.5 mm, margin entire, apex obtuse; plicae ovate-elliptic, 1–1.2 mm, margin denticulate, apex obtuse. Stamens inserted just below middle of corolla tube, equal; filaments 3–4 mm; anthers curved, subreniform, ca. 1 mm. Style 1–1.5 mm; stigma lobes linear. Capsules narrowly obovoid, 5–6 mm; gynophore to 1.7 cm. Seeds light brown, ellipsoid, 1–1.3 mm. Fl. and fr. Sep.

• Alpine meadows; ca. 4200 m. W Sichuan.

167. *Gentiana scabrida* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 25(19): 168. 1908.

玉山龙胆 yu shan long dan

Annuals 3–20 cm tall. Stems dark purple, ascending to erect, branched from base, densely papillate. Petiole tube 2–2.5 mm, papillate adaxially and on margins; leaf blade ovate-elliptic to ovate, 0.9–1.5 cm × 3–5 mm, abaxially glabrous, adaxially densely and minutely papillate, base obtuse, apex acuminate to acute and cuspidate, midvein distinct. Pedicel dark purple, 2–10 mm, densely papillate. Calyx narrowly obconic, 6–10 mm; lobes spreading to recurved, spatulate to ovate-lanceolate, 2–4 mm, base narrowed, apex obtuse and mucronate, midvein prominent. Corolla pale yellow to yellow, with dark spots in throat, obconic, 0.9–2.3 cm; lobes broadly ovate, 1.5–5 mm, margin entire, apex obtuse and mucronate; plicae broadly ovate, 1.2–4 mm, margin entire or erose, apex cuspidate to obtuse. Stamens inserted at middle of corolla tube, equal; filaments 5–7 mm; anthers narrowly ellipsoid, 2–3 mm. Style 2–3 mm; stigma lobes linear. Capsules narrowly obovoid to obovoid, 5–7 mm; gynophore to 2 cm, stout. Seeds dark brown, ellipsoid, 1–1.3 mm. Fl. and fr. Jul-Oct.

• 2300–3800 m. Taiwan.

- 1a. Corolla 2–2.3 cm, lobes 4–5 mm, plicae 3–4 mm 167a. var. *scabrida*
 1b. Corolla 0.9–1 cm, lobes 1.5–2 mm, plicae 1.2–1.5 mm 167b. var. *horaimontana*

167a. *Gentiana scabrida* var. *scabrida*

玉山龙胆 (原变种) yu shan long dan (yuan bian zhong)

Annuals 15–20 cm tall. Corolla 2–2.3 cm, lobes 4–5 mm; plicae 3–4 mm, apex obtuse.

- Grassland slopes; 2300–3500 m. Taiwan.

167b. *Gentiana scabrida* var. *horaimontana* (Masamune) Liu & Kuo, Bull. Exp. Forest Natl. Taiwan Univ. 114: 188. 1974.

矮玉山龙胆 ai yu shan long dan

Gentiana horaimontana Masamune, Trans. Nat. Hist. Soc. Taiwan 26: 56. 1936.

Annuals scarcely 3 cm tall. Corolla 0.9–1 cm, lobes 1.5–2 mm; plicae 1.2–1.5 mm, apex obtuse and cuspidate.

- Grassland slopes; ca. 3800 m. Taiwan.

168. *Gentiana pedicellata* (Wallich ex D. Don) Grisebach, Gen. Sp. Gent. 273. 1838.

糙毛龙胆 cao mao long dan

Ericala pedicellata Wallich ex D. Don, London Edinburgh Philos. Mag. & J. Sci. 8: 76. 1836; *E. procumbens* D. Don ex G. Don; *Gentiana pedicellata* var. *wallichii* Kusnezow; *G. quadrifaria* Blume var. *pilosula* C. B. Clarke.

Annuals 3–10 cm tall. Stems ascending to erect, branched from base, densely papillate. Basal leaves withered at anthesis; petiole 0.5–1.5 mm; leaf blade narrowly elliptic to elliptic-lanceolate, 1–2 cm × 4–6 mm, densely and minutely papillate but especially adaxially, base narrowed, apex acuminate to obtuse and apiculate, veins 1–3. Stem leaves with petiole tube 1–1.5 mm, densely papillate on margin and abaxially; leaf blade linear-elliptic, lanceolate, or occasionally oblanceolate, 5–10 × 1.5–2 mm, densely and minutely papillate but especially adaxially, base obtuse, apex acuminate and apiculate, veins 1–3. Pedicel purple, 2–15 mm, densely papillate. Calyx tubular, 3–5 mm; lobes spreading, recurved, or rarely erect, ovate-elliptic to ovate, 1.2–1.5 mm, outside densely and minutely papillate, base not or slightly narrowed, apex obtuse and cuspidate, midvein prominent. Corolla outside pale yellow-green, inside blue to blue-purple with yellow to orange throat, tubular to funnelform, 6–10 mm, twice as long as calyx; lobes ovate, 1.5–2 mm, margin entire, apex obtuse and mucronate; plicae broadly ovate, 0.9–1.1 mm, margin denticulate, apex obtuse to rounded. Stamens inserted just below middle of corolla tube, equal; filaments 2.5–3 mm; anthers ellipsoid, 0.7–1 mm. Style 1–1.5 mm; stigma lobes narrowly oblong. Capsules narrowly obovoid to obovoid, 2–3 mm; gynophore to 2 cm, stout. Seeds dark brown, ellipsoid to ovoid, 0.5–0.8 mm. Fl. and fr. Apr-Jul.

Bogs, clearings in forests, meadow and roadside slopes, wastelands; 2100–3400 m. SW Xizang, W Yunnan [Bhutan, NW and E India, N Myanmar, Nepal, Pakistan, Sikkim].

169. *Gentiana moniliformis* C. Marquand, Bull. Misc. Inform. Kew 1931: 86. 1931.

念珠脊龙胆 nian zhu ji long dan

Annuals 4–6 cm tall. Stems purple, ascending to erect, branched from base, densely papillate. Basal leaves withered at anthesis; petiole 0.5–1 mm; leaf blade spatulate to narrowly elliptic, 0.8–1.7 cm × 4–6 mm, densely and minutely papillate

but especially adaxially, base obtuse, apex acuminate to obtuse and apiculate, midvein distinct. Stem leaves with petiole tube 1–2 mm, papillate; leaf blade linear-elliptic to lanceolate, 3.5–8 × 1–3 mm, densely and minutely papillate but especially adaxially, base obtuse, apex acuminate and apiculate, midvein distinct. Pedicel purple, 2–5 mm, densely papillate. Calyx tubular, 4.5–6 mm; lobes spreading, narrowly triangular to ovate, 1.5–2.5 mm, outside densely and minutely papillate, base not or slightly narrowed, apex acuminate to acute and cuspidate, midvein prominent. Corolla outside pale yellow-green, inside pale greenish blue, tubular, 7–9 mm, scarcely exerted from calyx; lobes ovate, 1.2–1.5 mm, margin entire, apex obtuse and mucronate; plicae ovate, 0.7–1 mm, margin entire, apex obtuse. Stamens inserted at basal part of corolla tube, equal; filaments 2–2.5 mm; anthers ellipsoid, 0.6–0.8 mm. Style 1–1.2 mm; stigma lobes narrowly oblong. Capsules narrowly obovoid to obovoid, 3.5–4 mm; gynophore to 5.5 mm, stout. Seeds dark brown, 0.5–0.6 mm, oblong. Fl. and fr. May.

- Hillsides; 2100 m. W Yunnan.

170. *Gentiana yokusai* Burkill, J. Proc. Asiat. Soc. Bengal 2: 316. 1906.

灰绿龙胆 hui lu long dan

Annuals 2.5–14 cm tall. Stems ascending to erect, branched throughout, usually with 2–5 crowded flowering branches, densely papillate. Petiole 1.5–2.5 mm, margin ciliolate; leaf blade adaxially sometimes densely and minutely papillate, base obtuse, margin thick cartilaginous, apex acuminate and with an aristate tip to 0.7 mm, midvein prominent. Basal leaf blades lanceolate to ovate-lanceolate, 0.7–2.2 cm × 4.5–8 mm. Stem leaves spreading; leaf blade ovate or cordate, 4–12 × 3–6 mm. Pedicel 1.2–1.5 mm, papillate. Calyx narrowly obconic, 5–8 mm; lobes slightly spreading, lanceolate to ovate, 2–3 mm, slightly unequal, base slightly narrowed, margin thick cartilaginous and ciliolate, apex acuminate and with an aristate tip to 0.7 mm, midvein prominent. Corolla blue to blue-purple, funnelform, 7–12 mm; lobes ovate, 2–2.5 mm, margin entire, apex obtuse; plicae ovate, 1–1.5 mm, margin entire or denticulate, apex obtuse. Stamens inserted just below middle of corolla tube, equal; filaments 2–2.5 mm; anthers narrowly ellipsoid, 0.5–0.8 mm. Style 1.5–2 mm; stigma lobes linear. Capsules narrowly obovoid to obovoid, 3–6.5 mm; gynophore to 1.3 cm, stout. Seeds light brown, oblong to ellipsoid, 0.7–1 mm. Fl. and fr. Mar-Sep.

Below 100–2700 m. Anhui, Fujian, Guizhou, Hebei, Hubei, Hunan, Jiangsu, Jiangxi, Nei Mongol, Shaanxi, Shanxi, Sichuan, Taiwan, Zhejiang [Japan, Korea].

- 1a. Stem leaf blades ovate 170a. var. *yokusai*
1b. Stem leaf blades cordate 170b. var. *cordifolia*

170a. *Gentiana yokusai* var. *yokusai*

灰绿龙胆 (原变种) hui lu long dan (yuan bian zhong)

Gentiana agrorum Harry Smith; *G. tenuissima* Hayata; *G. yokusai* var. *japonica* Burkill.

Stem leaves dark green; leaf blade ovate.

Along streams, wet places, roadsides, edges of cultivated land, wastelands, sunny slopes, scrub, forests; below 100–2700 m. Anhui, Fujian, Guizhou, Hebei, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Taiwan, Zhejiang [Japan, Korea].

170b. *Gentiana yokusai* var. *cordifolia* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 42. 1984.

心叶灰绿龙胆 xin ye hui lu long dan

Stem leaves light green; leaf blade cordate.

• Hillsides, valleys; ca. 1000 m. Hebei, Nei Mongol, Shaanxi, Shanxi.

171. *Gentiana sutchuenensis* Franchet in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 136. 1890.

四川龙胆 si chuan long dan

Gentiana decipiens Harry Smith; *G. rigidifolia* Harry Smith.

Annuals 2.5–8 cm tall. Stems erect, branched throughout, usually with 2–5 crowded flowering branches, sparsely papillate. Petiole tube 1–1.5 mm, papillate; leaf blade glabrous, base narrowed to obtuse, margin thick cartilaginous and ciliolate, apex acuminate and aristate with a tip ca. 0.7 mm, midvein prominent. Basal leaves withered at anthesis; leaf blade elliptic to narrowly so, 1.5–4.5 cm × 5–9 mm. Stem leaf blades lanceolate, narrowly elliptic, or ovate, 0.5–2 cm × 2.5–6 mm, narrowed toward stem apex. Pedicel 2–10 mm, sparsely papillate. Calyx obconic, 5–7.5 mm; lobes spreading, lanceolate to ovate-lanceolate, 2–2.5 mm, slightly unequal, base slightly narrowed, margin thick cartilaginous and densely ciliolate, apex acuminate and aristate with a tip ca. 0.7 mm, midvein prominent. Corolla blue to blue-purple, with pale yellow-green base, funnellform, 0.9–1.2 cm; lobes ovate, 2–3 mm, margin entire, apex obtuse; plicae ovate, 1–1.5 mm, margin entire or denticulate, apex obtuse. Stamens inserted at basal part of corolla tube, equal; filaments 2.5–3 mm; anthers ellipsoid, 0.8–1 mm. Style 2–2.5 mm; stigma lobes narrowly oblong. Capsules narrowly obovoid to obovoid, 3.5–5 mm; gynophore to 1.2 cm, stout. Seeds light brown, ellipsoid, 0.7–1 mm. Fl. and fr. Apr–Jul.

• Along streams, river banks, roadsides, grassland slopes, forests; 400–2500 m. S Gansu, Guizhou, S Shaanxi, Sichuan, Yunnan.

172. *Gentiana scabrifilamenta* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 42. 1984.

毛蕊龙胆 mao rui long dan

Annuals 2–5 cm tall. Stems erect, branched from base, densely papillate. Basal leaves with petiole 1–1.5 mm; leaf blade ovate, 4–7 × 3–5 mm, base obtuse, margin cartilaginous and ciliolate, apex acute, midvein distinct. Stem leaves with petiole tube 1–1.5 mm, abaxially papillate; leaf blade elliptic-lanceolate to elliptic, 5–9 × 1–3 mm, base obtuse, margin cartilaginous and ciliolate, apex acute and apiculate, midvein prominent. Flowers subsessile. Calyx tubular, 8–10 mm, tube

membranous; lobes spreading, narrowly triangular, 3–3.5 mm, base not narrowed, margin narrowly membranous, apex acuminate and apiculate, midvein prominent. Corolla blue, with dark blue short lines in throat, tubular, 1.2–1.4 cm; lobes ovate-elliptic, 2–2.5 mm, margin entire, apex obtuse; plicae ovate, 1.5–2 mm, margin 2-cleft or denticulate. Stamens inserted at middle of corolla tube, equal; filaments 1–1.2 mm, scabrous or papillate; anthers ellipsoid, 0.8–1 mm. Ovary narrowly ellipsoid, 2.5–3.5 mm; gynophore 1–1.5 mm. Style 1–1.5 mm; stigma lobes narrowly oblong. Fl. Aug.

• Forests; ca. 4000 m. SE Xizang.

173. *Gentiana simulatrix* C. Marquand, Bull. Misc. Inform. Kew 1937: 190. 1937.

厚边龙胆 hou bian long dan

Annuals 2–6 cm tall. Stems ascending to erect, branched throughout, densely papillate. Basal leaves withered at anthesis; petiole 0.5–1 mm; leaf blade ovate, 6–8 × 3–5 mm, base obtuse, margin thick cartilaginous, apex acute and cuspidate, midvein distinct. Stem leaves crowded to sometimes widely spaced; petiole tube 0.5–1 mm, papillate; leaf blade elliptic to ovate-elliptic, 5–7 × 2–4 mm, base obtuse, margin thick cartilaginous, apex obtuse and cuspidate, midvein distinct. Flowers subsessile. Calyx narrowly obconic, 4.5–7 mm, tube membranous; lobes erect to rarely slightly spreading, ovate, 1.5–3 mm, base narrowed, margin thick cartilaginous, apex acute and cuspidate, midvein prominent. Corolla blue, tubular, 7–8 mm; lobes ovate, 1.5–2 mm, margin entire, apex obtuse; plicae ovate, 1–1.5 mm, margin entire or few dentate, apex obtuse. Stamens inserted at basal part of corolla tube, equal; filaments 1.5–2.5 mm; anthers narrowly ellipsoid, 0.7–0.9 mm. Style 0.7–1 mm; stigma lobes narrowly oblong. Capsules narrowly obovoid to obovoid, 4–5 mm; gynophore 8–9 mm, stout. Seeds light brown, ellipsoid, 0.6–0.8 mm. Fl. and fr. May–Aug.

Grassland slopes; ca. 3000 m. SW Sichuan, SE Xizang [Bhutan].

174. *Gentiana alsinoides* Franchet, Bull. Soc. Bot. France 31: 374. 1884.

繁缕状龙胆 fan lu zhuang long dan

Annuals 3.5–7 cm tall. Stems erect, branched from base, densely papillate. Petiole tube 0.5–1 mm, papillate; leaf blade ovate-lanceolate to ovate-triangular, subleathery, rigid, base obtuse, margin thick cartilaginous and smooth or ciliolate, apex acute and cuspidate, midvein prominent. Basal leaves withered at anthesis; leaf blade 0.9–1.2 cm × 2–4 mm. Stem leaves crowded; leaf blade 2–8 × 1–3 mm. Flowers subsessile. Calyx tubular to narrowly obconic, 4.5–5 mm; tube membranous; spreading, ovate, 1–1.2 mm, base slightly or not narrowed, margin thick cartilaginous and smooth or ciliolate, apex acute and cuspidate, midvein prominent. Corolla pale blue to blue, tubular, 7–8 mm; lobes ovate-lanceolate, 2–2.5 mm, margin entire, apex obtuse; plicae ovate, 1–1.5 mm, margin erose, apex obtuse. Stamens inserted at basal part of corolla tube, equal; filaments 2–2.5 mm; anthers ellipsoid, 0.6–0.8 mm. Style 1–1.2 mm; stigma lobes narrowly oblong. Capsules narrowly obovoid, 3.5–4 mm; gynophore 1.2–1.5

mm, stout. Seeds brown, ellipsoid, 0.9–1.1 mm. Fl. and fr. Jul-Sep.

• Dry grassland slopes, limestone slopes; 2700–3400 m. W Sichuan, NW Yunnan.

175. *Gentiana nyingchiensis* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 31. 1984.

林芝龙胆 lin zhi long dan

Annuals 2–3 cm tall. Stems ascending, much branched from base, densely papillate. Basal leaves withered at anthesis; petiole 1–2 mm, membranous, densely papillate; leaf blade ovate-elliptic, 4–6 × 2.5–3 mm, densely pubescent especially adaxially, base narrowed, margin densely ciliolate, apex acute and cuspidate, veins indistinct. Stem leaves crowded to widely spaced, reflexed to recurved; petiole tube 0.5–1 mm, papillate; leaf blade deltate-spatulate, 3–4.5 × 1–1.5 mm, densely pubescent especially adaxially, base narrowed, margin densely ciliolate, apex deltate acute and cuspidate, veins indistinct or only midvein adaxially distinct. Pedicel 1.5–2.5 mm, densely papillate. Calyx obconic, 3.5–4.5 mm, tube membranous; lobes recurved, ovate, 1–1.3 mm, densely pubescent especially outside, base narrowed, margin densely ciliolate, apex deltate acute, veins indistinct or only midvein distinct outside. Corolla pale blue, with pale yellow-green base and blue-gray throat, tubular, 5.5–6 mm; lobes semiorbicular, 0.9–1.1 mm, margin entire, apex rounded and mucronate; plicae ovate-orbicular, 0.7–1 mm, margin denticulate, apex rounded. Stamens inserted at middle of corolla tube, equal; filaments 1.2–1.5 mm; anthers ellipsoid, 0.5–0.7 mm. Style 0.7–1 mm; stigma lobes linear. Capsules narrowly obovoid to obovoid, 3.5–4 mm; gynophore to 6 mm, stout. Seeds brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jul-Sep.

• Scrub, cliffs; 4300–4500 m. SE Xizang.

176. *Gentiana mailingensis* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 30. 1984.

米林龙胆 mi lin long dan

Annuals 2–5 cm tall. Stems ascending, much branched from base, basally glabrous, apically sparsely papillate. Basal leaves withered at anthesis; petiole 0.8–1 mm, glabrous; leaf blade elliptic to ovate-elliptic, 5–6 × 2–3.5 mm, glabrous, base narrowed, margin indistinctly cartilaginous and densely ciliolate, apex acute and cuspidate, midvein indistinct. Stem leaves widely spaced, flat; petiole longer than leaf blade, papillate, petiole tube 0.7–1.5 mm; leaf blade spatulate to orbicular-spatulate, 4–6 × 1.5–2.5 mm, shorter to longer than internodes, abaxially glabrous, adaxially glabrous or papillate, base narrowed, margin densely ciliolate, apex rounded and mucronate, veins indistinct. Pedicel 2–15 mm, sparsely papillate. Calyx obconic, 5–7 mm, tube membranous; lobes recurved, suborbicular, 1.5–2 mm, papillate, base narrowed, margin densely ciliolate, apex rounded and mucronate, veins indistinct. Corolla blue, with pale yellow-green base and blue-gray throat, tubular, 7–9 mm; lobes ovate-orbicular, 1–1.2 mm, margin entire, apex rounded and mucronate; plicae ovate, 0.8–1 mm, margin denticulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 2.5–3 mm;

anthers ellipsoid, 0.5–0.7 mm. Style 1–1.5 mm; stigma lobes oblong. Capsules narrowly obovoid, 3.5–5 mm; gynophore 1.3–2 cm, slender. Seeds light brown, ellipsoid, 1–1.4 mm. Fl. and fr. Jul-Aug.

• Alpine meadows, scrub meadows; 3900–4500 m. SE Xizang.

177. *Gentiana crassuloides* Bureau & Franchet, J. Bot. (Morot) 5: 104. 1891.

肾叶龙胆 shen ye long dan

Annuals 3–6 cm tall. Stems ascending, much branched from base, densely papillate. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade ovate-lanceolate, ovate-elliptic, or ovate, 3–10 × 1.5–6 mm, base rounded, margin thick cartilaginous, apex acute and cuspidate, midvein prominent. Stem leaves widely spaced, shorter than internodes; petiole tube 0.5–1 mm, papillate; leaf blade base rounded, margin thick cartilaginous, midvein prominent; lower to middle stem leaf blades ovate-triangular, 1.5–3 × 1.5–3.5 mm, apex acute and cuspidate with a recurved tip; upper leaf blades reniform, 1.5–4 × 2–4.5 mm, apex rounded to truncate and mucronate with a recurved tip. Pedicel 1.5–3 mm, densely papillate. Calyx tubular, 5–12 mm; tube membranous; lobes recurved, or rarely erect, obovate to reniform, 1.2–1.5 × 1.5–2 mm, base rounded to cordate and contracted, margin thick cartilaginous, apex rounded to truncate and mucronate with a recurved tip, midvein prominent. Corolla blue to blue-purple, with pale yellow-green base, tubular to tubular-salverform, 0.9–2.1 cm, 1.5–5 mm in diam. at throat; lobes ovate, 1.5–2.5 mm, margin entire, apex obtuse to rounded; plicae broadly ovate, 1–1.5 mm, margin erose, apex obtuse. Stamens inserted just above to middle of corolla tube, equal; filaments 1.2–4 mm; anthers narrowly ellipsoid, 1–1.2 mm. Style 1.5–3.5 mm; stigma lobes narrowly elliptic. Capsules narrowly obovoid to obovoid, 3.5–5 mm; gynophore to 1.8 cm, stout. Seeds light brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jun-Sep.

Stream and river banks, grassland slopes, bogs, scrub, forests; 2700–4500 m. S Gansu, W Hubei, SE Qinghai, W Sichuan, S and SE Xizang, NW Yunnan [Bhutan, NW India, Nepal, Sikkim].

178. *Gentiana crassula* Harry Smith, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 104. 1926.

景天叶龙胆 jing tian ye long dan

Annuals 4–10 cm tall. Stems ascending, mostly branched from base, sparsely papillate. Basal leaves poorly developed, withered at anthesis; petiole 1–1.5 mm, densely papillate; leaf blade ovate, 5–7 × 3–3.5 mm, base narrowed, margin cartilaginous and ciliolate, apex acute and cuspidate, midvein prominent. Stem leaves widely spaced, recurved; petiole tube 1–1.5 mm, papillate; leaf blade spatulate to obovate, 3–6 × 1.5–2 mm, shorter than internodes, fleshy, base narrowed, margin cartilaginous and ciliolate, apex rounded and mucronate, midvein prominent. Flowers subsessile. Calyx 0.7–1.3 cm, narrowly obconic; lobes recurved, ovate-orbicular, 2.5–4 mm, base rounded and contracted, margin cartilaginous and ciliolate, apex rounded and mucronate, midvein prominent. Corolla blue-purple, tubular, 1.2–1.5 cm; lobes ovate, 2–2.5 mm, margin entire, apex obtuse; plicae

ovate, 1–1.2 mm, margin entire or 2-cleft, apex obtuse. Stamens inserted at middle of corolla tube, slightly unequal; filaments 1.2–2.5 mm; anthers ellipsoid, 0.5–0.7 mm. Style 1–1.5 mm; stigma lobes oblong. Capsules narrowly obovoid to obovoid, 6–8 mm; gynophore 0.5–2.2 cm, stout. Seeds light brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jul-Aug.

- Grassland slopes; 3400–4200 m. Sichuan, NW Yunnan.

179. *Gentiana curviphylla* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 27. 1984.

弯叶龙胆 wan ye long dan

Annuals 3–7 cm tall. Stems ascending, branched from base or rarely basally simple and branched from middle, densely papillate. Basal leaves poorly developed, withered at anthesis; petiole 1–1.5 mm, densely papillate; leaf blade narrowly triangular to ovate-lanceolate, 4–6 × 1.5–2.5 mm, base narrowed, margin thick cartilaginous and smooth, apex deltate acute and cuspidate, midvein prominent. Stem leaves usually widely spaced, recurved; petiole tube 0.5–1 mm, membranous with 3 green herbaceous veins, papillate; leaf blade spatulate, 3–4 × 1.5–2 mm, usually shorter than internodes, base rounded, margin thick cartilaginous and smooth, apex acute and apiculate, midvein prominent. Flowers subsessile. Calyx obconic, 4.5–6 mm; tube membranous, with 15 green veins; lobes recurved, ovate-deltate, 1.4–1.6 mm, herbaceous, base distinctly narrowed, margin thick cartilaginous and smooth or ciliolate, apex deltate acute and cuspidate, midvein prominent. Corolla blue to blue-purple, with pale yellow-green base, tubular to salverform, 1–1.2 cm, 4–6 mm in diam. at throat, inside minutely papillate; lobes ovate, 2–2.5 mm, margin entire, apex obtuse; plicae ovate, 1–1.5 mm, slightly asymmetric, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 2.5–3 mm; anthers narrowly ellipsoid, 0.7–1 mm. Style 2–2.5 mm; stigma lobes narrowly oblong. Capsules narrowly obovoid, 3.5–4.5 mm; gynophore to 8 mm. Seeds dark brown, triquetrous, 1–1.2 mm. Fl. and fr. Jun-Aug.

- Grassland slopes, clearings in forests; 2800–4300 m. W Sichuan, Yunnan.

180. *Gentiana bryoides* Burkill, J. Proc. Asiat. Soc. Bengal 2: 316. 1906.

卵萼龙胆 luan e long dan

Gentiana stylosa Biswas.

Annuals 2–5 cm tall. Stems ascending to erect, 2 to few branched from base, sparsely papillate. Basal leaves withered at anthesis; petiole 1–1.5 mm, margin ciliolate or sometimes papillate; leaf blade ovate to ovate-orbicular, 5–7 × 3–4.5 mm, base narrowed, margin thick cartilaginous and smooth or ciliolate, apex acute to obtuse and mucronate, veins 1–3, distinct, and slender. Stem leaves crowded to spreading; petiole tube 0.5–1 mm, margin ciliolate, abaxially glabrous or sometimes papillate; leaf blade obovate, 3–4.5 × 1–1.5 mm, shorter to longer than internodes, base narrowed, margin thick cartilaginous and smooth or ciliolate, apex rounded and

mucronate, midvein distinct. Flowers subsessile or on pedicels to 1.2 cm, sparsely papillate. Calyx obconic, 5–6 mm; lobes recurved to rarely erect, ovate to ovate-orbicular, 1.5–2 mm, base slightly narrowed, margin cartilaginous and smooth or sparsely ciliolate, apex acute to rounded and cuspidate, midvein prominent. Corolla pale blue, with short dark blue lines in throat, tubular to narrowly obconic, 9–10 mm; lobes ovate, 2–2.5 mm, margin entire, apex obtuse and mucronate; plicae broadly ovate, 1–1.3 mm, margin entire or crenulate, apex obtuse. Stamens inserted just below middle of corolla tube, equal; filaments 2.5–3 mm, linear-subulate; anthers narrowly ellipsoid, 0.8–1 mm. Style 1.2–1.5 mm; stigma lobes narrowly oblong. Capsules narrowly obovoid, 3–5 mm; gynophore 1.5–1.8 cm, slender. Seeds brown, ovoid, 0.8–1 mm. Fl. and fr. May-Jun.

- Alpine meadows, forests; 3800–4500 m. S and SE Xizang [Bhutan, Nepal, Sikkim].

181. *Gentiana ludingensis* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 29. 1984.

泸定龙胆 lu ding long dan

Annuals 3–6 cm tall. Stems ascending, branched throughout, papillate. Basal leaves withered at anthesis; petiole 1–2 mm, densely papillate; leaf blade narrowly elliptic to elliptic, 1.5–3 cm × 4–6 mm, base narrowed, margin cartilaginous and ciliolate, apex obtuse and cuspidate, midvein distinct. Stem leaves widely spaced; petiole tube 1–1.5 mm, papillate; leaf blade oblanceolate to spatulate, 6–9 × 1–2.2 mm, shorter than internodes, base narrowed, margin cartilaginous and ciliolate, apex rounded and mucronate, midvein distinct. Flowers subsessile. Calyx obconic, 5–6 mm, tube membranous; lobes recurved, ovate-elliptic to ovate, 1.5–1.8 mm, outside minutely papillate, base rounded and contracted, margin cartilaginous and ciliolate, apex acute and cuspidate, midvein prominent. Corolla pale blue, with short dark blue lines in throat, tubular, 7–8 mm; lobes ovate, 1.8–2 mm, margin entire, apex obtuse and mucronate; plicae ovate, 1–1.2 mm, margin entire, apex obtuse. Stamens inserted just below middle of corolla tube, equal; filaments 2–2.5 mm; anthers ellipsoid, 0.5–0.8 mm. Style 1–1.5 mm; stigma lobes oblong. Capsules narrowly obovoid to obovoid, 3.5–4.5 mm; gynophore to 9 mm. Seeds light brown, ellipsoid, 0.6–1 mm. Fl. and fr. Mar-Jun.

- River banks, roadsides, grassland slopes, wastelands, scrub, forests; 2300–3000 m. W Sichuan.

182. *Gentiana squarrosa* Ledebour, Mém. Acad. Imp. Sci. Saint-Petersbourg, Sér. 6, Sci. Math., Second Pt. Sci. Nat. 5: 520. 1812.

鳞叶龙胆 lin ye long dan

Annuals 2–8 cm tall. Stems ascending, branched throughout, densely papillate. Basal leaves withered at anthesis; petiole 1–2 mm, densely papillate; leaf blade ovate-elliptic, ovate, or ovate-orbicular, 6–10 × 5–9 mm, base narrowed, margin thick cartilaginous and ciliolate, apex

obtuse and cuspidate, midvein distinct. Stem leaves recurved; petiole tube 0.5–1 mm, papillate; leaf blade spatulate to obovate, 4–7 × 1.5–3 mm, shorter to longer than internodes, base narrowed, margin thick cartilaginous and densely ciliolate, apex rounded and mucronate, midvein distinct. Pedicel 2–8 mm, densely papillate. Calyx obconic, 5–8 mm, tube outside sometimes densely papillate; lobes recurved, ovate to ovate-orbicular, 1.5–2 mm, base narrowed, margin thick cartilaginous and densely ciliolate, apex acute, midvein prominent. Corolla blue, tubular to funnellform, 7–10 mm, scarcely exerted from calyx; lobes ovate, 1.5–2 mm, margin entire, apex obtuse; plicae ovate, 1–1.2 mm, margin entire or denticulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 2–2.5 mm; anthers ellipsoid, 0.7–1 mm. Style 1–1.5 mm; stigma lobes broadly oblong or semiorbicular. Capsules narrowly obovoid to obovoid, 3.5–5.5 mm; gynophore to 8 mm, stout. Seeds dark brown, ellipsoid, 0.8–1 mm. Fl. and fr. Apr-Sep.

River banks, roadsides, valleys, wastelands, steppes, scrub, alpine meadows; 100–4200 m. Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi [NW India, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Nepal, Pakistan, E Russia].

183. *Gentiana pseudosquarrosa* Harry Smith in Handel-Mazzetti, Symb. Sin. 7: 963. 1936.

假鳞叶龙胆 jia lin ye long dan

Annuals 3–6 cm tall. Stems ascending, branched throughout, densely papillate. Basal leaves withered at anthesis; petiole 1–2 mm, densely papillate; leaf blade ovate-lanceolate, ovate-elliptic, or ovate, 0.6–1.5 cm × 4–6 mm, base narrowed, margin thick cartilaginous and densely ciliolate, apex obtuse and cuspidate, midvein distinct. Stem leaves widely spaced, recurved; petiole tube 0.7–1.5 mm, papillate; leaf blade spatulate to obovate, 3–7 × 1.5–2.2 mm, shorter than internodes, base narrowed, margin thick cartilaginous and densely ciliolate, apex rounded and mucronate, midvein distinct. Pedicel 2–6 mm, densely papillate. Calyx obconic, 4–6 mm, tube sometimes densely papillate outside; lobes recurved, ovate to ovate-orbicular, 1.5–2 mm, base narrowed, margin thick cartilaginous and densely ciliolate, apex acute, midvein prominent. Corolla dark blue, tubular to funnellform, 1–1.2 cm; lobes ovate, 2–2.5 mm, margin entire, apex obtuse; plicae ovate, 1.5–2 mm, margin entire or 2-cleft, apex obtuse. Stamens inserted just below middle of corolla tube, equal; filaments 3–3.5 mm; anthers ellipsoid, 0.7–1 mm. Style 2–2.2 mm; stigma lobes oblong. Capsules narrowly obovoid to obovoid, 3–4 mm; gynophore to 1.2 cm, stout. Seeds light brown, ellipsoid to ovoid-ellipsoid, 0.5–1 mm. Fl. and fr. Apr-Sep.

• Grassland slopes, alpine meadows, scrub; 1400–3800 m. SW Qinghai, W Sichuan, SE Xizang, NW Yunnan.

184. *Gentiana prainii* Burkill, J. Proc. Asiat. Soc. Bengal 2: 317. 1906.

柔软龙胆 rou ruan long dan

Gentiana gracilentia T. N. Ho.

Annuals 4–10 cm tall. Stems prostrate to ascending,

weak, 1 or 2 × dichotomously branched from base, glabrous. Leaf blade papery, glabrous, apex obtuse, veins indistinct. Basal leaves withered at anthesis; petiole 0.5–1 mm; leaf blade elliptic, 1.5–5 × 1.2–3 mm. Stem leaves widely spaced; petiole 0.5–0.7 mm, entirely connate; leaf blade ovate to cordate, 4–6 × 2–3 mm, shorter than internodes. Flowers few. Pedicel 0.5–1.5 cm, glabrous. Calyx campanulate, 2–2.5 mm; lobes triangular-subulate, 0.8–1 mm, margin narrowly membranous, apex acute, midvein indistinct. Corolla outside pale blue-gray, inside pale yellow-white, campanulate, 5–6 mm, to 9 mm in fruit; lobes obliquely ovate, 1.2–4.5 mm, margin entire, apex obtuse; plicae extremely oblique, auricular, attached to right side of each lobe, 0.3–0.4 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 1.5–2.5 mm; anthers ellipsoid, ca. 0.3 mm. Style short but distinct, only ca. 0.3 mm; stigma lobes oblong. Capsules narrowly obovoid to obovoid, 3.5–4.5 mm, apex rounded, 3- or 4-seeded; gynophore to 1.5 cm, stout. Seeds dark brown, ellipsoid, 1.3–1.4 mm. Fl. and fr. Sep.

Steep open grassy hillsides; 3800–4500 m. S Xizang [Bhutan, Sikkim].

185. *Gentiana hirsuta* Ma & E. W. Ma ex T. N. Ho, Acta Biol. Plateau Sin. 3(3): 38. 1984.

硬毛龙胆 ying mao long dan

Annuals 3–8 cm tall. Stems purple, ascending to erect, weak, branched from base, glabrous. Leaf blade sparsely hirsute, margin long ciliate, apex obtuse, veins indistinct. Basal leaves withered at anthesis; petiole 0.5–1 mm; leaf blade ovate to ovate-orbicular, 5–6 × 3–3.5 mm. Stem leaves spreading to recurved; petiole 1.5–2 mm, entirely connate, purple hirsute; leaf blade ovate to ovate-triangular, 2.5–3 × 1.5–2 mm, much shorter than internodes. Flowers few. Pedicel purple, 6–12 mm, glabrous. Calyx narrowly obconic, 3.5–4 mm, outside sparsely hirsute; lobes spreading to recurved, lanceolate, 2–2.5 mm, sparsely hirsute, base narrowed, margin long ciliate, midvein indistinct, apex obtuse. Corolla pale blue-purple, with blackish lines in throat, funnellform, 8–10 mm; lobes ovate, 1.2–1.5 mm, margin denticulate, apex obtuse; plicae broadly ovate, 0.9–1.1 mm, margin entire or 2-cleft, apex obtuse. Stamens inserted at apical part of corolla tube, equal; filaments 1.2–1.4 mm; anthers ellipsoid, 0.8–1 mm. Style 1–1.5 mm; stigma lobes oblong. Capsules narrowly obovoid, 4–4.5 mm; gynophore to 6 mm, stout. Seeds brown, narrowly ellipsoid, 1–1.2 mm. Fl. and fr. Aug.

• Grassland slopes; ca. 2900 m. W Sichuan.

186. *Gentiana pluviarum* W. W. Smith subsp. *subtilis* (Harry Smith) T. N. Ho, Novon 4: 371. 1994.

纤细龙胆 xian xi long dan

Gentiana subtilis Harry Smith, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 103. 1926.

Annuals 2–4.5 cm tall. Stems prostrate to ascending, weak, branched from base, glabrous. Basal leaves withered at anthesis; petiole 1–1.2 mm; leaf blade spatulate, 2.5–6 × 1–2 mm, glabrous, margin cartilaginous, apex acute, veins 1–3. Stem leaves widely spaced, recurved; petiole 0.5–1 mm,

entirely connate; leaf blade spatulate to elliptic 1–2.2 × 0.6–1 mm, shorter than internodes, apex obtuse, midvein indistinct. Flowers few to many. Pedicel 0.5–1 mm, surrounded by upper leaves, glabrous. Calyx campanulate, 3–3.5 mm; lobes spreading to recurved, lanceolate to elliptic, 1.2–1.5 mm, apex acute and apiculate, midvein indistinct. Corolla white, with (4 or) 5 large blackish spots in throat, tubular, 4–5 mm; lobes ovate, 0.4–0.6 mm, margin entire, apex obtuse; plicae ovate, 0.3–0.5 mm, margin entire, apex acute. Stamens inserted at basal part of corolla tube, equal; filaments 0.7–1 mm; anthers ellipsoid, 0.3–0.4 mm. Style 0.3–0.4 mm; stigma lobes ellipsoid. Capsules narrowly obovoid, 2–3 mm; gynophore 3–5 mm. Seeds brown, ellipsoid, 0.8–1 mm.

- Grassland slopes; 3700–4200 m. NW Yunnan.

Gentiana pluviarum subsp. *pluviarum* occurs in NW India, Nepal, and Sikkim and has linear leaves and calyx lobes.

187. *Gentiana xanthonannos* Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 253. 1965.

小黄花龙胆 xiao huang hua long dan

Annuals 2–3 cm tall. Stems erect, branched from base, with short crowded branches. Leaf blade puberulent, margin narrowly cartilaginous and ciliolate, apex obtuse to rounded, midvein distinct. Basal leaves withered at anthesis; petiole 0.5–1 mm; leaf blade oblanceolate to spatulate, 5–7 × 3–4 mm. Stem leaves crowded; petiole 0.3–0.5 mm, entirely connate; leaf blade spatulate to obovate, 4–5 × 2–3 mm. Flowers few to many, sessile. Calyx tubular, 4–5 mm, outside puberulent; lobes ovate-lanceolate, 2–2.5 mm, margin narrow, membranous, and ciliate, apex acute and caudate, midvein distinct. Corolla greenish yellow or inside sometimes pale blue, tubular, 8–10 mm; lobes ovate-lanceolate, 2–2.5 mm, apex acuminate and caudate; plicae suborbicular, 0.9–1.1 mm, margin entire, apex rounded. Stamens inserted at middle of corolla tube, equal; filaments 1.4–1.6 mm; anthers ellipsoid, 0.8–1 mm. Style 0.8–1 mm; stigma lobes oblong. Capsules obovoid, 4–4.5 mm; gynophore to 1 cm. Seeds light brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jun.

- Hillsides, forests; 2100–2400 m. NW Yunnan.

188. *Gentiana parvula* Harry Smith in Handel-Mazzetti, Symb. Sin. 7: 961. 1936.

小龙胆 xiao long dan

Annuals 1.5–2.5 cm tall. Stems erect, 2 or 3 × branched from base or simple. Leaf blade puberulent, margin narrowly cartilaginous, apex rounded; veins 1–3, abaxially distinct. Basal leaves withered at anthesis; petiole 0.5–1 mm; leaf blade broadly elliptic to suborbicular, 0.7–2.2 cm × 4–8 mm. Stem leaves crowded, 3 or 4 pairs; petiole 1–1.5 mm, entirely connate; leaf blade elliptic to ovate, 5–8 × 3–5 mm. Flowers few, sessile. Calyx tubular, 8–9 mm, outside puberulent; lobes ovate-lanceolate, 2–2.5 mm, margin narrowly cartilaginous, apex acute and caudate, midvein distinct. Corolla greenish yellow or inside sometimes pale blue, tubular, 1.2–1.4 cm; lobes ovate-lanceolate, 2–3 mm, margin entire, apex acute and caudate; plicae ovate, 1.5–2.5 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, unequal; filaments 1.5–3 mm; anthers narrowly ellipsoid, 1.2–1.5 mm.

Style 2–3 mm; stigma lobes linear. Capsules narrowly obovoid to obovoid, 6–9 mm; gynophore to 8 mm, stout. Seeds brown, ellipsoid, (1.2–)1.5–1.8 mm. Fl. and fr. Apr–Aug.

- Sandy places; ca. 3300 m. SW Sichuan.

189. *Gentiana pubiflora* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 36. 1984.

毛花龙胆 mao hua long dan

Annuals 3–5 cm tall. Stems erect, short branched from base, densely hirsute. Basal leaves withered at anthesis; petiole 0.5–1 mm; leaf blade ovate-orbicular, 7–12 × 5.5–9 mm, abaxially hirsute and glabrescent, adaxially glabrous, margin strongly ciliate, apex rounded, veins 1–3. Stem leaves crowded to widely spaced, shorter than internodes; petiole 0.5–0.7 mm, entirely connate, densely hirsute; leaf blade broadly ovate to ovate-orbicular, 5–8 × 4–6 mm, abaxially hirsute and glabrescent, adaxially glabrous, margin strongly ciliate, apex rounded and caudate, midvein distinct. Flowers few to many. Pedicel purple, 2–4 mm, surrounded by upper leaves, densely hirsute. Calyx tubular, 1–1.2 cm, outside hirsute; lobes ovate-lanceolate, 3–3.5 mm, margin strongly ciliate and sometimes narrowly membranous, apex acuminate and caudate, midvein distinct. Corolla greenish yellow or inside sometimes pale blue, tubular, 1.8–2.1 cm, outside puberulent and glabrescent; lobes ovate-lanceolate, 4–4.5 mm, margin entire, apex acute and caudate; plicae broadly ovate, 1.2–1.5 mm, margin entire or denticulate, apex rounded. Stamens inserted at middle of corolla tube, unequal; filaments 3.5–6.5 mm; anthers ellipsoid, 1–1.2 mm. Style 1–1.5 mm; stigma lobes oblong. Capsules narrowly ellipsoid, 7–8 mm; gynophore ca. 4 mm. Seeds brown, triquetrous-ellipsoid, 1–1.2 mm. Fl. and fr. Apr–May.

- Scrub, forests; 2600–3300 m. NW Yunnan.

190. *Gentiana pubigera* C. Marquand, Bull. Misc. Inform. Kew 1928: 59. 1928.

柔毛龙胆 rou mao long dan

Gentiana puberula Franchet (1890), not Michaux (1803).

Annuals 2–3.5 cm tall. Stems erect, much branched from base, with short branches, glabrous. Leaf blade spatulate to obovate, hirsute and glabrescent, margin long ciliate, apex rounded, veins 1–3. Basal leaves withered at anthesis; petiole 0.5–1 mm; leaf blade 0.9–1.2 cm × 4.5–8 mm. Stem leaves crowded; petiole 0.5–0.7 mm, entirely connate, hirsute; leaf blade 4–6 × 1.7–3.5 mm, as long as or longer than internodes. Flowers few to many. Pedicel 2–4 mm, surrounded by upper leaves, glabrous. Calyx tubular to narrowly obconic, 7.5–11 mm, outside hirsute and glabrescent; lobes ovate-lanceolate, 2–2.5 mm, margin long ciliate, apex acuminate and caudate, midvein distinct. Corolla greenish yellow or inside sometimes pale blue, tubular, ca. 1.4 cm, glabrous; lobes ovate-lanceolate, 1.5–2.5 mm, margin entire, apex acute and caudate; plicae broadly ovate, 1.2–1.5 mm, margin entire or erose, apex rounded. Stamens inserted at middle of corolla tube, unequal; filaments 2.5–6 mm; anthers ellipsoid, 0.8–1 mm. Style 1.5–2 mm; stigma lobes narrowly oblong. Capsules

obovoid, 8–9 mm; gynophore to 1.3 cm. Seeds light brown, ellipsoid, 1.2–1.5 mm. Fl. and fr. May.

- Grassland slopes; 2400–3800 m. NW Yunnan.

191. *Gentiana ninglangensis* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 37. 1984.

宁蒍龙胆 ning lang long dan

Annuals 2–3.5 cm tall; leaves and calyces densely puberulent or glabrescent. Stems erect, branched from base, with short branches, glabrous. Basal and lower stem leaves with petiole 0.5–1 mm; leaf blade spatulate to obovate, 0.5–2 cm × 3.5–5.5 mm, abaxially hirsute and glabrescent, adaxially glabrous, margin strongly ciliate, apex acute to rounded, veins 1–3. Middle to upper stem leaves with petiole 1–1.5 mm, entirely connate, hirsute and glabrescent; leaf blade linear-lanceolate to elliptic, 6–10 × 1.5–2.5 mm, abaxially hirsute and glabrescent, adaxially glabrous, apex acuminate. Flowers few to many. Pedicel 3–5 mm, surrounded by upper leaves, glabrous. Calyx tubular, 6.5–9 mm, outside hirsute and glabrescent; lobes ovate-lanceolate, 3–4 mm, margin long ciliate, apex acuminate and caudate, midvein distinct. Corolla greenish yellow or inside sometimes pale blue, tubular, 1.4–1.6 cm, glabrous; lobes ovate-lanceolate, 2–3 mm, margin entire, apex acute and caudate; plicae ovate-orbicular, 1.2–1.5 mm, margin entire or indistinctly denticulate, apex rounded. Stamens inserted at middle of corolla tube, unequal; filaments 3.5–6.5 mm; anthers narrowly ellipsoid, 1.2–1.5 mm. Style 1.2–1.5 mm; stigma lobes narrowly oblong. Capsules narrowly obovoid, 5–6.5 mm; gynophore to 1 cm. Seeds brown, ellipsoid, 1.2–1.5 mm. Fl. and fr. May.

- 2400–3300 m. S Sichuan, NW Yunnan.

- 1a. Leaves and calyces densely puberulent 191a. var. *ninglangensis*
1b. Leaves and calyces glabrescent 191b. var. *glabrescens*

191a. *Gentiana ninglangensis* var. *ninglangensis*

宁蒍龙胆 (原变种) ning lang long dan (yuan bian zhong)

Leaves and calyces densely puberulent.

- Wet meadows; 2500–3000 m. NW Yunnan.

191b. *Gentiana ninglangensis* var. *glabrescens* (Harry Smith) T. N. Ho, Novon 4: 371. 1994.

脱毛龙胆 tuo mao long dan

Gentiana pubigera C. Marquand var. *glabrescens* Harry Smith in Handel-Mazzetti, Symb. Sin. 7: 961. 1936.

Leaves and calyces glabrescent.

- Hillsides; 2400–3300 m. S Sichuan.

192. *Gentiana licentii* Harry Smith, Bull. Misc. Inform. Kew 1937: 132. 1937.

苞叶龙胆 bao ye long dan

Annuals 3–5 cm tall. Stems ascending, few branched from base, papillate. Basal leaves with petiole 1–2 mm; leaf blade involucriform, ovate-orbicular, 1.2–2.4 × 0.9–1.6 cm, margin cartilaginous and ciliolate, apex rounded and mucronate, veins 1–3. Stem leaves 2–4 pairs, widely spaced; petiole 1.5–2 mm, entirely connate; leaf blade 5–8 × 1–3.5 mm, shorter than internodes, apex obtuse, vein 1. Lower stem leaf blades spatulate, margin narrowly cartilaginous and ciliolate; upper leaf blades elliptic, margin narrowly membranous and smooth or ciliolate. Flowers few. Pedicel 7–10 mm, papillate. Calyx narrowly obconic, 7–8 mm; lobes triangular, 1.2–1.5 mm, margin narrowly membranous, apex acute and apiculate, midvein distinct. Corolla blue, outside tinged pale yellow-green, funnellform, 1.5–1.7 cm; lobes ovate-orbicular, 2–2.5 mm, margin entire, apex rounded and mucronate; plicae triangular, 1.5–2 mm, margin entire or 2-cleft. Stamens inserted at middle of corolla tube, equal; filaments 2.5–3 mm; anthers ellipsoid, 1–1.2 mm. Style 1–1.5 mm; stigma lobes oblong. Capsules obovoid, 6–8 mm; gynophore to 3.5 cm. Seeds light brown, triquetrous, 1.2–1.4 mm.

- Slopes. SE Gansu.

193. *Gentiana macrauchena* C. Marquand, Bull. Misc. Inform. Kew 1931: 85. 1931.

大颈龙胆 da jing long dan

Gentiana incompta Harry Smith.

Annuals 3–7 cm tall. Stems dark brown, ascending to erect, stout, much branched from base, glabrous. Basal leaves withered at anthesis; petiole 1–2 mm, glabrous; leaf blade involucriform, ovate to ovate-orbicular, 8–10 × 5–7 mm, margin cartilaginous and smooth, apex obtuse to rounded and mucronate, midvein distinct. Stem leaves 2–4 pairs, widely spaced; petiole 1.5–2 mm, entirely connate, membranous; leaf blade lanceolate to oblong, 4.5–6 × 1.5–2 mm, shorter than internodes, margin broadly membranous, apex obtuse, midvein distinct. Flowers few. Pedicel 2–4 mm, stout, to 1.2 cm in fruit. Calyx narrowly obconic, 8–11 mm; lobes broadly triangular, 2.5–3 mm, margin membranous, apex acute, midvein distinct. Corolla blue, tubular, 1.3–1.5 cm; lobes ovate, 2–3 mm, margin entire, apex obtuse; plicae ovate, 1–1.5 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 2–3 mm; anthers ellipsoid, 1.3–1.5 mm. Capsules obovoid, 4.5–5.5 mm; gynophore to 5 cm, stout. Seeds brown, triquetrous-ellipsoid, 0.8–1 mm. Fl. and fr. Apr–Jul.

- Roadside and grassland slopes, valleys, scrub, forests; 800–2800 m. W Hubei, S Shaanxi, E Sichuan, SE Xizang.

194. *Gentiana thunbergii* (G. Don) Grisebach in A. de Candolle, Prodr. 9: 108. 1845.

丛生龙胆 cong sheng long dan

Annuals or biennials 5–15 cm tall. Stems ascending to erect, few branched from base, glabrous. Basal leaves withered at anthesis; petiole 1–2 mm, glabrous; leaf blade involucriform, ovate-elliptic, ovate, or rarely obovate-oblong,

1–3 × 0.7–2.2 cm, margin cartilaginous and smooth, apex acuminate to rarely rounded, midvein distinct. Stem leaves 3–5 pairs, widely spaced; petiole 1.5–2 mm, entirely connate, glabrous; leaf blade lanceolate to oblong, 6–8 × 1–4.5 mm, shorter than internodes, margin of lower stem leaves narrowly cartilaginous, that of upper stem leaves broadly membranous, apex obtuse, vein 1. Flowers few. Pedicel 2–4 mm, sometimes to 1.2 cm in fruit, glabrous. Calyx narrowly obconic, (6–)8–9 mm; lobes narrowly triangular, 2.5–3 mm, margin membranous, apex acuminate, midvein distinct. Corolla blue, funnellform, (1.2–)1.5–2 cm; lobes ovate, 2–3 mm, margin entire, apex obtuse; plicae broadly oblong, 1–1.5 mm, margin entire or denticulate, apex rounded. Stamens inserted at middle of corolla tube, equal; filaments 2–2.5 mm; anthers ellipsoid, 1.2–1.5 mm. Style 2–2.5 mm; stigma lobes linear-oblong. Capsules narrowly obovoid, 6–8 mm; gynophore to 2.8 cm. Seeds brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jul-Sep.

1300–1800 m. Guangdong, Guangxi, Heilongjiang, Hunan, Jiangxi, Jilin, Liaoning, Shanxi [Japan, Korea].

- 1a. Corolla 1.5–2 cm 194a. var. *thunbergii*
1b. Corolla ca. 1.2 cm 194b. var. *minor*

194a. *Gentiana thunbergii* var. *thunbergii*

丛生龙胆 (原变种) *cong sheng long dan* (*yuan bian zhong*)

Ericala thunbergii G. Don, Gen. Hist. 4: 192. 1837;
Gentiana japonica Maximowicz.

Plants medium sized. Corolla 1.5–2 cm.

Hillsides; 1300–1800 m. Guangdong, Guangxi, Hunan, Jiangxi, Jilin, Shanxi [Japan, Korea].

194b. *Gentiana thunbergii* var. *minor* Maximowicz, Mélanges Biol. Bull. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 12: 758. 1888.

小丛生龙胆 *xiao cong sheng long dan*

Plants small. Corolla ca. 1.2 cm.

Heilongjiang, Jilin, Liaoning [Japan].

195. *Gentiana bella* Franchet in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 124. 1890.

秀丽龙胆 *xiu li long dan*

Annuals 2–6 cm tall. Stems ascending, branched from base, glabrous. Basal leaves in rosette or withered at anthesis; petiole 1–2 mm; leaf blade ovate-orbicular, 1.2–3 cm × 7–10 mm, margin cartilaginous and smooth, apex rounded with a recurved tip, veins 3–5, distinct, and slender. Stem leaves 2 or 3 pairs, widely spaced; petiole tube 1.5–2 mm; leaf blade spatulate to obovate, 4.5–6 × 2–3 mm, shorter to slightly longer than internodes, margin of upper leaves indistinctly membranous, apex obtuse to rounded with a recurved tip, midvein indistinct. Flowers few. Pedicel 3–4(–20) mm, glabrous. Calyx narrowly obconic, 6–7 mm; lobes narrowly triangular, 2–2.5 mm, margin narrowly membranous, apex acute, midvein distinct. Corolla blue-purple, with blackish stripes and spots in throat, funnellform, (1.3–)1.4–2 cm; lobes

ovate, 2.5–3 mm, margin entire, apex obtuse; plicae ovate, 2–2.5 mm, margin entire or denticulate, apex obtuse. Stamens inserted just below middle of corolla tube, unequal; filaments 4–5 mm; anthers ellipsoid, 0.8–1 mm. Style 2.5–3 mm; stigma lobes linear. Capsules narrowly obovoid, 6–8 mm; gynophore to 5 mm, stout. Seeds dark brown, ellipsoid, 0.9–1.1 mm. Fl. and fr. Jun-Aug.

Grassland slopes, alpine meadows, forests; 3000–4100 m. NW Yunnan [N Myanmar].

196. *Gentiana forrestii* C. Marquand, Bull. Misc. Inform. Kew 1928: 52. 1928.

苍白龙胆 *cang bai long dan*

Gentiana pallescens Harry Smith.

Annuals 3–5 cm tall. Stems purple, prostrate to ascending, 2 or 3 × dichotomously branched from base, glabrous. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade involucriform, ovate-orbicular, 0.7–1.7 × 0.7–1.3 cm, margin indistinct and cartilaginous, apex rounded with a recurved tip; veins 1–3, distinct, slender. Stem leaves 2 or 3 pairs, widely spaced; petiole tube 1.5–2 mm; leaf blade 4–5 × 2–4.5 mm, much shorter to slightly longer than internodes. Lower stem leaves spatulate to obovate; upper leaves linear to elliptic, margin membranous and smooth or ciliolate, apex acuminate to obtuse, veins 1–3. Flowers few. Pedicel 0.5–2.5 cm, glabrous. Calyx narrowly obconic, 5–7 mm; lobes narrowly triangular, 2–3 mm, margin narrowly membranous, apex acute and apiculate, midvein distinct. Corolla inside white or pale blue, with blackish stripes in throat and sometimes blackish spots, funnellform, 1–1.3(–1.5) cm; lobes ovate, 2.5–3 mm, margin entire, apex obtuse; plicae oblong to ovate-orbicular, 1–1.5 mm, margin entire or denticulate, apex obtuse to truncate. Stamens inserted just below middle of corolla tube, unequal; filaments 2.5–4 mm; anthers ellipsoid, 0.5–0.7 mm. Style 1–1.5 mm; stigma lobes linear. Capsules narrowly obovoid, 3.5–4.5 mm; gynophore to 3.2 cm, stout. Seeds light brown, triquetrous, 1–1.2 mm. Fl. and fr. Apr-Aug.

• Grassland slopes, alpine meadows; 3000–4200 m. SE Xizang, NW Yunnan.

197. *Gentiana complexa* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 34. 1984.

莲座叶龙胆 *lian zuo ye long dan*

Annuals 2–3 cm tall. Stems purple, ascending; branches basal, short, stout, glabrous. Basal leaves with petiole 1–2 mm; leaf blade involucriform, obovate-orbicular to suborbicular, 1–1.6 × 0.9–1.6 cm, margin cartilaginous and smooth, apex rounded; veins 1–3, distinct, slender. Stem leaves 2 or 3 pairs, widely spaced; petiole tube 1.5–2 mm; leaf blade spatulate to obovate, 5–7 × 3–4.5 mm, shorter or as long as internodes, margin cartilaginous and ciliolate, apex obtuse to rounded with a recurved tip, midvein indistinct. Flowers few. Pedicel 3–5 mm, elongated in fruit, surrounded by upper leaves, glabrous. Calyx narrowly obconic, 6.5–7.5 mm; lobes triangular, 1.5–2 mm, margin narrowly membranous, apex acute, midvein distinct. Corolla outside pale yellow-green, inside pale blue, tubular, 1.1–1.3 cm; lobes

ovate, 1–1.5 mm, margin entire, apex obtuse and mucronate; plicae oblong, 0.5–0.7 mm, margin crenulate, apex rounded. Stamens inserted at middle of corolla tube, unequal, generally 3 longer and 1.5–2 mm, 2 shorter and 1–1.5 mm; filaments linear-subulate; anthers ellipsoid, 0.5–0.7 mm. Style 0.5–0.8 mm; stigma lobes narrowly oblong. Capsules narrowly obovoid, 4–5 mm; gynophore to 1.1 cm. Seeds brown, oblong to ellipsoid, 0.9–1.1 mm. Fl. and fr. Apr–May.

• Roadside and wasteland slopes; 2300–2800 m. S Sichuan (Emei Shan).

198. *Gentiana flexicaulis* Harry Smith, Bull. Misc. Inform. Kew 1937: 133. 1937.

弯茎龙胆 wan jing long dan

Annuals 4–6 cm tall, almost glabrous. Stems prostrate to ascending, slender, 2 or 3 × dichotomously branched from base, glabrous. Basal leaves with petiole 1–2 mm; leaf blade involucrifoliate, ovate-elliptic to ovate-orbicular, 1–1.7 cm × 6–8 mm, margin indistinct and membranous, apex obtuse to rounded with a recurved tip; veins 3–5, distinct, slender. Stem leaves 3–6 pairs, spreading, widely spaced; petiole tube 1–1.5 mm; leaf blade spatulate to obovate, 5–10 × 2–7 mm, much shorter than internodes, margin indistinct and membranous, apex obtuse to rounded with a recurved tip, veins 1–3, distinct, and slender. Flowers few. Pedicel 4–6 mm, papillate. Calyx narrowly obconic, 8–9 mm; lobes triangular, 1.5–2 mm, margin narrowly membranous, apex acute, midvein distinct. Corolla clear pale blue, usually with pale yellow-white base, funnelliform, 1.2–1.6(–1.9) cm; lobes ovate, 1.5–3 mm, margin entire, apex obtuse; plicae ovate, 1–2 mm, margin entire, apex obtuse. Stamens inserted just below middle of corolla tube, unequal, generally 3 longer and 5–6 mm, 2 shorter and 3–4 mm; filaments linear; anthers ellipsoid, 0.8–1 mm. Style 1.5–2 mm; stigma lobes narrowly oblong. Capsules narrowly obovoid to obovoid, 5–6.5 mm; gynophore to 3 cm, stout. Seeds brown, triquetrous-ellipsoid, 1.2–1.5 mm. Fl. and fr. May–Sep.

• River banks, valleys, hillsides, grasslands; 2400–4600 m. N Sichuan.

199. *Gentiana inconspicua* Harry Smith, Bull. Misc. Inform. Kew 1937: 131. 1937.

糙毛龙胆 cao mao long dan

Annuals 2–3.5 cm tall. Stems prostrate to ascending, 1 × dichotomously branched from base, papillate. Basal leaves with petiole 1–2 mm; leaf blade involucrifoliate, ovate-orbicular, 6–10 × 5–7 mm, margin indistinct, membranous, and ciliolate, apex rounded with a recurved tip; veins 3–5, distinct, slender. Stem leaves 2–4 pairs, recurved; petiole tube 1–1.5 mm; leaf blade obovate-orbicular, 3–7 × 2–4 mm, equal or slightly longer than internodes, margin narrowly membranous and ciliate, apex rounded with a recurved tip, veins distinct. Flowers few; subsessile to pedicel ca. 6 mm, surrounded by upper leaves, papillate. Calyx narrowly obconic, 3.5–4.5 mm; lobes triangular, 1.2–1.7 mm, margin narrowly membranous and ciliate, apex acute, midvein indistinct. Corolla purple, tubular to funnelliform, 7–10 mm;

lobes ovate, 1.5–2 mm, margin entire, apex obtuse; plicae ovate, 0.5–1 mm, margin entire, apex subacute. Stamens inserted at middle of corolla tube, unequal; filaments 2.8–3.5 mm; anthers ovoid, 0.6–0.8 mm. Style 0.5–1 mm; stigma lobes oblong. Capsules narrowly obovoid to obovoid, 4.5–5.5 mm; gynophore to 5 mm. Seeds brown, triquetrous-ellipsoid, 1.2–1.5 mm. Fl. and fr. Jul.

• *Rhododendron* scrub; 4100–4300 m. N Sichuan.

200. *Gentiana spathulifolia* Maximowicz ex Kusnezow, Bull. Acad. Imp. Sci. Saint-Petersbourg 35: 351. 1894.

匙叶龙胆 chi ye long dan

Annuals 8–12 cm tall. Stems purple, ascending to erect, branched from base, densely papillate. Basal leaves withered at anthesis; petiole 0.7–1 mm; leaf blade broadly ovate to suborbicular, 4–5.5 × 4–5 mm, margin indistinctly cartilaginous, apex rounded and mucronate, midvein prominent. Stem leaves 4–7 pairs, widely spaced; petiole tube 0.5–1 mm; leaf blade ovate-spatulate or upper leaves linear to narrowly elliptic, 4–5 × 1.3–2 mm, shorter than internodes, margin indistinctly cartilaginous and smooth or ciliate, apex triangular acute, midvein abaxially prominent. Flowers few. Pedicel purple, 3–10 mm, exerted from uppermost leaves, densely papillate. Calyx narrowly obconic, 5–7 mm; lobes narrowly triangular, 1.5–2.5 mm, margin narrowly membranous, apex acute, midvein prominent. Corolla purple, sometimes with blackish lines and spots in tube, funnelliform, (1–)1.2–1.4 cm; lobes ovate, 2–2.5 mm, margin entire, apex obtuse; plicae ovate, 1.5–2 mm, margin entire or 2-cleft, apex obtuse. Stamens inserted just below middle of corolla tube, equal; filaments 3–3.5 mm; anthers ellipsoid, 0.5–0.8 mm. Style 1–1.5 mm; stigma lobes linear. Capsules narrowly obovoid to obovoid, 5–6 mm; gynophore to 1.5 cm, stout. Seeds brown, ellipsoid, 1.2–1.5 mm. Fl. and fr. Aug–Sep.

• 2800–3800 m. S and W Gansu, SE Qinghai, Shaanxi (Taibai Shan), N Sichuan.

- 1a. All stem leaf blades spatulate, margin smooth 200a. var. *spathulifolia*
1b. Upper stem leaf blades linear to narrowly elliptic, margin ciliate ... 200b. var. *ciliata*

200a. *Gentiana spathulifolia* var. *spathulifolia*

匙叶龙胆 (原变种) chi ye long dan (yuan bian zhong)

All stem leaf blades spatulate, margin smooth.

• Hillsides; 2800–3800 m. S Gansu, SE Qinghai, Shaanxi (Taibai Shan), N Sichuan.

200b. *Gentiana spathulifolia* var. *ciliata* Kusnezow, Bull. Acad. Imp. Sci. Saint-Petersbourg, 35: 351. 1894.

紫红花龙胆 zi hong hua long dan

Upper stem leaf blades linear to narrowly elliptic, margin ciliate.

• Grassland slopes; ca. 3500 m. W Gansu, N Sichuan.

201. *Gentiana abaensis* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 35. 1984.

阿坝龙胆 a ba long dan

Annuals 8–12 cm tall. Stems purple, ascending to erect, branched from base, densely papillate. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade ovate to orbicular, 6–9 × 4.5–5.5 mm, margin cartilaginous and ciliolate, apex obtuse to rounded and mucronate, midvein prominent. Stem leaves 4–7 pairs, widely spaced; petiole 5–8 mm; leaf blade spatulate, 4–6 × 1.5–2.5 mm, shorter than internodes, abaxially pubescent, adaxially glabrous, margin indistinctly cartilaginous and ciliate, apex triangular acute, midvein abaxially prominent. Flowers few. Pedicel purple, 8–10 mm, slightly elongated in fruit, densely papillate. Calyx narrowly obconic, 6–7 mm, densely pubescent but glabrescent; lobes narrowly triangular, 2.5–3.5 mm, margin narrowly membranous, apex acute, midvein prominent. Corolla purple, with blackish lines and spots in tube, funnellform, 1–1.2 cm; lobes ovate, 2–3 mm, margin entire, apex obtuse; plicae ovate, 1.5–2 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 4–5 mm; anthers ellipsoid, 0.5–0.8 mm. Style 1.5–2 mm; stigma lobes oblong. Capsules narrowly obovoid to obovoid, 4.5–5.5 mm; gynophore to 1.3 cm, stout. Seeds dark brown, broadly oblong, 1.2–1.5 mm. Fl. and fr. Aug–Sep.

• Hillsides, scrub on shady slopes; ca. 3300 m. S Gansu, N Sichuan.

202. *Gentiana pseudoaquatica* Kusnezow, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 63. 1893.

假水生龙胆 jia shui sheng long dan

Annuals 3–5 cm tall. Stems ascending, branched from base, densely papillate. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade ovate-orbicular to orbicular, 3–6 × 3–5 mm, margin distinctly cartilaginous and ciliolate, apex rounded and mucronate, midvein prominent. Stem leaves with petiole tube 1–1.5 mm, margin ciliolate; leaf blade spatulate to obovate, 3–5 × 2–3 mm, margin distinctly cartilaginous and ciliate, apex rounded, midvein abaxially prominent. Flowers few. Pedicel 2–13 mm, densely papillate. Calyx narrowly obconic, 5–6 mm; lobes triangular, 1.5–2 mm, margin narrowly membranous, apex acute, midvein prominent. Corolla dark blue, outside usually with yellow-green stripes, funnellform, 0.9–1.4 cm; lobes ovate, 2–2.5 mm, margin entire, apex acute to obtuse; plicae ovate, 1.5–2 mm, margin entire or denticulate, apex obtuse. Stamens inserted just below middle of corolla tube, equal; filaments 3–4 mm; anthers ellipsoid, 1–1.5 mm. Style 1.5–2 mm; stigma lobes linear. Capsules narrowly obovoid to obovoid, 3–4 mm; gynophore to 1.8 cm, stout. Seeds brown, ellipsoid, 1–1.2 mm. Fl. and fr. Apr–Aug.

Along streams, river banks, wet places in valleys, grassland slopes, bog meadows, scrub meadows, forests, clearings in forests; 1100–4700 m. Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Xizang [Kashmir, Korea, Mongolia, Russia].

203. *Gentiana burkillii* Harry Smith in Handel-Mazzetti, Symb. Sin. 7: 953. 1936.

白条纹龙胆 bai tiao wen long dan

Gentiana pseudohumilis Burkill (1906), not Makino (1904).

Annuals 3–8 cm tall. Stems pale purple, ascending, branched from base, densely papillate. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade ovate-lanceolate to ovate-orbicular, 4–6 × 2–3 mm, margin distinctly cartilaginous and ciliolate, apex rounded and mucronate, midvein prominent. Stem leaves with petiole tube 1–1.5 mm, margin ciliolate; leaf blade obovate, 3–5 × 1.5–3 mm, margin distinctly cartilaginous and ciliate, apex rounded, midvein abaxially prominent. Flowers few. Pedicel pale purple, 3–7 mm, densely papillate. Calyx tube tubular, 5–7 mm, with 5–7 white, membranous, and longitudinal stripes; lobes incurved, triangular, 1.5–2 mm, margin narrowly membranous, apex acute, midvein crested. Corolla blue, tubular, 0.9–1.1 cm, slightly exerted from calyx; lobes ovate, 2–2.5 mm, margin entire, apex obtuse; plicae ovate, 1.5–2 mm, margin entire or denticulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 1.5–2 mm; anthers narrowly ellipsoid, 0.8–1 mm. Style 1.5–2 mm; stigma lobes linear. Capsules narrowly obovoid, 5–7 mm; gynophore to 2.7 cm, stout. Seeds light brown, ellipsoid, 0.8–1 mm. Fl. and fr. Jun–Aug.

Slopes, valleys; 3600–4300 m. Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi [Afghanistan, NW India, Kashmir, Nepal, Russia].

204. *Gentiana aperta* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 500. 1881.

开张龙胆 kai zhang long dan

Annuals 2–10 cm tall. Stems prostrate to ascending, branched from base, glabrous. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade ovate, 5–7 × 3–4 mm, margin narrowly and indistinctly membranous, apex obtuse, veins 1–3, distinct, and slender. Stem leaves 3–5 pairs, widely spaced; petiole tube 1–2 mm; leaf blade elliptic, rarely ovate toward base of stem, 5–9 × 1–2.5 mm, much shorter than internodes, margin narrowly and indistinctly membranous, apex obtuse, veins 1–3, distinct, and slender. Flowers few. Pedicel 0.5–1.5 cm, much exerted from uppermost leaves, glabrous. Calyx campanulate, 5.5–6.5 mm; tube herbaceous, with 5 membranous longitudinal veins; lobes linear-lanceolate to lanceolate, 2.5–3.5 mm, margin narrowly membranous, apex acuminate, midvein prominent. Corolla open, white or pale blue to blue, inside with or without dark blue stripes but with pale yellow spots in throat, campanulate, 0.9–1.2 cm; lobes elliptic to ovate-elliptic, 2–3(–4) mm, margin entire, apex obtuse; plicae oblong, 1.5–2(–3) mm, apex deeply 2-cleft with both segments entire and acute. Stamens inserted at basal part of corolla tube, equal; filaments 4–5 mm; anthers ellipsoid, 0.6–0.8 mm. Style 1.5–2 mm; stigma lobes linear. Capsules narrowly obovoid, 4–5 mm; gynophore to 1 cm, stout. Seeds light brown, ellipsoid, 0.9–1.1 mm. Fl. and fr. Jun–Aug.

• 2000–4000 m. NE Qinghai.

1a. Corolla pale blue to blue 204a. var. *aperta*

1b. Corolla white 204b. var. *aureopunctata*

204a. *Gentiana aperta* var. *aperta*

开张龙胆 (原变种) kai zhang long dan (yuan bian zhong)

Gentiana maximoviczii Kanitz.

Corolla pale blue to blue, inside with dark blue stripes.

• Along streams, foothills, scrub, alpine meadows; 2000–4000 m. NE Qinghai.

204b. *Gentiana aperta* var. *aureopunctata* T. N. Ho & J. H. Li in T. N. Ho, *Acta Biol. Plateau Sin.* 3(3): 34. 1984.

黄斑龙胆 huang ban long dan

Corolla white. Fl. and fr. Jun-Aug.

• Alpine meadows, scrub; 2900–3500 m. NE Qinghai.

205. *Gentiana leucomelaena* Maximowicz ex Kusnezow, *Bull. Acad. Imp. Sci. Saint-Petersbourg* 34: 505. 1892.

蓝白龙胆 lan bai long dan

Gentiana humilis Steven var. *evolutior* C. B. Clarke; *G. leucomelaena* var. *alba* Kusnezow; *G. leucomelaena* var. *pusilla* Krylov.

Annuals 2–10 cm tall. Stems prostrate to ascending, branched from base, glabrous. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade ovate-elliptic to ovate-orbicular, 5–8 × 2–3 mm, margin indistinctly membranous, apex obtuse to rounded; veins 1–3, indistinct. Stem leaves 3–5 pairs; petiole tube 1.5–3 mm; leaf blade lanceolate to elliptic, rarely basally spatulate to ovate, 3–9 × 0.7–2 mm, usually shorter than internodes, margin narrowly and indistinctly membranous, apex acuminate to obtuse, midvein abaxially distinct. Flowers few. Pedicel 0.4–4 cm, glabrous. Calyx campanulate, 4–5 mm; lobes triangular, 1.5–2 mm, margin narrowly membranous, apex acute, midvein indistinct. Corolla pale blue, rarely white, with blue-gray stripes, with dark blue spots in throat, campanulate, 0.8–1.3 cm; lobes ovate, 2.5–3 mm, margin entire, apex obtuse; plicae oblong, 1.2–1.5 mm, margin irregularly lacinate, apex obtuse. Stamens inserted at basal part of corolla tube, equal; filaments 2.5–3.5 mm; anthers ellipsoid, 0.7–1 mm. Style 0.5–0.7 mm; stigma lobes oblong. Capsules obovoid, 3.5–5 mm; gynophore to 2 cm, stout. Seeds broadly dark brown, ellipsoid, 0.6–0.8 mm. Fl. and fr. May-Oct.

Along streams, bog meadows, meadows, alpine meadows, scrub; 1900–5000 m. Gansu, Qinghai, Sichuan, Xinjiang, Xizang [Kashmir, Kazakhstan, Kyrgyzstan, N Mongolia, Nepal, Pakistan, Russia, Sikkim, Tajikistan].

The widespread *Gentiana leucomelaena* is similar to the much more narrowly distributed *G. aperta*. Although T. N. Ho treats them as distinct species, J. S. Pringle considers *G. leucomelaena* as a synonym of *G. aperta*.

206. *Gentiana prattii* Kusnezow, *Trudy Imp. S.-Peterburgsk. Bot. Sada* 13: 63. 1893.

黄白龙胆 huang bai long dan

Annuals 2–5 cm tall. Stems purple, ascending to erect, branched from base, densely, very minutely papillate. Basal leaves withered at anthesis; petiole 1–1.5 mm; leaf blade ovate-orbicular, 3–3.5 × 2.5–3 mm, margin cartilaginous and ciliate, apex rounded and mucronate, midvein prominent. Stem leaves 4–9 pairs; petiole tube 0.5–1 mm, margin ciliate; leaf blade 4–5 × 1.5–2 mm, shorter to as long as internodes. Lower stem leaves ovate or rarely spatulate, margin cartilaginous; middle to upper leaves elliptic, margin narrowly membranous and ciliate, apex obtuse and apiculate, midvein abaxially prominent. Flowers few. Pedicel 1–3 mm, surrounded by leaves, densely papillate. Calyx narrowly obconic, 5–6 mm; lobes ovate-lanceolate to triangular, 1.5–2 mm, margin narrowly membranous and ciliate, apex acuminate to acute and apiculate, midvein prominent. Corolla pale yellow-white, with blackish stripes, closed, tubular, 8–9 mm; lobes ovate, 1.5–2 mm, margin entire, apex obtuse; plicae oblong, 0.7–1 mm, margin erose, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 1.5–2 mm; anthers ellipsoid, 0.8–1 mm. Style 1.5–2 mm; stigma lobes linear. Capsules narrowly obovoid to obovoid, 4–5 mm; gynophore to 8 mm, stout. Seeds dark brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jun-Sep.

• Meadow and grassland slopes; 3000–4000 m. Qinghai, W Sichuan, NW Yunnan.

207. *Gentiana aquatica* Linnaeus, *Sp. Pl.* 1: 229. 1753.

水生龙胆 shui sheng long dan

Ericala aquatica (Linnaeus) Borkhausen; *Gentiana humilis* Steven.

Annuals 5–10 cm tall. Stems ascending, branched from base, glabrous. Basal leaves with petiole 0.5–1 mm; leaf blade ovate-orbicular to orbicular, 5–9 × 2.5–6 mm, margin cartilaginous, apex obtuse to rounded and mucronate, midvein distinct. Stem leaves 3–6 pairs, widely spaced; petiole tube 1–2 mm; leaf blade margin narrowly membranous, midvein abaxially distinct. Lower stem leaf blades oblanceolate, ovate-elliptic, or obovate, 3–4 × 1.5–2 mm, apex obtuse to rounded and mucronate; middle to upper leaf blades navicular to oblong, 3.5–5 × 1.5–2 mm. Flowers few. Pedicel 2–4 mm, slightly longer in fruit. Calyx narrowly obconic, 6–10 mm; lobes triangular, 1.5–2 mm, apex acute, midvein distinct. Corolla blue, closed, tubular, 1.2–2 cm; lobes ovate, 2–2.5 mm, margin entire, apex obtuse; plicae ovate, 1–1.5 mm, margin entire or denticulate, apex obtuse. Stamens inserted at basal part of corolla tube, equal; filaments 2–3 mm; anthers ellipsoid, 0.8–1 mm. Capsules obovoid, 4–6 mm; gynophore to 2.5 cm, slender. Fl. and fr. Jun-Aug.

Cold steppes; 4600–5200 m. W Xizang [Kazakhstan, Mongolia, Russia, Tajikistan].

North American material formerly included in this species is better separated as *Gentiana fremontii* Torrey.

208. *Gentiana conduplicata* T. N. Ho, *Acta Biol. Plateau Sin.* 3(3): 33. 1984.

对折龙胆 dui zhe long dan

Annuals 2–3 cm tall. Stems ascending, branched from base, glabrous. Basal leaves with petiole 0.5–0.8 mm; leaf blade ovate-lanceolate to ovate, 2–5 × 2–2.5 mm, margin cartilaginous and smooth, apex acute and apiculate, midvein distinct. Stem leaves 5–8 pairs, folded; petiole tube 1–1.5 mm; leaf blade 2.5–4 × 1–1.5 mm, ± as long as internodes, basal half margin narrowly membranous and ciliolate but apical half cartilaginous and smooth, apex acute to obtuse, midvein abaxially prominent. Lower stem leaf blades ovate; middle to upper leaves oblong to elliptic. Flowers few. Pedicel 3–4 mm, surrounded by leaves, glabrous. Calyx narrowly obconic, 5–7 mm; lobes triangular, 1–1.3 mm, margin narrowly membranous, apex acute, midvein prominent. Corolla blue-purple, with pale yellow-green base and a blackish ring in throat, tubular to narrowly funnelform, 0.9–1.1 cm; lobes ovate, 1.5–2 mm, margin entire, apex obtuse; plicae oblong, 1–1.5 mm, margin denticulate, apex truncate. Stamens inserted at middle of corolla tube, equal; filaments 2.5–3 mm; anthers narrowly ellipsoid, 0.8–1 mm. Style 1–1.5 mm; stigma lobes oblong. Capsules narrowly obovoid, 5–6 mm; gynophore to 2.5 cm, stout. Seeds brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jun.

- Grassland slopes; ca. 4000 m. SW Sichuan.

209. *Gentiana micantiformis* Burkill, J. Proc. Asiat. Soc. Bengal 2: 315. 1906.

类亮叶龙胆 lei liang ye long dan

Annuals 2–4 cm tall. Stems prostrate to ascending, branched from base, glabrous. Basal leaves withered at anthesis; petiole 0.5–1.5 mm; leaf blade broadly ovate to ovate-orbicular, 4–6 × 3–4 mm, margin cartilaginous, apex rounded and mucronate, midvein prominent. Stem leaves 3–7 pairs; petiole tube 1–1.5 mm; leaf blade 3.5–5 × 1–1.5 mm, shape very variable, linear, linear-lanceolate, oblong, or ovate, margin broadly membranous, apex acuminate to obtuse, midvein abaxially prominent. Flowers few, subsessile. Calyx narrowly obconic, 6–7 mm, tube membranous; lobes triangular, 1.5–2.5 mm, margin broadly membranous, apex acute and apiculate, midvein prominent. Corolla blue, with short dark blue lines in throat, funnelform, 1–1.2 cm; lobes ovate, 1.5–2 mm, margin entire, apex acute; plicae ovate, 0.5–1 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 1.5–2 mm; anthers ellipsoid, 0.6–0.8 mm. Style 0.5–1 mm; stigma lobes linear. Capsules narrowly obovoid, 3–4 mm; gynophore to 1.3 cm, slender. Seeds light brown, ellipsoid, 0.6–0.8 mm. Fl. and fr. Jul–Oct.

Alpine meadows; 4200–4500 m. Qinghai, S and SE Xizang [Bhutan, Sikkim].

210. *Gentiana tatsienensis* Franchet, Bull. Soc. Bot. France 43: 489. 1896.

打箭炉龙胆 da jian lu long dan

Annuals 3–5 cm tall. Stems prostrate to ascending, branched from base, glabrous. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade ovate-lanceolate to ovate, 6–10 × 3–4 mm, glabrous, margin cartilaginous and ciliolate, apex acute and apiculate, midvein prominent. Stem leaves 3–6 pairs; petiole tube 1.5–2 mm; leaf blade ovate or toward stem

base spatulate, 3–6 × 1–1.5 mm, abaxially papillate, adaxially glabrous, margin broadly membranous or basally cartilaginous, apex acute to obtuse, midvein abaxially prominent. Flowers few. Pedicel 2–3 mm, surrounded by leaves, glabrous. Calyx narrowly obconic, 5–6 mm, outside densely papillate; lobes ovate-lanceolate to ovate, 2–3.5 mm, margin broadly membranous, apex acute and apiculate, midvein prominent. Corolla blue, tubular, 1–1.2 cm; lobes ovate, 1.5–2 mm, margin entire, apex obtuse and mucronate; plicae broadly ovate, 0.8–1 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 2–3 mm; anthers ellipsoid, 1.2–1.5 mm. Style 0.5–1 mm; stigma lobes linear. Capsules narrowly obovoid, 4–5 mm; gynophore to 7 mm. Seeds light brown, ellipsoid, 1–1.2 mm. Fl. and fr. Apr–Jul.

- Along streams, roadsides, valleys, open grassy hillside; 3300–5000 m. W Sichuan, Xizang.

211. *Gentiana chungtienensis* C. Marquand, Bull. Misc. Inform. Kew 1928: 50. 1928.

中甸龙胆 zhong dian long dan

Annuals 3–5 cm tall. Stems erect, branched from base, glabrous. Basal leaves with petiole 3–5 mm; leaf blade ovate to ovate-orbicular, 5–15 × 3.5–8 mm, margin cartilaginous and ciliolate, apex obtuse to rounded and mucronate, veins 3–5. Stem leaves 4–7 pairs, folded; petiole tube 1.5–2 mm; leaf blade navicular, 3–9 × 2.5–3.5 mm, equal or slightly longer than internodes, margin broadly membranous, apex obtuse and cuspidate, midvein abaxially distinct. Flowers few. Pedicel 4–9 mm, surrounded by leaves. Calyx narrowly obconic, 0.9–1.1 cm; lobes triangular, 3–4 mm, margin broadly membranous, apex acute, midvein slender. Corolla pale blue, outside with yellow-green stripes, narrowly obconic, 1.7–2.2 cm; lobes ovate, 4–5 mm, margin entire, apex caudate with a tip to 1.5 mm; plicae ovate, 2–2.5 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, unequal; filaments 4–5.5 mm; anthers narrowly ellipsoid, 1–1.5 mm. Style 1.5–2 mm; stigma lobes linear. Capsules narrowly obovoid, 8–9 mm; gynophore to 1.7 cm, stout. Seeds dark brown, ellipsoid, 1–1.3 mm. Fl. and fr. May–Jun.

- Hillsides, forest margins; 3000–3700 m. NW Yunnan.

212. *Gentiana subuniflora* C. Marquand, Bull. Misc. Inform. Kew 1931: 87. 1931.

单花龙胆 dan hua long dan

Annuals 2–4 cm tall. Stems purple, erect, simple or few branched from base. Basal leaves withered at anthesis; petiole 1.5–2 mm; leaf blade obovate to ovate-orbicular, 6–8 × 2–5 mm, densely papillate, margin cartilaginous, apex rounded and mucronate, midvein prominent. Stem leaves crowded; petiole tube 0.5–0.8 mm; leaf blade ovate or toward stem base spatulate to obovate, 2.5–5 × 2.5–3.5 mm, densely papillate, margin broadly membranous or toward stem base cartilaginous, apex acute, midvein abaxially prominent. Flowers few; sessile or pedicel 2–3 mm, purple, surrounded by leaves, densely papillate. Calyx narrowly obconic, 6–8 mm, densely pubescent; lobes narrowly triangular to

lanceolate, 2.5–3.5 mm, margin broadly membranous, apex acuminate and caudate, midvein prominent. Corolla pale blue, with dark blue stripes, narrowly obconic, (1.4)2–2.5 cm; lobes broadly ovate, 2–4.5 mm, margin entire, apex obtuse to rounded; plicae broadly ovate, 1.5–2.5 mm, margin rounded crenulate. Stamens inserted at middle of corolla tube, unequal; filaments 3.5–4.5 mm; anthers narrowly ellipsoid, 1.3–1.5 mm. Style 2.5–3 mm; stigma lobes broadly oblong. Capsules narrowly obovoid, 8–9 mm; gynophore ca. 4 mm. Seeds brown, ellipsoid, 0.9–1.1 mm. Fl. and fr. Apr-Jul.

- Hillsides, foothills; 3600–4500 m. W Sichuan.

213. *Gentiana radiata* C. Marquand, Bull. Misc. Inform. Kew 1931: 87. 1931.

辐射龙胆 fu she long dan

Annuals 2.5–6 cm tall. Stems ascending to erect, few branched from base, densely papillate. Basal leaves withered at anthesis; petiole 0.4–0.6 mm; leaf blade obovate to ovate-orbicular, 6–8 × 4–5 mm, densely papillate but glabrescent, margin cartilaginous, apex rounded and mucronate, midvein prominent. Stem leaves 3 or 4 pairs, folded; petiole tube 1–1.5 mm, densely papillate; leaf blade lanceolate, 5–7 × 2–4.5 mm, densely papillate but glabrescent, margin broadly membranous, apex acuminate and caudate, midvein abaxially prominent. Flowers few. Pedicel purple, 0.8–1.2 cm, surrounded by leaves, densely papillate. Calyx narrowly obconic, 1.3–1.5 cm, outside densely papillate but glabrescent; lobes subulate to narrowly triangular, 3.5–5.5 mm, margin broadly membranous, apex acuminate and caudate, midvein prominent. Corolla blue, with blackish stripes, narrowly obconic, 2–2.5 cm; lobes ovate, 3–4 mm, margin entire, apex acute; plicae ovate, 2–3 mm, margin entire or crenulate, apex obtuse. Stamens inserted at middle of corolla tube, unequal; filaments 3–4 mm; anthers ellipsoid, 1.2–1.5 mm. Ovary narrowly ellipsoid, 3–3.5 mm. Style 1.5–2 mm; stigma lobes oblong. Fl. Apr-Jun.

- Hillsides; 4100–4500 m. SW Sichuan.

214. *Gentiana pedata* Harry Smith in Handel-Mazzetti, Symb. Sin. 7: 967. 1936.

鸟足龙胆 niao zu long dan

Annuals 2–8 cm tall. Stems erect, lower half simple and leafless, upper half much branched with short internodes, and apically with many leaves and flowering branches crowded into a capitulum, angled, sparsely puberulent on angles. Leaves overlapping, crowded, recurved, folded; leaf blade subleathery, rigid, abaxially densely pubescent, adaxially glabrous. Lower leaves with petiole tube 0.5–1 mm; leaf blades narrowly elliptic to ovate-lanceolate, 1.5–2.2 cm × 4–7 mm, base narrowed, margin cartilaginous and ciliolate, apex acuminate to acute and apiculate, veins distinct; upper leaves with petiole tube 1–1.5 mm, membranous, papillose; leaf blades spatulate, 5–7 × 2–3 mm, base obtuse, margin cartilaginous to broadly membranous and ciliolate, apex obtuse and cuspidate, midvein distinct. Flowers many, subsessile. Calyx campanulate, 8–9 mm, tube membranous; lobes triangular, 4–4.5 mm, as long as tube, outside pubescent, margin broadly membranous and ciliolate, apex

acute and cuspidate, midvein prominent. Corolla blue-purple, tubular, 1.2–1.4 cm; lobes ovate-triangular, 2.5–3 mm, margin entire, apex acuminate to acute; plicae ovate, 0.8–1 mm, margin entire, apex obtuse. Stamens inserted at basal part of corolla tube, unequal; filaments 3.5–6 mm; anthers narrowly ellipsoid, 1.3–1.5 mm. Style 2.5–3 mm; stigma lobes linear. Capsules narrowly obovoid, 4–5 mm; gynophore 1.5–2 mm, stout. Seeds brown, ellipsoid, 1–1.2 mm. Fl. and fr. Mar-May.

- Grassland slopes; 1900–3000 m. Guizhou, SW Sichuan, NE Yunnan.

215. *Gentiana scytophylla* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 39. 1984.

革叶龙胆 ge ye long dan

Annuals 3–7 cm tall. Stems erect, lower half simple and leafless, upper half much branched with short internodes, and apically with many leaves and flowering branches crowded into a capitulum, angled, densely puberulent on angles. Leaves overlapping, crowded, decreasing in size toward stem apex; petiole tube 0.5–1 mm; leaf blade recurved, folded, lanceolate to ovate-lanceolate, 6–9 × 1.5–2.5 mm, subleathery, rigid, glossy, base narrowed, margin of lower leaf blades cartilaginous, that of upper blades membranous, apex acute and cuspidate, midvein distinct. Flowers many, subsessile. Calyx tubular, 6–6.5 mm, tube membranous; lobes ovate to triangular, 2.5–3.5 mm, about as long as tube, margin ciliolate with basal half membranous and apical half cartilaginous, apex acute and cuspidate, midvein prominent. Corolla pale blue, tubular, 8–9 mm; lobes 1–1.5 mm, ovate, margin entire, apex obtuse; plicae ovate, 0.7–1 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 1.5–2 mm; anthers 0.9–1.1 mm, ellipsoid. Style 1–1.2 mm; stigma lobes narrowly oblong. Capsules narrowly obovoid, 5.5–6 mm; gynophore 1–1.5 mm, stout. Seeds light brown, ellipsoid, 0.7–0.8 mm. Fl. and fr. Feb.

- Dry slopes; ca. 2700 m. NE Yunnan.

216. *Gentiana xingrenensis* T. N. Ho, Novon 4: 370. 1994.

兴仁龙胆 xing ren long dan

Annuals 3–4 cm tall. Stems erect, lower half simple and leafless, upper half much branched with short internodes, and apically with many leaves and flowering branches crowded into a capitulum, angled. Lower leaves with petiole tube 0.5–1 mm; leaf blade oblong, obovate, or orbicular, 1.4–2 × 0.8–1.6 cm, base narrowed, margin cartilaginous, apex obtuse to rounded and cuspidate with a recurved tip, midvein distinct. Upper leaves with petiole tube 1–1.5 mm; leaf blade linear-lanceolate to linear, 5–7 × 1–2.5 mm, base obtuse, margin cartilaginous and ciliolate, apex acuminate and awned, midvein distinct. Flowers many, subsessile. Calyx tubular, 6–7 mm; lobes subulate, 2.5–3 mm, margin cartilaginous and ciliolate, apex acuminate and awned, midvein prominent. Corolla outside pale yellow-green, inside pale blue, tubular, 8–10 mm; lobes ovate, 1–1.5 mm, margin entire, apex obtuse; plicae ovate, 0.5–0.8 mm, margin denticulate, apex obtuse.

Stamens inserted at basal part of corolla tube, equal; filaments 2–2.5 mm; anthers ellipsoid, 0.8–1 mm. Style 0.8–1 mm; stigma lobes oblong. Capsules obovoid, ca. 3 mm; gynophore ca. 2 mm, stout. Fl. and fr. Aug.

- Scrub; ca. 1300 m. Guizhou.

217. *Gentiana albomarginata* C. Marquand, Bull. Misc. Inform. Kew 1937: 175. 1937.

膜边龙胆 mo bian long dan

Gentiana argentea (D. Don) Grisebach var. *albescens* Franchet.

Annuals 2–8 cm tall. Stems erect, lower half simple and leafless, upper half much branched with short internodes, and apically with many leaves and flowering branches crowded into a capitulum, angled, densely puberulent. Leaves overlapping, crowded; petiole tube 1–1.5 mm; leaf blade abaxially densely and minutely papillate, adaxially glabrous, base narrowed to obtuse, margin ca. 0.7 mm wide, membranous, and densely ciliolate, apex obtuse to rounded and cuspidate, midvein crested. Lower leaf blades ovate-lanceolate to ovate, 1–1.5 cm × 4–7 mm. Upper leaf blades oblanceolate, oblong, or narrowly elliptic, 7–9 × 3–4 mm. Flowers many, subsessile. Calyx campanulate, 7–8.5 mm; lobes ovate-elliptic, 3–4 mm, margin membranous, ca. 0.7 mm wide, and ciliolate, apex obtuse and cuspidate, midvein crested. Corolla pale blue-purple, broadly tubular, 8–9 mm; lobes ovate, 0.7–1 mm, margin entire, apex obtuse; plicae ovate, 0.5–0.8 mm, margin entire, apex obtuse. Stamens inserted at basal part of corolla tube, equal; filaments 2–2.5 mm; anthers narrowly ellipsoid, 1–1.2 mm. Style 0.5–0.8 mm; stigma lobes oblong. Capsules narrowly obovoid, 4–4.5 mm; gynophore 1–1.5 mm, stout. Seeds dark brown, ellipsoid, 0.5–0.7 mm. Fl. and fr. Apr–May.

- Grasslands; 1900–3300 m. NW Yunnan.

218. *Gentiana capitata* Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 126. 1825.

头状龙胆 tou zhuang long dan

Ericala capitata (Buchanan-Hamilton ex D. Don) D. Don; *Gentiana cephalodes* Edgeworth.

Annuals 2–5.5 cm tall. Stems erect, lower half simple and leafless, upper half much branched with short internodes, and apically with many leaves and flowering branches crowded into a capitulum, angled, sparsely puberulent on angles. Lower leaves with petiole tube 0.5–1 mm; leaf blade elliptic to ovate, 0.8–1.5 cm × 6.5–10 mm, base narrowed to obtuse, margin cartilaginous, apex acute to obtuse, midvein distinct. Upper leaf blades oblong to elliptic, 6–8 × 1.5–2 mm, base obtuse, margin white or purple, broad, and membranous, apex obtuse, midvein distinct. Flowers many, subsessile. Calyx tubular, 4.5–7 mm, tube membranous; lobes broadly oblong, 1.5–2 mm, margin white or purple and broadly membranous, apex obtuse and cuspidate, midvein prominent. Corolla pale blue-purple, broadly tubular, 8–11 mm; lobes ovate-orbicular to semiorbicular, 1–1.2 mm, margin entire, apex obtuse to rounded; plicae semiorbicular, 0.8–1 mm, margin with 2 or 3 teeth to denticulate, apex rounded.

Stamens inserted at basal part of corolla tube, equal; filaments 3–3.5 mm; anthers ellipsoid, 0.8–1 mm. Style 0.5–0.8 mm; stigma lobes oblong. Capsules narrowly obovoid, 4–7 mm; gynophore 1–1.5 mm, stout. Seeds brown, 0.8–1.1 mm, ellipsoid. Fl. and fr. Apr–Jun.

Meadow slopes, scrub meadows, forest margins; 2800–4200 m. S and SE Xizang [Bhutan, NE India, Kashmir, Myanmar, Nepal, Sikkim].

219. *Gentiana huxleyi* Kusnezow, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 64. 1893.

藏南龙胆 zang nan long dan

Gentiana kumaonensis Biswas.

Annuals 1.5–4 cm tall. Stems erect, lower half simple and leafless, upper half much branched and with short internodes, and apically with many leaves and flowering branches crowded into a capitulum, angled. Petiole tube 0.5–1.5 mm, membranous; leaf blade spatulate to obovate, 5–10 × 3–6 mm, base narrowed, apex rounded to emarginate with a recurved tip, midvein crested. Lower leaf blades with margin cartilaginous; upper leaf blades with margin membranous. Flowers many, subsessile. Calyx campanulate, 8–9 mm, tube membranous; lobes oblong to ovate, 2–2.5 mm, margin membranous, apex obtuse and cuspidate, midvein crested. Corolla blue, broadly tubular, 7–11 mm; lobes ovate, 2–3 mm, margin entire, apex obtuse; plicae ovate, 2–2.5 mm, margin erose, apex obtuse. Stamens inserted at basal part of corolla tube, equal; filaments 4–4.5 mm; anthers narrowly ellipsoid, 1.8–2 mm. Ovary obovoid, 4.5–5 mm. Style 0.8–1 mm; stigma lobes oblong. Fl. and fr. Apr–Jun.

Hillsides; 3800–4000 m. S Xizang [Bhutan, NW India, Nepal, Pakistan, Sikkim].

220. *Gentiana albicalyx* Burkill, J. Proc. Asiat. Soc. Bengal 2: 314. 1906.

银萼龙胆 yin e long dan

Gentiana capitata Buchanan-Hamilton ex D. Don var. *strobiliformis* C. B. Clarke.

Annuals 1.5–4 cm tall. Stems erect, lower half simple and leafless, upper half angled, much branched with short internodes, apically with many leaves and flowering branches crowded into a capitulum, densely puberulent. Leaves overlapping, crowded; petiole tube 0.5–1 mm; leaf blade obovate to flabellate, 3–5 × 3.5–6 mm, glabrous, base narrowed to obtuse, margin ca. 0.5 mm wide, membranous, and smooth, apex rounded to truncate and mucronate with a recurved tip, midvein crested. Flowers many, subsessile. Calyx obconic, 4–4.5 mm, tube membranous; lobes oblong to suborbicular, 1.2–1.5 mm, herbaceous, margin membranous, ca. 0.5 mm wide, and smooth, apex rounded and mucronate with a recurved tip, midvein crested. Corolla blue, with pale yellow base, broadly tubular, 7–8 mm; lobes broadly ovate, 1.2–1.5 mm, margin entire, apex obtuse to rounded; plicae semiorbicular, 0.5–0.8 mm, margin entire or indistinctly denticulate, apex rounded. Stamens inserted at middle of corolla tube, equal; filaments 1.5–2 mm; anthers narrowly ellipsoid, 0.5–0.7 mm. Style 1–1.3 mm; stigma lobes

narrowly oblong. Capsules ovoid, ca. 2 mm; gynophore 0.7–1 mm. Fl. and fr. Jun.

Alpine meadows; 2600–4500 m. S Xizang [Bhutan, NW India, Nepal, Sikkim].

221. *Gentiana globosa* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 40. 1984.

圆球龙胆 yuan qiu long dan

Annuals 1.5–2.5 cm tall. Stems erect, lower half simple and leafless, upper half much branched with short internodes, apically with many leaves and flowering branches crowded into a capitulum, angled. Leaves overlapping, crowded; petiole tube 0.5–1.5 mm; leaf blade 2–6 × 2–4 mm, larger toward stem apex, margin distinctly cartilaginous, apex obtuse to rounded and cuspidate, midvein crested. Lower leaf blades broadly ovate; upper leaf blades broadly obovate to flabellate. Flowers many, subsessile. Calyx tubular, 6–7 mm, tube membranous; lobes suborbicular, 2–2.5 mm, herbaceous, margin distinctly cartilaginous, apex rounded and cuspidate, midvein crested. Corolla blue, with pale yellow-white base, broadly tubular, 8–10 mm; lobes ovate-triangular, 1–1.2 mm, margin entire, apex acute; plicae deeply 2-cleft with both segments ovate, ca. 0.5 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 1.5–2 mm; anthers narrowly ellipsoid, 0.8–1 mm. Ovary ellipsoid, 1.8–2 mm. Style 1.5–2 mm; stigma lobes semiorbicular. Fl. and fr. Jul–Oct.

Alpine meadows, scrub meadows; 3700–4300 m. SW Sichuan, SE Xizang [Nepal].

222. *Gentiana jamesii* Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 128. 1890.

长白山龙胆 chang bai shan long dan

Gentiana kawakamii Makino.

Perennials 10–20 cm tall, with short stolons. Stems erect, fastigiate branched from base or simple, glabrous. Leaves petiolate; leaf blade lanceolate to ovate-elliptic, 0.7–1.5 cm × 2.5–4 mm, abaxially glabrous, adaxially densely papillate, margin ± revolute, apex obtuse, midvein indistinct. Flowers 1 to few, subsessile. Calyx obconic, 8.5–10 mm, tube membranous; lobes spreading to recurved, broadly ovate, 1.5–3 mm, equal, inside densely papillate, base narrowed, apex obtuse and rounded, midvein indistinct. Corolla blue to blue-purple, broadly tubular, 2.3–3 cm; lobes oblong to ovate-elliptic, 6–7 mm, margin entire, apex obtuse to rounded; plicae broadly ovate, 2.5–3 mm, margin lacinate. Stamens inserted at middle of corolla tube, equal; filaments 5–6 mm; anthers narrowly ellipsoid, 1.5–2 mm. Style 1.5–2 mm, linear; stigma lobes oblong. Capsules narrowly obovoid, 6–9 mm; gynophore to 1.6 cm, stout. Seeds brown, ellipsoid, 0.9–1.1 mm. Fl. and fr. Jul–Sep.

Meadow slopes, roadsides, stony places; 1100–2400 m. Heilongjiang, Jilin, Liaoning [Japan, Korea, E Russia].

223. *Gentiana intricata* C. Marquand, Bull. Misc. Inform. Kew 1937: 170. 1937.

帚枝龙胆 zhou zhi long dan

Gentiana fastigiata Franchet (1884), not Bentham (1844).

Annuals 2.5–3.5 cm tall. Stems erect, with branches crowded into a dense apical head, densely purple papillate. Leaves long petiolate; leaf blade obovate-spatulate to orbicular-spatulate, base narrowed, margin cartilaginous and ciliolate, apex rounded and sometimes with a short recurved mucronate tip, midvein prominent. Basal leaves withered at anthesis; petiole shorter than blade; leaf blade 7–9 × 4–5 mm. Stem leaves with petiole longer than blade; leaf blade 5–10 × 1.5–5.5 mm. Flowers many, subsessile. Calyx obconic, 3.5–5 mm; lobes recurved, 1–1.5 mm, equal, ovate-elliptic to ovate, base narrowed, margin cartilaginous and smooth or ciliolate, apex obtuse and cuspidate, midvein prominent. Corolla pale blue, outside tinged yellow-green, tubular, 6–7 mm; lobes ovate, 1–1.5 mm, margin entire or crenulate, apex obtuse; plicae ovate, 0.8–1 mm, margin entire or erose, apex obtuse. Stamens inserted at basal part of corolla tube, equal; filaments 2.5–3.5 mm; anthers ellipsoid, 0.4–0.6 mm. Style 1.5–2 mm; stigma lobes linear. Capsules narrowly obovoid to obovoid, 3–4 mm; gynophore to 6 mm, stout. Seeds light brown, ellipsoid, 0.9–1.1 mm. Fl. and fr. May–Aug.

• Grassland slopes, scrub, forests; 2200–3500 m. SE Xizang, NW Yunnan.

224. *Gentiana subintricata* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 41. 1984.

假帚枝龙胆 jia zhou zhi long dan

Annuals 2.5–7 cm tall. Stems purple, erect, basally simple, middle fastigiate branched with branches corymbose, densely purple papillate. Basal leaves withered at anthesis. Stem leaves with petiole longer than blade; leaf blade oblong to obovate-spatulate, 4–6 × 1.7–3 mm, papillate, base narrowed, margin cartilaginous and distinctly ciliate, apex rounded and mucronate with a short recurved tip, midvein prominent. Flowers many, subsessile. Calyx tubular, 6–8 mm; tube membranous; lobes recurved, spatulate to ovate, 1.5–2 mm, equal, base slightly narrowed, margin cartilaginous and smooth or ciliate, apex obtuse and mucronate, midvein prominent. Corolla outside with blackish stripes, inside pale purple, funnelform, 1.1–1.4 cm; lobes ovate, 2–2.5 mm, margin entire, apex obtuse; plicae ovate, 1.5–2 mm, margin denticulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 1.2–1.5 mm; anthers ellipsoid, 1–1.2 mm. Ovary ellipsoid, 2.5–3 mm; gynophore ca. 1.5 cm, slender. Style 1–1.2 mm; stigma lobes suborbicular. Fl. Jul–Aug.

• Grassland slopes; 3400–3700 m. NW Yunnan.

225. *Gentiana taiwanica* T. N. Ho in T. N. Ho & S. W. Liu, Bull. Nat. Hist. Mus. London (Bot.) 23: 59. 1993.

台湾龙胆 tai wan long dan

Gentiana angusta (Masamune) Liu & Koo (1974), not M. E. Jones (1908); *G. scabrida* Hayata var. *angusta* Masamune.

Annuals 10–15 cm tall. Stems purple, erect, rigid, fastigiate branched from base, densely papillate. Leaf blade abaxially glabrous, adaxially papillate, apex acuminate and

apiculate. Basal leaves with petiole 2–4 mm, papillate; leaf blade lanceolate to ovate, 1–2 cm × 5–7 mm. Stem leaves widely spaced, petiolate; leaf blade linear-lanceolate to lanceolate, 0.8–1.5 cm × 3–5 mm, shorter than internodes. Flowers few. Pedicel purple, 2–3 mm, densely papillate. Calyx narrowly obconic, 1–1.3 cm; lobes elliptic-lanceolate, 6–7 mm, subequal, as long as to slightly longer than tube, base slightly narrowed, apex acuminate to obtuse, midvein prominent. Corolla blue, tubular to funnelform, 2–2.5 cm; lobes broadly ovate, 4.5–5.5 mm, margin entire, apex obtuse and mucronate; plicae ovate-elliptic, 3.5–4 mm, margin entire or denticulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 8–10 mm; anthers narrowly ellipsoid, 2.5–3 mm. Style 7–8 mm; stigma lobes oblong. Capsules exerted from corolla, narrowly obovoid to obovoid, 8–10 mm. Fl. and fr. Jul.

- Hillsides in mountains; ca. 3200 m. Taiwan.

226. *Gentiana zollingeri* Fawcett, J. Bot. 21: 183. 1883.

笔龙胆 bi long dan

Annuals 3–6 cm tall. Stems purple, erect, branched from base or rarely simple, glabrous. Leaves usually widely spaced; petiole tube 1–2 mm; leaf blade broadly ovate to suborbicular, 1–1.3 cm × 3–8 mm, margin cartilaginous, smooth or ciliolate, apex rounded and mucronate, veins 1–3. Leaves sometimes narrowed toward stem apex; leaf blade lanceolate to narrowly elliptic, 7–9 × 1.5–2 mm, margin narrowly membranous and ciliolate, apex acuminate and apiculate, midvein distinct. Flowers (1 or) few to many. Pedicel purple, 1–1.5 mm, glabrous. Calyx narrowly obconic, 7–9 mm; lobes narrowly triangular to ovate-elliptic, 3.5–4.5 mm, equal, as long as tube, margin narrowly membranous and smooth, apex acute, midvein prominent. Corolla pale blue, with pale yellow base, funnelform, 1.4–1.7 cm; lobes ovate, 2.5–3 mm, margin entire, apex obtuse; plicae broadly oblong to ovate, 1–1.5 mm, margin slightly 2-cleft to denticulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 4–5 mm; anthers ellipsoid, 1.5–2 mm. Style 1.5–2 mm; stigma lobes oblong. Capsules narrowly obovoid, 6–7 mm; gynophore to 1 cm, stout. Seeds brown, ellipsoid, 0.3–0.5 mm. Fl. and fr. Apr.–Jun.

Meadows, scrub, forests; 500–1600 m. Anhui, Fujian, Gansu, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Qinghai, Xinjiang, Zhejiang [Japan, Korea, E Russia].

227. *Gentiana franchetiana* Kusnezow, Trudy Imp. S.-Peterburgsk. Bot. Sada 15: 385. 1904.

密枝龙胆 mi zhi long dan

Gentiana pulla Franchet (1890), not Grisebach (1874).

Annuals 2–3.5 cm tall. Stems purple, erect, branched from middle, apically, or rarely from base, densely papillate. Leaves crowded; petiole tube 0.5–1 mm, abaxially papillate; leaf blade ovate-lanceolate to ovate, subleathery, rigid, margin cartilaginous and ciliolate, apex acuminate to acute and apiculate, midvein prominent. Basal leaves withered at anthesis; leaf blade 7–10 × 2.5–6 mm. Stem leaf blades 5–9 × 1–3 mm. Flowers few to many, subsessile. Calyx narrowly

obconic, 5–6 mm; lobes linear-lanceolate, 2.5–3 mm, equal, as long as tube, subleathery, rigid, margin cartilaginous and ciliolate, apex acute and apiculate, midvein prominent. Corolla outside tinged green, inside dark blue, tubular, 8–9 mm; lobes ovate, 1–1.2 mm, margin entire, apex obtuse; plicae ovate, 0.6–0.8 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 2–3 mm; anthers narrowly ellipsoid, 1–1.2 mm. Style 1–1.5 mm; stigma lobes oblong. Capsules obovoid, 3–3.5 mm; gynophore to 6 mm, stout. Seeds brown, ovoid, 0.5–0.7 mm. Fl. and fr. Apr.–Oct.

- Hillsides; 1400–2300 m. SW Sichuan, C and NW Yunnan.

228. *Gentiana exigua* Harry Smith in Handel-Mazzetti, Symb. Sin. 7: 957. 1936.

弱小龙胆 ruo xiao long dan

Annuals 3–6 cm tall. Stems purple, erect, fastigiate branched from base, densely papillate. Petiole 1–2 mm, papillate; leaf blade subleathery, rigid, margin cartilaginous and ciliolate, apex acuminate and apiculate, midvein prominent. Basal leaf blades ovate-lanceolate to ovate, 0.7–1.5 cm × 3–9 mm. Stem leaves overlapping, crowded; leaf blade lanceolate, 4–9 × 1–3 mm, smaller toward apex. Flowers few to many, subsessile. Calyx narrowly obconic, 5.5–6.5 mm, tube membranous; lobes linear-lanceolate, 2.5–3 mm, as long as tube, subleathery, rigid, margin cartilaginous and ciliolate, apex acuminate and apiculate, midvein prominent. Corolla blue, tubular, 6–10 mm; lobes ovate, 1.5–2 mm, margin entire, apex obtuse; plicae ovate-orbicular, 0.8–1.5 mm, margin entire or denticulate, apex obtuse. Stamens inserted at basal part of corolla tube, unequal; filaments 2.5–4 mm; anthers narrowly ellipsoid, 0.5–1 mm. Style 1.5–2 mm; stigma lobes oblong. Capsules obovoid, 3–3.5 mm; gynophore to 5 mm, slender. Seeds light brown, ellipsoid, 0.6–0.8 mm. Fl. and fr. May–Sep.

- Grassland slopes, bog meadows, roadsides in valleys; 1500–3200 m. SW Sichuan, NW Yunnan.

229. *Gentiana cristata* Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 251. 1965.

脊突龙胆 ji tu long dan

Annuals or biennials, 2–4.5 cm tall. Stems purple, erect, branched from base, with flowering branches crowded together, densely papillate. Basal leaves withered at anthesis; petiole 1–3 mm; leaf blade broadly ovate to suborbicular, 1–1.5 × 0.7–1 cm, margin cartilaginous and long irregularly ciliate, apex rounded, midvein crested and long irregularly ciliate. Stem leaves widely spaced basally and in middle, crowded apically, petiolate; leaf blade ovate-orbicular, 3–7 × 2–6 mm, margin broadly membranous and long irregularly ciliate, apex rounded, midvein crested and long irregularly ciliate. Flowers many, solitary or 2 or 3 crowded together, subsessile. Calyx narrowly obconic, 8–9 mm; lobes narrowly triangular, 5–6 mm, margin broadly membranous and long irregularly ciliate, apex acute and apiculate, midvein crested and long irregularly ciliate. Corolla pale blue, tubular, 1–1.2 cm; lobes ovate-triangular, 2–2.5 mm, margin entire, apex acute and apiculate; plicae ovate, 0.8–1 mm, margin entire,

apex obtuse. Stamens inserted at basal part of corolla tube, unequal; filaments 2.5–4 mm; anthers ellipsoid, 0.6–0.8 mm. Style 1.5–2 mm; stigma lobes oblong. Capsules narrowly obovoid, 5.5–6.5 mm; gynophore to 5 mm, stout. Seeds light brown, narrowly ellipsoid, 1–1.2 mm. Fl. and fr. Jul.

- Grassland slopes; ca. 4200 m. SE Xizang, NW Yunnan.

230. *Gentiana taliensis* I. B. Balfour & Forrest, Notes Roy. Bot. Gard. Edinburgh 4: 75. 1907.

大理龙胆 da li long dan

Gentiana heterostemon Harry Smith; *G. heterostemon* subsp. *bietii* Harry Smith; *G. heterostemon* subsp. *cavaleriei* Harry Smith; *G. heterostemon* subsp. *glabricaulis* Harry Smith; *G. pedicellata* (Wallich ex D. Don) Grisebach var. *chinensis* Kusnezow.

Annuals 2–10 cm tall, very variable in habit. Stems purple, erect, rigid, branched from base, with flowering branches crowded together, densely papillate. Basal leaves with petiole 1–3 mm; leaf blade lanceolate to elliptic-lanceolate, 1–3 cm × 3–10 mm, margin cartilaginous and ciliolate, apex obtuse, midvein distinct. Stem leaves widely spaced, petiolate; leaf blade narrowly to broadly lanceolate, or ovate-lanceolate, 0.5–2 cm × 1.5–4 mm, smaller toward apex, margin membranous and ciliolate, apex acute to obtuse and aristate, midvein distinct. Flowers many. Pedicel purple, 1.5–3.5 mm, densely papillate. Calyx narrowly obconic, 6–8 mm; lobes lanceolate to ovate-lanceolate, 3.5–4 mm, equal, as long as to longer than tube, margin membranous, apex acute and awned, midvein prominent. Corolla pale blue, tubular-funnelform, 1–1.3 cm; lobes ovate, 2–3 mm, margin entire, apex acute; plicae ovate, 1–1.2 mm, margin entire or emarginate, apex obtuse. Stamens inserted at basal part of corolla tube, unequal, 3 longer and 4–6 mm, 2 shorter and 2.5–3 mm; filaments linear-subulate; anthers ellipsoid, 1.4–1.6 mm. Style 1.5–2 mm; stigma lobes linear. Capsules obovoid, 4–5 mm; gynophore to 7 mm, stout. Seeds brown, ellipsoid to ovoid, 0.5–0.7 mm. Fl. and fr. Mar–Nov.

Grassland slopes, valleys, forest margins; 1200–2800 m. Guizhou, SW Sichuan, Yunnan [N Myanmar].

231. *Gentiana anisostemon* C. Marquand, Bull. Misc. Inform. Kew 1931: 88. 1931.

异药龙胆 yi yao long dan

Annuals 4–7 cm tall. Stems erect, rigid, fastigiate branched from base, with flowering branches crowded together, glabrous or papillate. Basal leaves withered at anthesis; petiole 0.5–1 mm; leaf blade broadly ovate, 7–10 × 5–8 mm, margin cartilaginous and ciliolate, apex rounded and mucronate, midvein indistinct. Stem leaves overlapping, petiolate; leaf blade oblong-lanceolate to oblong, 3–9 × 1.5–3.5 mm, margin broadly membranous, apex obtuse and mucronate, midvein indistinct. Flowers few to many. Pedicel 2–4 mm, densely papillate. Calyx narrowly obconic, 7–10 mm; lobes elliptic-lanceolate, 3–4 mm, equal, ca. as long as tube, margin broadly membranous, apex acute and apiculate, midvein indistinct. Corolla blue-purple, funnelform, 1.3–2 cm; lobes ovate-orbicular, 3.5–4.5 mm, margin entire,

apex rounded; plicae ovate-oblong to ovate, 2–2.5 mm, margin denticulate, apex obtuse. Stamens inserted at middle of corolla tube, unequal; filaments 3–6 mm; anthers narrowly ellipsoid, 1.5–1.7 mm. Style 2–3 mm; stigma lobes linear. Capsules narrowly obovoid, 6–7 mm; gynophore to 7 mm, stout. Seeds brown, ellipsoid, 1.1–1.3 mm. Fl. and fr. Apr–May.

- Grassland slopes, forests; 3600–4300 m. NW Yunnan.

232. *Gentiana maeulchanensis* Franchet, Bull. Soc. Bot. France 43: 488. 1896.

马耳山龙胆 ma er shan long dan

Annuals 2–10 cm tall. Stems erect, fastigiate branched from base, with short weak branches, densely purple papillate. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade ovate, 0.7–2.5 × 0.5–1.4 cm, margin cartilaginous and often ciliolate, apex acute; veins 1–3, slender. Stem leaves 4–6 pairs, widely spaced; petiole tube 1–1.5 mm; leaf blade spatulate to obovate, 4–8 × 1.5–5 mm, much shorter than internodes, margin ciliolate, apex rounded and mucronate, midvein slender. Flowers few to many, subsessile. Calyx tubular, 6–6.5 mm; lobes narrowly lanceolate, 3–3.5 mm, as long as tube, equal, margin membranous, apex acute and apiculate, midvein slender. Corolla pale blue, with blue-gray stripes, tubular, 1–1.2 cm; lobes ovate, 1.5–2 mm, margin entire, apex obtuse and mucronate; plicae ovate, 1–1.5 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, unequal, 2 longer and 2.5–3 mm, 3 shorter and 1.5–2 mm; filaments linear-subulate; anthers ellipsoid, 0.7–1 mm. Style 1.5–2 mm; stigma lobes linear. Capsules narrowly obovoid to obovoid, 3–4 mm; gynophore to 8 mm. Seeds light brown, ellipsoid, 0.8–1 mm. Fl. and fr. Apr–Jul.

Grassland slopes, dry hillsides; 2500–3600 m. S Xizang, NW Yunnan [Bhutan, N Myanmar, Sikkim].

233. *Gentiana kunmingensis* S. W. Liu in T. N. Ho, Novon 4: 369. 1994.

昆明龙胆 kun ming long dan

Annuals or biennials, 2–5 cm tall. Stems erect, rigid, fastigiate-branched from base, flowering branches crowded into a capitulum, papillate toward apex. Basal leaves with petiole 1–3 mm; leaf blade spatulate, oblanceolate, or obovate, 0.5–2.2 cm × 3–13 mm, densely pubescent, margin densely ciliolate, apex rounded, midvein prominent. Stem leaves petiolate; leaf blade 5–11 × 1.5–3.5 mm, smaller toward apex, densely pubescent, margin densely ciliolate, apex rounded, midvein distinct. Lower stem leaves widely spaced, shorter than internodes, leaf blade spatulate to obovate; upper leaves crowded, leaf blade elliptic. Flowers many, subsessile. Calyx narrowly obconic, 7–8 mm, outside pubescent; lobes narrowly triangular, 3–3.5 mm, almost as long as tube, equal, margin membranous and densely ciliolate, apex acute, midvein prominent. Corolla pale yellow, tubular, 8–9 mm, scarcely exceeding calyx; lobes ovate, 1.5–2 mm, margin entire, apex obtuse; plicae ovate, 0.8–1 mm, margin entire or crenulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 1.2–1.5 mm; anthers ellipsoid,

0.4–0.6 mm. Style 1–1.2 mm; stigma lobes linear. Capsules narrowly obovoid to obovoid, 4–4.5 mm; gynophore to 5 mm, stout. Seeds brown, ellipsoid to ovoid, 0.7–1 mm. Fl. and fr. Apr.

- Hillsides; 1800–1900 m. Yunnan (Kunming Shi).

234. *Gentiana papillosa* Franchet, Bull. Soc. Bot. France 31: 374. 1884.

乳突龙胆 ru tu long dan

Annuals 3–5 cm tall. Stems erect, fastigiate branched from base, densely papillate. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade ovate-lanceolate, 7–10 × 2–5 mm, abaxially glabrous, adaxially densely papillate, margin cartilaginous and densely ciliolate, apex obtuse, midvein distinct and papillate. Stem leaves petiole tube 1–1.5 mm, densely papillate; leaf blade spatulate to obovate, 7–10 × 1.5–4 mm, toward stem apex sometimes narrowly elliptic, 3–5 × 0.8–1.2 mm, abaxially glabrous, adaxially densely papillate, margin cartilaginous and densely ciliolate, apex obtuse to rounded and mucronate, midvein distinct and papillate. Flowers many. Pedicel 2–5 mm, densely papillate. Calyx narrowly obconic, 6–7 mm; lobes lanceolate, 3–4 mm, as long as to longer than tube, equal, margin cartilaginous and densely ciliolate, apex acuminate, midvein distinct and papillate. Corolla blue, tubular, 0.9–1.2 cm; lobes ovate, 1–1.5 mm, margin entire, apex obtuse; plicae ovate, 0.8–1.2 mm, margin erose, apex obtuse. Stamens inserted just below middle of corolla tube, equal; filaments 3–4 mm; anthers ellipsoid, 0.5–0.7 mm. Style 1.5–2 mm; stigma lobes oblong. Capsules narrowly obovoid to obovoid, 3–4 mm; gynophore to 8 mm, stout. Seeds light brown, ellipsoid, 0.8–1 mm. Fl. and fr. Apr-Sep.

- Hillsides, roadsides, grasslands; 2200–2800 m. SW Sichuan, C and NW Yunnan.

235. *Gentiana tentyoensis* Masamune, Trans. Nat. Hist. Soc. Taiwan 32: 1. 1942.

厚叶龙胆 hou ye long dan

Annuals 2–3 cm tall. Stems erect, simple, glabrous. Basal leaves with petiole 1–2 mm; leaf blade ovate to obovate, ca. 10 × 8 mm, margin thick herbaceous and ciliolate, apex rounded and mucronate, midvein prominent. Stem leaves petiolate; leaf blade dark green, oblong to orbicular, ca. 6 × 4–6 mm, margin thick herbaceous and ciliolate, apex obtuse, midvein distinct. Flowers subsessile. Calyx narrowly obconic, 7–8 mm; lobes ovate-oblong, 3–3.5 mm, equal, margin ciliolate, apex acuminate, midvein prominent. Corolla purple, campanulate, 1.6–1.8 cm; lobes ovate, 2.5–3 mm, margin entire, apex acuminate. Stamens inserted at basal part of corolla tube, equal; filaments 3–4 mm; anthers ellipsoid, 1.2–1.5 mm. Ovary narrowly obovoid, ca. 1.2 cm. Style 1–1.2 mm; stigma lobes linear.

- Cliffs near coast. Taiwan.

236. *Gentiana bomiensis* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 43. 1984.

波密龙胆 bo mi long dan

Annuals (4–)7–14 cm tall. Stems erect, fastigiate branched from base, papillate. Basal leaves withered at anthesis; petiole 1–2 mm; leaf blade ovate-orbicular, 0.6–1.5 cm × 2.5–7 mm, margin cartilaginous and ciliolate, apex rounded, veins 1–3. Stem leaves widely spaced; petiole tube 1–1.5 mm; leaf blade spatulate to obovate or upper leaves linear to elliptic, 1.5–5 × 1–5 mm, shorter than internodes, narrowed toward stem apex, margin cartilaginous and ciliolate, apex acuminate to rounded, midvein distinct. Flowers many. Pedicel 5–11 mm, exerted from uppermost leaves. Calyx narrowly obconic, 4–5 mm; lobes lanceolate to triangular, 1.5–1.8 mm, margin narrowly membranous and smooth, apex acute and apiculate, midvein smooth. Corolla blue, with short blackish lines in throat, tubular to narrowly funnellform, 8–10 mm, to 1.5 cm in fruit; lobes ovate, 2–2.5 mm, margin entire, apex obtuse; plicae ovate-elliptic, 1.5–2 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 2–2.5 mm; anthers ellipsoid, 0.8–1 mm. Style 0.7–1 mm; stigma lobes linear. Capsules narrowly obovoid, 3.5–4.5 mm; gynophore to 2 cm, stout. Seeds brown, ellipsoid, 0.7–1 mm. Fl. and fr. Apr-Sep.

- Meadow slopes, forests; 2100–3600 m. SE Xizang.

237. *Gentiana daochengensis* T. N. Ho, Acta Biol. Plateau Sin. 3(3): 44. 1984.

稻城龙胆 dao cheng long dan

Annuals 1.5–2.5 cm tall, blackish purple. Stems erect, fastigiate branched from base, usually papillate. Petiole longer than blade, margin densely ciliolate; leaf blade spatulate, 3–5 × 2–2.5 mm, margin cartilaginous and ciliolate, apex triangular acute and apiculate, midvein distinct. Flowers many. Pedicel ca. 2 mm, densely papillate. Calyx narrowly obconic, 4–5 mm; lobes triangular, 1.3–1.5 mm, margin membranous and smooth, apex acute, midvein prominent. Corolla dark purple, with yellow-green base, tubular, 9–10 mm; lobes ovate, 1.5–2 mm, margin entire, apex obtuse; plicae oblong, 1.5–1.8 mm, margin denticulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 1.5–2 mm; anthers narrowly ellipsoid, 0.7–0.9 mm. Style 0.5–1 mm; stigma lobes linear. Capsules narrowly obovoid, 3.5–4 mm; gynophore to 8 mm, stout. Seeds brown, ellipsoid, 0.6–0.8 mm. Fl. and fr. Aug.

- Grassland slopes; 3700 m. SW Sichuan.

238. *Gentiana riparia* Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 706. 1841.

河边龙胆 he bian long dan

Annuals 2–8 cm tall. Stem erect, fastigiate branched from middle with branches crowded into a capitulum, papillate. Leaves overlapping, crowded; petiole tube 1–1.5 mm; leaf blade spatulate to orbicular-spatulate, 5–7 × 1.2–7 mm, narrowed toward stem apex, margin of lower leaves cartilaginous and upper leaves narrowly membranous, apex rounded and mucronate, midvein prominent. Flowers many. Pedicel 2–8 mm, surrounded by upper leaves, papillate. Calyx narrowly obconic, 6.5–8 mm; lobes lanceolate to ovate, 1.2–

1.5 mm, margin membranous and smooth, apex obtuse and mucronate, midvein prominent. Corolla blue, funnellform, 1–1.2 cm; lobes ovate, 2.5–3 mm, margin entire, apex obtuse; plicae ovate, 1.5–2 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 2.5–3 mm; anthers ellipsoid, 1–1.3 mm. Style 1.5–2 mm; stigma lobes oblong. Capsules obovoid, 3–3.5 mm; gynophore to 8 mm. Seeds brown, ellipsoid, 0.8–1 mm. Fl. and fr. Apr–May.

River banks, sandy grasslands; 600–1200 m. Gansu, Shanxi, Xinjiang [Kashmir, Kazakhstan, Mongolia, Russia (Siberia); SW Asia].

239. *Gentiana densiflora* T. N. Ho, Novon 4: 369. 1994.

密花龙胆 mi hua long dan

Annuals 3–13 cm tall. Stems purple, erect, fastigiate branched from base, with short slender branches and 2–6 crowded flowering branches, papillate. Basal leaves withered at anthesis; petiole 2–3 mm; leaf blade ovate to broadly ovate, 1–2.5 × 0.7–1.3 cm, margin cartilaginous and ciliolate, apex obtuse; veins 1–3, slender. Stem leaves widely spaced; petiole tube 1–1.5 mm, abaxially papillate; leaf blade spatulate to obovate, 0.5–1.5(–2) × 0.2–1(–1.5) cm, shorter than internodes, smaller toward stem apex, margin narrowly membranous and ciliolate, apex rounded; veins 1–3, slender. Flowers many. Pedicel purple, 2–3.5 mm, surrounded by upper leaves, papillate. Calyx narrowly obconic, 5–6.5 mm; lobes broadly triangular, 1–2 mm, margin narrowly membranous and smooth, apex acute and apiculate, midvein prominent. Corolla outside pale yellow-green, inside pale blue, tubular, 1–1.3 cm; lobes ovate, 1.5–2 mm, margin entire, apex obtuse; plicae semiorbicular, 0.8–1 mm, margin entire or crenulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 2.5–3 mm; anthers narrowly ellipsoid, 1.3–1.5 mm. Style 1–1.5 mm; stigma lobes oblong. Capsules narrowly obovoid to obovoid, 4.5–6 mm; gynophore to 1.8 cm, stout. Seeds brown, ellipsoid, 1–1.2 mm. Fl. and fr. Apr–Jun.

• Grassland and roadside slopes, wet grasslands, scrub, forest margins, forests; 900–3000 m. Guizhou, E Sichuan.

240. *Gentiana napulifera* Franchet, Bull. Soc. Bot. France 43: 488. 1896.

蕺根龙胆 fu gen long dan

Gentiana sarcorrhiza Ling & Ma ex T. N. Ho.

Perennials 1–4 cm tall. Roots fusiform, 1.5–4.5 cm × 3–4 mm, fleshy. Stems purple, erect, as high as to slightly higher than basal leaves, simple or apically few branched, cespitose, densely papillate. Leaves with petiole tube 0.7–1 mm, margin ciliolate, abaxially puberulent; leaf blade linear-lanceolate, elliptic, or narrowly obovate, abaxially glabrous, adaxially minutely and densely papillate, margin indistinctly cartilaginous and ciliate, apex acuminate and cuspidate, midvein prominent and densely hirsute. Basal leaves crowded, leaf blades 1.2–2.5 cm × 3–9 mm. Stem leaves 1–3 pairs, widely spaced; leaf blade 4–10 × 1.5–2.5 mm. Flowers 1–3, subsessile. Calyx narrowly obconic, 5–7 mm, tube

outside puberulent; lobes linear-lanceolate, 2–3 mm, outside glabrous, margin cartilaginous and densely ciliate, midvein prominent and hirsute, apex acuminate and cuspidate, apically puberulent. Corolla pale blue-purple, funnellform, 1–1.5 cm; lobes ovate, 2–3 mm, margin entire, apex obtuse; plicae ovate-oblong, 1.5–2 mm, margin denticulate, apex truncate. Stamens inserted at middle of corolla tube, equal; filaments 2.5–3 mm; anthers linear, 2–2.2 mm. Style 0.8–1 mm; stigma lobes semiorbicular. Capsules narrowly obovoid, 2.5–3 mm; gynophore to 7 mm. Seeds brown, ellipsoid, 0.6–1 mm. Fl. and fr. Apr–Jul.

• Grassland slopes; 1500–1900 m. SW Sichuan, C and NW Yunnan.

Gentiana napulifera is similar to *G. loureiroi*. Although T. N. Ho recognizes both as distinct species, J. S. Pringle considers *G. napulifera* to be synonymous with *G. loureiroi*.

241. *Gentiana praticola* Franchet, Bull. Soc. Bot. France 43: 489. 1896.

草甸龙胆 cao dian long dan

Perennials 5–11 cm tall. Roots cylindrical, slender, fleshy. Stems purple, erect, dichotomously branched from base, densely papillate. Basal leaves developed, not withered at anthesis; petiole 3–5 mm, margin densely ciliolate; leaf blade elliptic to ovate-lanceolate, 1.5–2.5 cm × 4–7 mm, abaxially glabrous, adaxially densely and minutely papillate, margin indistinctly cartilaginous and densely ciliolate, apex obtuse, midvein distinct and slender. Stem leaves widely spaced; petiole tube 0.5–0.7 mm; leaf blade broadly elliptic to ovate, 5–13 × 2.5–8 mm, shorter than internodes, abaxially glabrous, adaxially densely and minutely papillate, margin indistinctly cartilaginous and densely ciliolate, apex obtuse, midvein slender. Flowers many, 2 or 3 crowded into uppermost leaf axils, subsessile. Calyx campanulate, 6.5–7.5 mm, tube membranous; lobes green, usually recurved, elliptic-lanceolate to elliptic, 2–3 mm, subleathery, margin indistinctly cartilaginous and densely ciliolate, apex acute to caudate, midvein distinct. Corolla blue to dark blue, outside with stripes, broadly tubular, 0.7–1.5 cm; lobes ovate, 2–2.5 mm, margin entire, apex obtuse; plicae semiorbicular, 1–1.2 mm, margin denticulate, apex rounded. Stamens inserted at middle of corolla tube, equal; filaments 2.5–3 mm; anthers ellipsoid, 1–1.5 mm. Style 1–1.5 mm; stigma lobes linear. Capsules obovoid, 4–4.5 mm; gynophore to 8 mm. Seeds brown, ellipsoid, 0.7–0.8 mm. Fl. and fr. Jun–Oct.

• Grassland slopes, dry hillsides, forests; 1200–3200 m. Guizhou, Sichuan, NW Yunnan.

242. *Gentiana loureiroi* (G. Don) Grisebach in A. de Candolle, Prodr. 9: 108. 1845.

华南龙胆 hua nan long dan

Ericala loureiroi G. Don, Gen. Hist. 4: 192. 1837; *Gentiana pedicellata* (Wallich ex D. Don) Grisebach var. *rosulata* Kusnezow.

Perennials 3–8 cm tall, sometimes with stolons to 2.5 cm. Roots cylindrical, fleshy. Stems purple, erect, simple or few

branched, loosely cespitose, densely papillate. Basal leaves usually developed; petiole 3–7 mm, ciliolate; leaf blade elliptic, 1.5–3 cm × 3–5 mm, abaxially glabrous, adaxially densely and minutely papillate, margin indistinctly cartilaginous, densely minute ciliolate, apex obtuse to acute, often mucronate, midvein indistinct or abaxially slender. Stem leaves widely spaced; petiole 5–8 mm, ciliolate; leaf blade lanceolate to elliptic, 4–8 × 1–2.5 mm, shorter than internodes, abaxially glabrous, adaxially densely minute papillate, margin indistinctly cartilaginous and densely minute ciliolate, apex acute, ± cuspidate, midvein indistinct or abaxially slender. Pedicel 4–12 mm, densely papillate. Calyx campanulate, 5–6.5 mm; lobes erect to sometimes spreading, linear-lanceolate to lanceolate, 2.5–4 mm, margin indistinctly membranous and ciliolate, apex acute and cuspidate, midvein indistinct. Corolla blue to blue-purple, rarely outside pale yellow-green, funnellform, 1–1.7 cm; lobes ovate, 2–2.5 mm, margin entire, apex obtuse; plicae ovate-orbicular, 1–1.5 mm, margin entire or denticulate, apex rounded. Stamens inserted at middle of corolla tube, equal; filaments 3–6 mm; anthers 1.8–2.5 mm. Style 1.5–2 mm; stigma lobes narrowly oblong. Capsules narrowly obovoid to obovoid, 4.5–5.5 mm; gynophore to 1.8 cm. Seeds brown, ellipsoid, 0.7–0.9 mm. Fl. and fr. Feb–Sep.

Roadside slopes, hillsides, forests; 300–3200 m. Fujian, Guangdong, Guangxi, Hainan, Hunan, Jiangsu, Jiangxi, Taiwan, Zhejiang [Bhutan, NE India, Myanmar, Thailand, Vietnam].

243. *Gentiana arisanensis* Hayata, Icon. Pl. Formos. 6: Suppl. 48. 1917.

阿里山龙胆 a li shan long dan

Gentiana caespitosa Hayata (1908), not M. Martens & Galeotti (1844).

Perennials 4–10 cm tall, with short slender stolons. Stems ascending to erect, rigid, basally much branched and cespitose, glabrous. Leaves crowded, recurved; petiole tube 1–1.5 mm, papillate on margin and abaxially; leaf blade ovate-elliptic to ovate, 5–8 × 2.5–3.5 mm, leathery, rigid, margin thick cartilaginous and ciliolate, apex obtuse, midvein distinct. Flowers subsessile. Calyx funnellform, 7–9 mm; lobes ovate-lanceolate to triangular, 2–3 mm, leathery, margin smooth, apex acute, midvein prominent. Corolla purple, funnellform, 1.7–2 cm; lobes ovate, 3–5 mm, margin entire, sometimes erose, apex obtuse; plicae ovate, 1.5–2 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 4–4.5 mm; anthers ellipsoid, 2–2.2 mm. Style 2.5–3 mm; stigma lobes oblong. Capsules narrowly obovoid, 5–6 mm; gynophore to 2 cm. Seeds brown, ellipsoid, 1–1.2 mm. Fl. and fr. Aug–Oct.

• Alpine grasslands; 2700–3700 m. Taiwan.

244. *Gentiana winchuanensis* T. N. Ho in T. N. Ho & S. W. Liu, Bull. Nat. Hist. Mus. London (Bot.) 23: 59. 1993.

汶川龙胆 wen chuan long dan

Annuals 8–10 cm tall. Stems ascending, branched from base. Leaves widely spaced; petiole 2–3 mm; leaf blade ovate, 4–6 × 2–4 mm, shorter than internodes, margin cartilaginous

and ciliolate, apex acute, midvein distinct. Flowers many, sessile. Calyx narrowly obconic, 1.3–1.7 cm; lobes triangular, 1.5–2 mm, margin cartilaginous and ciliolate, apex acuminate, midvein strongly keeled and decurrent basally into conspicuous wings of calyx tube. Corolla blue-purple, with yellow and blackish spots in throat, salverform, 2.5–3 cm; lobes ovate, 6–7 mm, margin entire, apex acute and cuspidate; plicae ovate, 5–6 mm, margin denticulate, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 4.5–5 mm; anthers ellipsoid, 1–1.5 mm. Style 1–1.5 mm; stigma lobes oblong. Capsules narrowly ellipsoid, ca. 1 cm, apex long attenuate; gynophore ca. 5 mm. Seeds brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jul.

• Forests; ca. 2400 m. N Sichuan.

245. *Gentiana piasezkii* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 26: 498. 1880.

陕南龙胆 shan nan long dan

Gentiana pubicaulis Harry Smith.

Annuals 7–10 cm tall. Stems purple, ascending to erect, branched from base, densely papillate. Basal leaves with petiole 2–3 mm; leaf blade involucrifolm, narrowly elliptic, ovate-elliptic, or ovate, 1.7–2 cm × 4–6 mm, margin densely ciliolate, apex acute to obtuse, veins 1–3. Stem leaves widely spaced; petiole 1–1.5 mm, entirely connate; leaf blade lanceolate, narrowly elliptic, or rarely ovate, 5–9 × 2–3 mm, base obtuse, margin densely ciliolate, apex obtuse, veins 1–3. Flowers few to many. Pedicel purple, 4–8 mm, surrounded by upper leaves, densely purple papillate. Calyx narrowly obconic, 1–1.2 cm; lobes triangular, 2.5–3 mm, apex acute, midvein strongly keeled and decurrent basally into conspicuous wings of calyx tube. Corolla blue-purple to purple, with pale yellow-green base, and with blackish short lines in throat, salverform, 1.7–2.2 cm; lobes ovate, 4–5 mm, margin entire, apex obtuse; plicae ovate, 2–3 mm, margin entire or 2-cleft. Stamens inserted at middle of corolla tube, equal; filaments 4–5 mm; anthers narrowly ellipsoid, 1.5–2 mm. Style 2–4 mm; stigma lobes linear. Capsules narrowly obovoid, 6–8 mm, apex long attenuate; gynophore to 2.5 cm. Seeds light brown, ellipsoid, 1–1.2 mm. Fl. and fr. Apr–Sep.

• River banks, roadsides, valleys, meadow slopes, forests; 1000–4300 m. SE Gansu, N Sichuan.

246. *Gentiana shaanxiensis* T. N. Ho in T. N. Ho & S. W. Liu, Bull. Nat. Hist. Mus. London (Bot.) 23: 59. 1993.

陕西龙胆 shan xi long dan

Annuals 7–12 cm tall. Stems purple, ascending, branched from base, densely papillate. Basal leaves with petiole 2–3 mm; leaf blade narrowly elliptic, 2.5–4.2 cm × 3–8 mm, margin densely ciliolate, apex obtuse, midvein prominent. Stem leaves widely spaced; petiole 2–3 mm; leaf blade linear, 0.9–2.2 cm × 1.5–3 mm, base obtuse, margin densely ciliolate, apex acuminate, midvein prominent. Pedicel 2–10 mm, densely purple papillate. Calyx narrowly obconic, 2–2.7 cm, extending to corolla throat; lobes linear, 6–8 mm, margin densely ciliolate, apex acuminate, midvein strongly keeled and decurrent basally into conspicuous wings of calyx tube.

Corolla purple, salverform, 2.5–3.5 cm; lobes lanceolate, 6–8 mm, margin entire, apex acuminate and caudate; plicae ovate, 4–5 mm, margin entire or denticulate, apex acute. Stamens inserted at middle of corolla tube, equal; filaments 5–5.5 mm; anthers linear, 1.5–2 mm. Style 4–5 mm; stigma lobes linear.

Capsules narrowly obovoid, 0.9–1.1 cm, apex long attenuate; gynophore 2.5–4 cm. Seeds light brown, ellipsoid, 1–1.2 mm. Fl. and fr. Jul.

- Hillsides. Shaanxi.

XII. Sect. *Fimbricorona* T. N. Ho, Bull. Brit. Mus. (Nat. Hist.), Bot. 20(2): 184. 1990.

喉毛组 hou mao zu

Annuals. Corolla throat with a ring of multicellular hairs (not to be confused with fimbriate plicae between corolla lobes). Capsules obovoid, conspicuously winged; wing broad at apex but gradually narrowed toward base. Seed coat minutely reticulate.

Four species; Bhutan, SW China, Kashmir, Myanmar; two species in China.

247. *Gentiana cuneibarba* Harry Smith, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 102. 1926.

髯毛龙胆 ran mao long dan

Annuals 4.5–7 cm tall. Stems ascending, branched from base, papillate. Basal leaves withered at anthesis; petiole 2–3 mm; leaf blade ovate-elliptic to ovate, 5.5–7.5 × 2–4 mm, margin cartilaginous and ciliolate, apex acute and apiculate, veins 1–3. Stem leaves widely spaced, folded; petiole tube 0.5–1.5 mm; leaf blade linear to linear-lanceolate, 2.5–10 × 1–1.5 mm, margin ± ciliolate with lower stem leaves cartilaginous and upper stem leaves membranous, apex acuminate and apiculate, midvein distinct. Flowers few to many. Pedicel 2–4 mm, surrounded by upper leaves, papillate. Calyx tubular, 9–10 mm; lobes linear-lanceolate, 3.5–6 mm, margin ± ciliolate with basal half membranous and apical half cartilaginous, apex acuminate and apiculate, midvein prominent. Corolla blue-purple but throat white with dark spots, tubular, 1.7–2.1 cm, throat hairs ca. 2 mm and in 5 fascicles; lobes ovate-elliptic, 3–4 mm, margin entire, apex obtuse; plicae ovate, 2–2.5 mm, margin erose, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 1–1.5 mm; anthers ellipsoid, 1–1.2 mm. Style filiform, 4–5 mm; stigma lobes broadly oblong. Capsules narrowly obovoid, 6–7 mm, conspicuously winged; gynophore 3.5–4.5 mm, stout. Seeds brown, narrowly ellipsoid, 0.9–1.1 mm. Fl. and fr. Aug-Oct.

Grassland slopes, forests; 3100–4000 m. SE Xizang, NW Yunnan [Bhutan, N Myanmar].

248. *Gentiana faucipilosa* Harry Smith, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 102. 1926.

毛喉龙胆 mao hou long dan

Gentiana faucipilosa var. *caudata* C. Marquand.

Annuals 5–10 cm tall. Stems ascending, branched from base, papillate. Basal leaves withered at anthesis; petiole 2–3 mm, membranous; leaf blade ovate-elliptic to ovate-orbicular, 0.7–1.3 cm × 4–7 mm, margin cartilaginous and ± ciliolate, apex acute and cuspidate, veins 1–3. Stem leaves widely spaced, folded; petiole tube 1–1.5 mm, membranous, adaxially papillate; leaf blade linear to linear-lanceolate, 3–11 × 1–1.5 mm, margin ± ciliolate with lower stem leaves cartilaginous and upper stem leaves membranous, apex acuminate and apiculate, midvein distinct. Flowers few to many. Pedicel 2–6 mm, surrounded by upper leaves, papillate. Calyx tubular to narrowly obconic, 7–9 mm; lobes linear-lanceolate, 3.5–5 mm, apex acuminate and apiculate, midvein prominent, margin ± ciliolate with basal half membranous and apical half cartilaginous. Corolla blue, with greenish yellow base, tubular, 1–2.1 cm, throat hairs scattered; lobes ovate-elliptic, 3–4.5 mm, margin entire to 3-dentate, apex acuminate; plicae ovate, 2–3 mm, margin entire or denticulate, apex obtuse. Stamens inserted just below middle of corolla tube, equal; filaments 3–4 mm; anthers ellipsoid, 0.8–1 mm. Style 1–2 mm; stigma lobes oblong. Capsules narrowly obovoid to obovoid, 4–5 mm, conspicuously winged; gynophore to 1.5 cm. Seeds brown, ellipsoid, 0.8–1 mm. Fl. and fr. Jun-Oct.

Grasslands on gravel places, forests; 2200–3800 m. SE Xizang, NW Yunnan [Bhutan].

10. *LATOCHEA* Franchet, Bull. Soc. Bot. France 46: 212. 1899.

匙叶草属 chi ye cao shu

Herbs perennial, rhizomatous. Basal leaves in a well-developed rosette; blades mostly over 5 cm. Stem leaves in 1–3 pairs below inflorescence. Inflorescences formed by flowers in groups of (2 or) 3, partly in a terminal umbel-like cluster surrounded by whorl of 4 bracts, also in axil of bracts to form apparent whorls of (4–)6 flowers. Flowers 4-merous. Calyx lobed nearly to base. Corolla campanulate, lobed to middle, plicae absent. Stamens inserted at sinus between corolla lobes. Ovary incompletely 2-celled. Style slender, distinct; stigma 2-lobed. Nectaries in a whorl at base of ovary. Capsules distinctly curved, often with a long beaklike persistent style, many seeded. Seeds ± fusiform, wingless; seed coat longitudinally rugose.

- One species: endemic to SE and SW China.

1. *Latouchea fokiensis* Franchet, Bull. Soc. Bot. France 46: 212. 1899.

匙叶草 chi ye cao

Plants 15–30 cm tall. Rhizomes short, stout, with long rootlets. Stems erect, terete, striate, simple. Basal leaves short petiolate; leaf blade obovate-spatulate, 8–10 × 3–6 cm including petiole, base narrowed, margin entire or slightly undulate, apex rounded, veins pinnate. Stem leaves sessile, spatulate, 1.5–2.5 cm × 7–10 mm, base rounded, margin entire, apex obtuse, veins pinnate. Inflorescences erect, rachis terete, striate, simple, ca. 3 mm wide when pressed; nodes minutely hairy. Pedicel spreading, 8–10 mm; bractlets 2 per

flower, linear-lanceolate, 5–7 mm. Calyx 3.5–4.5 mm; lobes linear-lanceolate, apex acuminate, veins distinct. Corolla greenish, 1–1.2 cm; lobes ovate-triangular, 5–6 mm, margin entire, apex acuminate. Filaments 0.8–1 mm; anthers ellipsoid, 0.3–0.5 mm. Style linear, 2–3 mm. Capsules sessile, ovoid-conic, 1.5–1.8 cm. Seeds dark brown, 1.3–1.6 mm.

• Roadsides, forests; 1000–2100 m. Fujian, Guangdong, Guangxi, Guizhou, Hunan, SE Sichuan, NE Yunnan.

11. MEGACODON (Hemsley) Harry Smith in Handel-Mazzetti, Symb. Sin. 7: 950. 1936.

大钟花属 da zhong hua shu

Gentiana sect. *Megacodon* Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 137. 1890; *Gentiana* sect. *Stylophora* C. B. Clarke.

Herbs perennial. Roots stout, slightly fleshy. Stems erect, terete, stout, 1–1.5 cm in diam. at base, striate, simple. Basal leaves 2–4 pairs, small, membranous. Middle to upper stem leaves larger than lower leaves, herbaceous, base obtuse to rounded and subamplexicaul. Inflorescences a thyrse. Pedicel subtended by 2 bracts. Flowers large, nodding, 5-merous, with 2 bracts at base of pedicel. Pedicel slightly nodding, elongated in fruit. Calyx campanulate, lobed to below middle. Corolla campanulate, lobed to below middle; lobes with distinct reticulate veins; plicae absent. Stamens inserted at middle of corolla tube; filaments flattened; anthers ellipsoid. Ovary 1-celled. Style stout; stigma 2-lobed. Nectaries in a whorl on gynophore. Capsules 2-valved, many seeded. Seeds light brown, ellipsoid, wingless.

Two species: Bhutan, SW China, India, Nepal, Sikkim; both species in China.

- 1a. Leaf blade elliptic to ovate-lanceolate; calyx tube 6–8 mm; style 15–18 mm 1. *M. stylophorus*
1b. Leaf blade linear-lanceolate to elliptic-lanceolate; calyx tube 2–3 mm; style 4.5–5.5 mm 2. *M. venosus*

1. Megacodon stylophorus (C. B. Clarke) Harry Smith in Handel-Mazzetti, Symb. Sin. 7: 950. 1936.

大钟花 da zhong hua

Gentiana stylophora C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 118. 1883.

Plants 30–60(–100) cm tall. Basal leaf blades ovate, 2–4.5 × 1–2 cm. Middle to upper stem leaf apex obtuse, veins 7–9 and arcuate; middle stem leaf blades elliptic to ovate-elliptic, 7–22 × 3–9(–14) cm; upper stem leaf blades ovate-lanceolate, 5–10 × 1.2–3 cm, smaller toward apex. Thyrses 2–8-flowered. Pedicel 3–6(–16) cm. Calyx campanulate, 2.7–3.2 cm, tube 6–8 mm; lobes ovate-lanceolate, 2–2.6 cm, apex acuminate, veins 3–5. Corolla pale yellow-green, with brown veins, 5–7 × 4–5 cm, tube 8–10 mm; lobes oblong-spatulate, 4–6 cm, apex obtuse. Filaments 1.2–1.4 cm; anthers 1–1.2 cm. Style 1.5–1.8 cm; stigma lobes ellipsoid. Capsules ovoid-ellipsoid, 5–6 cm. Seeds 2.2–2.5 mm; seed coat longitudinally rugose. Fl. and fr. Jun-Sep.

Beside streams, meadows, scrub, forest margins; 3000–4400 m. S Sichuan, SE Xizang, NW Yunnan [Bhutan, NE India, Nepal, Sikkim].

2. Megacodon venosus (Hemsley) Harry Smith in S. Nilsson,

12. HALENIA Borkhausen in Roemer, Arch. Bot. (Leipzig) 1(1): 25. 1796.

花锚属 hua mao shu

Herbs annual [or perennial]. Roots slender, fibrous. Sometimes with elongated rhizomes. Leaves opposite [or whorled]. Inflorescences terminal and axillary, in clusters or sometimes in lax panicles of cymes. Terminal clusters umbel-like, subtended by a whorl of 4 leaves, often on short axillary branches. Flowers 4-merous. Calyx lobed nearly to base. Corolla campanulate, lobed to below middle, with spurs near base of corolla tube. Stamens inserted on corolla tube. Ovary 1-celled. Style very short. Stigma 2-lobed. Capsules ovoid, 2-valved, 1.1–1.3 cm, many seeded. Seeds ellipsoid to subglobose; seed coat almost smooth.

Grana Palynol. 7(1): 145. 1967.

川东大钟花 chuan dong da zhong hua

Gentiana venosa Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 137. 1890.

Plants 45–85(–180) cm tall. Basal leaf blades ovate-lanceolate to ovate, 2–5 × 1–1.5 cm. Middle to upper stem leaf apex acuminate to obtuse, veins 5–7 and arcuate; middle stem leaf blades elliptic-lanceolate, 10–30 × 3–6 cm; upper stem leaf blades linear-lanceolate, 5–7 × 0.7–1.2 cm, smaller toward apex. Thyrses 7–11-flowered. Pedicel 2.5–6 cm. Calyx campanulate, 2.7–3.2 cm, tube 2–3 mm; lobes elliptic-lanceolate, 2.5–3 cm, margin narrowly membranous, apex acuminate, veins 3–5. Corolla white or pale yellow, with brown veins, 5–6 × 6–7.5 cm, tube 8–10 mm; lobes oblong-spatulate, 4–5 cm, base slightly contracted, apex rounded. Filaments 1.3–1.5 cm; anthers 7–10 mm. Style cylindrical, 4.5–5.5 mm; stigma lobes ovate-orbicular. Immature capsule ovoid-ellipsoid, 1.5–1.8 cm. Seed coat reticulate and warty. Fl. and fr. Sep-Oct.

• Gravel hillsides, scrub, meadows; 600–3000 m. W Hubei, E Sichuan.

About 100 species: mainly in America, a few species in Asia and Europe; two species in China.

- 1a. Corolla yellow; calyx lobes linear-lanceolate 1. *H. corniculata*
1b. Corolla blue to purple; calyx lobes elliptic to ovate 2. *H. elliptica*

1. *Halenia corniculata* (Linnaeus) Cornaz, Bull. Soc. Neu-châteloise Sci. Nat. 25: 171. 1897.

花锚 hua mao

Swertia corniculata Linnaeus, Sp. Pl. 1: 227. 1753; *Halenia deltoides* Gandoger; *H. fischeri* Graham; *H. japonica* Gandoger; *H. siberica* Borkhausen.

Plants 10–80 cm tall. Stems erect, subquadrangular, striate, simple or branched from base and/or above base. Basal leaves usually withered at anthesis; petiole flattened, 1–1.5 cm; leaf blade elliptic to obovate, 1–3 cm × 5–8 mm, base cuneate, apex rounded. Stem leaves sessile or short petiolate; leaf blade elliptic-lanceolate to ovate, 3–8 × 1–1.5 cm, densely papillate when young, abaxially hispidulous along veins, adaxially becoming smooth, base obtuse to subrounded, apex acuminate, veins 3. Pedicel 0.5–3 cm. Calyx lobes linear-lanceolate, 5–8 × 1–1.5 mm, margin hispid-ciliate, apex acuminate. Corolla yellow, campanulate, 1.1–1.4 cm in diam. including spurs; tube 4–5 mm, base with 4–8 mm spurs; lobes elliptic to ovate, 5–7 × 3–5 mm, apex obtuse and apiculate. Filaments 2–3 mm; anthers subglobose, ca. 0.8 mm in diam. Seeds brown, 1–1.4 × ca. 1 mm. Fl. and fr. Jul-Sep.

Grasslands, forest margins, forests; 200–1800 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Shaanxi, Shanxi [Japan, Korea, Mongolia, Russia].

2. *Halenia elliptica* D. Don, London Edinburgh Philos. Mag. & J. Sci. 8: 77. 1836.

椭圆叶花锚 tuo yuan ye hua mao

Plants (7–)15–90 cm tall. Stems erect, subquadrangular, striate, simple or branched from base and/or above base. Basal leaves petiole flattened, 1–1.5(–3) cm; leaf blade spatulate, elliptic, or sometimes suborbicular, 2–3 × 0.5–1.5 cm, base narrowed to cuneate, apex acute to rounded, veins 3–5. Stem leaves sessile or short petiolate; leaf blade oblong, elliptic, ovate-lanceolate, or ovate, 1.5–7 × 0.5–3.5 cm, base

rounded to truncate, apex acute to rounded, veins 5. Pedicel 0.5–3.5 cm. Calyx lobes elliptic to ovate, apex acuminate. Corolla blue to purple, campanulate, 1–2.5 cm, basal spurs 5–10(–14) mm; lobes elliptic to ovate, apex obtuse and apiculate. Filaments 3–5 mm; anthers ovoid, ca. 1 mm. Seeds light brown, ca. 2 × 1 mm. Fl. and fr. Jul-Sep.

700–4100 m. Gansu, Guizhou, Hubei, Hunan, Liaoning, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Bhutan, India, Kyrgyzstan, Myanmar, Nepal, Sikkim].

- 1a. Corolla including spurs 1–1.5 cm in diam. 2a. var. *elliptica*
1b. Corolla including spurs ca. 2.5 cm in diam. 2b. var. *grandiflora*

2a. *Halenia elliptica* var. *elliptica*

卵萼花锚 luan e hua mao

Halenia vaniotii H. Léveillé.

Calyx lobes 4–6 × 2–3 mm. Corolla 1–1.5 cm in diam., lobes ca. 6 × 4–5 mm.

Beside streams in valleys, grassland slopes, scrub, forest margins, forests; 700–4100 m. Gansu, Guizhou, Hubei, Hunan, Liaoning, Nei Mongol, Qinghai, Shanxi, Xinjiang, Xizang, Yunnan [Bhutan, India, Kyrgyzstan, Myanmar, Nepal, Sikkim].

2b. *Halenia elliptica* var. *grandiflora* Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 141. 1890.

大花花锚 da hua hua mao

Corolla ca. 2.5 cm in diam.

• Beside streams, grassland slopes; 1300–2500 m. Gansu, Guizhou, Hubei, Qinghai, Shaanxi, Sichuan, Yunnan.

13. **VERATRILLA** Baillon ex Franchet, Bull. Soc. Bot. France 46: 310. 1899.

黄秦艽属 huang qin jiao shu

Herbs perennial, dioecious. Roots stout, obconic, slightly fleshy. Caudex sheathed by blackish remains of old petioles. Vegetative stems short with a rosette of leaves; flowering stems erect, stout, terete, striate, simple. Basal leaves petiole slender; leaf blade oblong-spatulate, base narrowed, apex obtuse to rounded, veins 3–5. Stem leaves sessile, smaller toward apex, base rounded and subamplexicaul, apex obtuse, veins 3–5. Inflorescences panicles of cymes with many small flowers, rounded in male plants, narrower and ± elongated in female plants. Flowers 4-merous. Calyx and corolla rotate, lobed nearly to base; each corolla lobe with 1 or 2 gland patches. Stamens inserted at sinus between corolla lobes. Ovary 1-celled. Style short. Capsules 2-valved, many seeded. Seeds small, discoid winged.

Two species: Bhutan, SW China, NE India, Sikkim; both species in China.

- 1a. Each corolla lobe with a purple gland patch often divided into 2 separate patches; capsules 6–7 mm; seeds 1.7–2 mm 1. *V. baillonii*
1b. Each corolla lobe with 1 blue gland patch; capsules 10–15 mm; seeds ca. 5 mm 2. *V. burkilliana*

1. *Veratrilla baillonii* Franchet, Bull. Soc. Bot. France 46: 311. 1899.

黄秦艽 huang qin jiao

Swertia mekongensis I. B. Balfour & Forrest.

Plants 30–45(–85) cm tall. Basal leaf petiole (2–)5–8 cm; leaf blade 5–14 × 1.2–2.5 cm. Stem leaves ovate-elliptic, 3.5–8 × 1.3–3.5 cm. Calyx lobes apex obtuse, veins 1–3. Corolla yellow-green, with purple veins, 6–7 mm, tube 1–1.5 mm; lobes oblong-spatulate, 4–5 mm, apex obtuse. Inflorescences of male plants a large crowded panicle. Calyx lobes linear-lanceolate, 2–2.5 mm. Stamens fertile; filaments 1.5–2 mm; anthers ellipsoid, 0.8–1 mm. Pistil aborted. Inflorescences of female plants lax, racemelike, few flowered. Calyx lobes ovate-lanceolate, 4–5 mm. Corolla lobes obtuse, with a purple gland patch often divided longitudinally into 2 separate patches. Stamens sterile, ca. 0.5 mm. Pistil 4–5 mm. Ovary ovoid. Style indistinct; stigma lobes suborbicular. Capsules ovoid, 6–7 mm. Seeds dark brown, subdiscoid, 1.7–2 mm; broadly winged; seed coat reticulate. Fl. and fr. May–Aug.

Meadow slopes, scrub, alpine scrub meadows; 3200–4600 m. W Sichuan, SE Xizang, NW Yunnan [E India].

2. *Veratrilla burkilliana* (W. W. Smith) Harry Smith in S.

Nilsson, Grana Palynol. 7(1): 145. 1967.

短叶黄秦艽 duan ye huang qin jiao

Swertia burkilliana W. W. Smith, J. Proc. Asiat. Soc. Bengal 7: 78. 1911.

Plants 15–30(–50) cm tall. Roots 10–12 × 2–3 cm. Basal leaf petiole 10–15 cm; leaf blade 7–10 × 2–2.5 cm. Stem leaves 3–6 pairs, elliptic to ovate-elliptic, 4–5(–9) × to 3 cm. Inflorescences of male plants very crowded, 3–8 × 3–4 cm. Calyx lobes triangular-lanceolate, 1.5–2 mm, apex obtuse, veins 1–3. Corolla dirty white to green, with purple streaks and spots, tube 1–1.5 mm; lobes oblanceolate, 5–7 mm, each with 1 blue gland patch, apex obtuse. Stamens fertile; filaments 1.5–2 mm; anthers ellipsoid, 0.8–1 mm. Pistil abortive. Inflorescences of female plants lax, narrow, few flowered, 8–10 × ca. 2.5 cm in fruit. Calyx and corolla as in male inflorescence. Stamens sterile. Stigma lobes suborbicular. Capsules ovoid, 1–1.5 cm. Seeds dark brown, discoid, ca. 5 × 3–4 mm; seed coat with honeycomblike pits. Fl. and fr. Jul–Aug.

Wet places; 4000–4300 m. S Xizang [Bhutan, Sikkim].

14. SWERTIA Linnaeus, Sp. Pl. 1: 226. 1753.

獐牙菜属 zhang ya cai shu

Agathotes D. Don; *Anagallidium* Grisebach; *Kingdon-wardia* C. Marquand; *Ophelia* D. Don ex G. Don; *Sczukinia* Turczaninow.

Herbs annual or perennial. Roots fibrous or woody; primary roots with few secondary rootlets or rhizomes short and with few fleshy adventitious rootlets. Stems absent, scapiform, or well developed, ascending or erect, terete, striate or angled, simple or branched. Leaves opposite, rarely alternate or whorled, margin entire. Inflorescences cymose, usually grouped into simple or paniculate thyrses, rarely strictly dichotomous, sometimes reduced to single flowers and inflorescences racemelike or flowers solitary and terminal. Flowers 4- or 5-merous. Calyx and corolla rotate, lobed to base, tubes less than 3 mm. Nectaries 1 or 2 per corolla lobe, with fimbriate margin or represented by naked spotlike gland patches. Stamens inserted at base of corolla tube. Ovary 1-celled. Style short to elongate. Capsules 2-valved, few to many seeded. Seeds small.

About 150 species: worldwide, mainly in Asia and Africa, few in North America and Europe; 75 species in China.

Swertia guibeiensis C. Z. Gao has been described from Guangxi (C. Z. Gao, Guihaia 14: 20–22. 1994). However, specimens have not been seen by the authors, and the species is not included in this treatment.

1a. Perennials.

2a. Nectaries 1 per corolla lobe.

3a. Flowers 5-merous.

4a. Corolla yellow-green, lobes 8–17 mm 3. *S. erythrosticta*

4b. Corolla white, lobes 3–3.5 mm 47. *S. rosularis*

3b. Flowers 4-merous.

5a. Plant densely tufted; stems 2–12 cm; inflorescences 1–7-flowered, umbel-like or reduced to a solitary terminal flower.

6a. Nectary reduced to a flat gland patch without raised margin or fimbriae.

7a. Plants 2–4 cm tall; petiole 0.8–1.8 cm; leaf blade ovate to suborbicular, 1-veined; corolla 8–10 mm in diam., glabrous 1. *S. handeliana*

7b. Plants 5–7 cm tall; petiole 5–6 cm; leaf blade oblong-spatulate, 3-veined; corolla 12–14 mm in diam., puberulent 29. *S. conaensis*

6b. Nectary with raised fimbriate margin.

8a. Inflorescences racemelike or umbel-like, 1–7-flowered 27. *S. multicaulis*

8b. Inflorescences scapose, 1-flowered 28. *S. scapiformis*

5b. Plant with single robust stem; stems 12–100 cm; inflorescences many flowered, conical

- thyse or verticillasterlike.
- 9a. Margin of leaves and calyx lobes minutely and somewhat irregularly lacinate; corolla brick red, drying yellow-green; nectaries margin with inflexed fimbriae 30. *S. splendens*
- 9b. Margin of leaves and calyx lobes smooth; corolla pale yellow-green, pale blue-green, or pale purple; nectaries margin smooth.
- 10a. Seeds wingless; inflorescences crowded, clusters of flowers \pm contiguous 33. *S. virescens*
- 10b. Seeds winged; inflorescences interrupted, cluster of flowers clearly separated from each other.
- 11a. Seeds ellipsoid, minutely winged at both ends; nectaries ovate-triangular 31. *S. verticillifolia*
- 11b. Seeds compressed, discoid winged; nectaries orbicular 32. *S. hookeri*
- 2b. Nectaries 2 per corolla lobe.
- 12a. Flowers 4-merous; plants with a taproot (rhizomatous in *S. davidii*).
- 13a. Inflorescences many flowered; nectaries radially elongated, with a narrow scale.
- 14a. Plant rhizomatous; leaves basal and cauline; calyx shorter than corolla; corolla pale blue with blue veins 55. *S. davidii*
- 14b. Plant not rhizomatous; leaves mostly basal; calyx longer than corolla; corolla dark purple 49. *S. pianmaensis*
- 13b. Inflorescences few flowered; nectaries pocket-shaped, with a triangular scale.
- 15a. Basal leaf blades narrowly spatulate to oblanceolate; calyx lobes 5–9 mm wide, bract-like 34. *S. patens*
- 15b. Basal leaf blades linear-oblong; calyx lobes 2–3 mm wide, not bractlike 35. *S. luquanensis*
- 12b. Flowers 5-merous (also 4-merous in *S. emeiensis*); plant rhizomatous.
- 16a. Nectary margin entire or each with 1 fimbria at base 2. *S. divaricata*
- 16b. Nectary margin conspicuously fimbriate.
- 17a. Seeds \pm smooth, discoid winged or minutely winged at both ends; stem leaves always present, usually alternate toward base of stem, rarely all opposite.
- 18a. Flowers 4- (or 5)-merous, 2.5–4 cm in diam.; corolla lobes oblong, apex caudate; nectaries orbicular, margin with few erect fimbriae 4. *S. emeiensis*
- 18b. Flowers 5-merous, 1.5–2(–3) cm in diam.; corolla lobes narrowly elliptic to ovate-oblong, apex not caudate; nectaries cupular, margin with many fimbriae.
- 19a. Calyx lobes as long as to longer than corolla or slightly shorter; seeds subglobose, with irregular narrow wings on edges and at both ends; inflorescences 4–7-flowered, rarely more flowered.
- 20a. Corolla pale yellow; pedicel 3–5.5 cm 5. *S. calycina*
- 20b. Corolla dark blue to blue-purple, pedicel 1.2–3 cm 6. *S. forrestii*
- 19b. Calyx lobes shorter than corolla; seeds compressed, discoid winged; inflorescences many flowered.
- 21a. All stem leaves alternate 7. *S. obtusa*
- 21b. Stem leaves basally alternate but middle to upper leaves opposite.
- 22a. Corolla pale purple to blue-purple, never spotted 8. *S. perennis*
- 22b. Corolla pale yellow to yellow, often spotted.
- 23a. Calyx ca. 2/3 as long as corolla; corolla lobes elliptic-lanceolate, 1.2–1.4 cm 9. *S. veratroides*
- 23b. Calyx 1/2(–2/3) as long as corolla; corolla lobes oblong, 0.8–1.2 cm 10. *S. connata*
- 17b. Seeds longitudinally rugose, usually wingless (*S. tibetica* winged on edges, *S. souliei* winged at both ends); stem leaves absent or, if present, always opposite.
- 24a. Stem leaves few or absent except for those subtending inflorescences (leaves mostly basal).
- 25a. Basal leaves 3 or 4 pairs, usually linear-elliptic or oblanceolate; corolla lobes 2–3 mm wide.
- 26a. Corolla blue or blue-purple; calyx lobes with narrow indistinct membranous margin 11. *S. graciliflora*
- 26b. Corolla yellow; calyx lobes with broad distinct membranous margin 12. *S. marginata*
- 25b. Basal leaves 1 or 2 pairs, elliptic, spatulate, or ovate to oblong; corolla lobes 5–8 mm wide.
- 27a. Corolla dark blue 13. *S. bifolia*
- 27b. Corolla pale yellow to yellow or yellow-green but pale blue on middle of inner surface.
- 28a. Corolla lobes usually 0.9–1.5 cm; calyx lobes narrowly lanceolate, apex acuminate; corolla lobes lanceolate, apex acuminate to acute; ovary horizontally folded 14. *S. przewalskii*

- 28b. Corolla lobes usually 1.5–2 cm; calyx lobes ovate-lanceolate, apex acute; corolla lobes oblong to elliptic, apex obtuse to rounded and erose; ovary smooth 15. *S. wolfgangiana*
- 24b. Stems with 2 to many pairs of leaves.
- 29a. Calyx lobes usually oblong-spatulate to elliptic, base narrowed, apex rounded; nectaries radially elongated 16. *S. cuneata*
- 29b. Calyx lobes linear to ovate-lanceolate, base not narrowed, apex acuminate to acute; nectaries cupular or orbicular.
- 30a. Stem upper leaves bractlike; nectaries orbicular; calyx lobes 6–8 mm.
- 31a. Corolla pale yellow, with purple spots; basal leaves ovate; stem leaves 2–3 cm 19. *S. rotundiglandula*
- 31b. Corolla dark purple; basal leaves spatulate to oblong-spatulate or narrowly lanceolate to linear-elliptic; stem leaves 4–12 cm.
- 32a. Inflorescences a panicle; basal leaf petiole 2–2.5 cm, blade 3.5–6 cm, spatulate to oblong-spatulate 20. *S. asarifolia*
- 32b. Inflorescences a thyrse, interrupted; basal leaf petiole 5–10 cm, blade 10–16 cm, narrowly lanceolate to linear-elliptic 21. *S. elata*
- 30b. Stem upper leaves not bractlike; nectaries cupular; calyx lobes (7–)9–20 mm.
- 33a. Inflorescences a narrow dense interrupted many-flowered thyrse; basal leaf blade 17–31 cm 17. *S. kingii*
- 33b. Inflorescences paniculate or racemelike; basal leaf blade 2–14 cm.
- 34a. Bases of stem leaf blades subamplexicaul.
- 35a. Basal leaf petiole 3–7 cm; stem leaves 2 or 3 pairs; leaf blade ovate-lanceolate 26. *S. souliei*
- 35b. Basal leaf petiole 1–2.5 cm; stem leaves more than 3 pairs; leaf blade broadly linear, lanceolate, or linear-elliptic.
- 36a. Calyx lobes 0.7–0.9 cm; corolla blue-purple, lobes 0.9–1.3 cm 22. *S. gyacaensis*
- 36b. Calyx lobes 1.5–2 cm; corolla yellow, with blue in middle of outer surface, lobes 2–2.5 cm 25. *S. younghusbandii*
- 34b. Bases of stem leaf blades not subamplexicaul.
- 37a. Plant 15–20 cm tall; corolla blackish purple 18. *S. endotricha*
- 37b. Plant 30–100 cm tall; corolla blue or yellow.
- 38a. Corolla pale blue to pale blue-gray, lobes (1–)1.3–1.5 cm, ca. 1.9 cm in fruit 23. *S. wardii*
- 38b. Corolla yellow, lobes 2.5–2.8 cm 24. *S. tibetica*
- 1b. Annuals.
- 39a. Stems dichotomously branched from base; flowers in branch forks; each nectary produced into a very short spur on back of corolla lobe 36. *S. dichotoma*
- 39b. Stems well defined, erect or ascending, with or without axillary branches; flowers both terminal and usually axillary; nectaries without an associated spur.
- 40a. Filaments dilated laterally so as to be lanceolate to ovate, bases contiguous or fused into a tube around ovary.
- 41a. Nectaries 2 per corolla lobe, inverted (opening toward base of corolla), pocket-shaped, fimbriate 70. *S. hispidicalyx*
- 41b. Nectaries 1 per corolla lobe, horseshoe-shaped and naked or oblong and with few divisions.
- 42a. Calyx and corolla tubes distinct, 2.5–3.5 mm; nectary oblong, laciniate; style cylindrical, 1.5–2 mm 75. *S. racemosa*
- 42b. Calyx and corolla tubes indistinct, 0.5–1.5 mm; nectary horseshoe-shaped, naked; style filiform, 2.5–4 mm.
- 43a. Filaments connate into a short tube surrounding ovary.
- 44a. Corolla blue-purple, reflexed at anthesis 71. *S. ciliata*
- 44b. Corolla pale yellow-green, erect at anthesis 72. *S. cincta*
- 43b. Filaments free.
- 45a. Calyx lobes leaflike, unequal, 2 larger and 3 smaller; corolla white, lobes margin lacerulate 73. *S. pubescens*
- 45b. Calyx lobes not leaflike, only slightly unequal; corolla pale yellow, lobes margin entire 74. *S. paniculata*
- 40b. Filaments not to slightly dilated at base, clearly separated from each other.

- 46a. Plants with 1 to few erect, robust, and narrowly 4-winged main stems that have larger flowers and numerous weak branches with flowers 1/4–1/3 as large as those of main stem; filaments with a small scale at base 69. *S. tetraptera*
- 46b. Plants with stems and flowers uniform, usually not branched from lowermost nodes; filaments without a scale at base.
- 47a. Nectaries reduced to a naked gland patch.
- 48a. Nectaries 1 per corolla lobe.
- 49a. Inflorescences rounded and lax; calyx somewhat campanulate, lobes spreading and ovate-triangular to ovate; corolla lobes narrowly oblong, 1.7–1.9 cm 37. *S. shintenensis*
- 49b. Inflorescences usually narrow and dense; calyx rotate, lobes erect and lanceolate to ovate-lanceolate; corolla lobes narrowly elliptic to elliptic-lanceolate, 0.8–1 cm 38. *S. cordata*
- 48b. Nectaries 2 per corolla lobe.
- 50a. Leaf blade broadly elliptic to ovate-lanceolate, 1–4(–5) cm wide; corolla with purple spots 39. *S. bimaculata*
- 50b. Leaf blade linear, linear-lanceolate, or lanceolate, 0.2–0.7 cm wide; corolla unspotted or with yellow spots.
- 51a. Calyx lobes ovate-lanceolate or lanceolate; corolla yellow, without spots, lobes oblong and apex acute; plants to 80 cm tall 40. *S. matsudae*
- 51b. Calyx lobes linear to linear-oblong; corolla white, with yellow-green spots, lobes elliptic-lanceolate and apex acuminate and apiculate; plants to 40 cm tall 41. *S. oculata*
- 47b. Nectaries fimbriate or with lacinate margin.
- 52a. Nectaries pocket-shaped, with an orbicular scale and numerous minutely papillose short fimbriae sometimes hidden by the scale.
- 53a. Nectaries 2 per corolla lobe.
- 54a. Stems ascending, 5–15 cm, cespitose, much branched at base; corolla white or pale purple, with dark blue-purple veins 42. *S. patula*
- 54b. Stems erect, 15–45 cm, pyramidal, branched throughout; corolla pale blue, without dark veins 43. *S. leduicii*
- 53b. Nectaries 1 per corolla lobe.
- 55a. Calyx lobes shorter or equal to corolla; corolla white or pale yellow, with brown spots 44. *S. angustifolia*
- 55b. Calyx lobes much longer than corolla; corolla yellow-green, with purple veins.
- 56a. Leaf blade narrowed at base; seed coat spongy 45. *S. nervosa*
- 56b. Leaf blade rounded at base; seed coat rugose 46. *S. arisanensis*
- 52b. Nectaries triangular, radially elongated, or cupular, with a narrow scale and long or sometimes short glabrous fimbriae.
- 57a. Flowers 3–5(–10) mm.
- 58a. Nectaries 1 per corolla lobe 48. *S. tenuis*
- 58b. Nectaries 2 per corolla lobe.
- 59a. Style distinct, slender; flowers 4-merous; nectaries radially elongated 50. *S. membranifolia*
- 59b. Style indistinct, stout; flowers usually 5-merous (occasionally 4-merous in *S. macrosperma*), nectaries cupular.
- 60a. Seeds 3 or 4 per capsule, 1.5–2 mm; nectaries with few fimbriae 51. *S. macrosperma*
- 60b. Seeds many per capsule, less than 1 mm; nectaries with many fimbriae.
- 61a. Calyx lobes elliptic-spatulate to elliptic; corolla lobes ovate, apex acute 52. *S. zayuensis*
- 61b. Calyx lobes linear-lanceolate; corolla lobes ovate-lanceolate, apex acuminate 53. *S. alba*
- 57b. Flowers (7–)10–20 mm.
- 62a. Flowers 4-merous (occasionally 5-merous in *S. kouitchensis*).
- 63a. Nectaries with short compound fimbriae 54. *S. tetrapetala*
- 63b. Nectaries with long simple fimbriae.
- 64a. Calyx as long as or longer than corolla, lobes unequal 56. *S. kouitchensis*
- 64b. Calyx 1/2–2/3 as long as corolla, lobes subequal.

- 65a. Plants regularly branched from near base so whole plant is pyramidal; corolla dark purple or pale yellow green to pale yellow 57. *S. mussotii*
- 65b. Plants with cymes in spreading branched panicles; corolla pale blue 58. *S. tozanensis*
- 62b. Flowers 5-merous.
 - 66a. Calyx lobes bractlike, unequal, 3 larger and ovate, 2 smaller and ovate-lanceolate, all with prominent reticulate veins outside 59. *S. delavayi*
 - 66b. Calyx lobes not bractlike, subequal, linear to linear-lanceolate, without prominent reticulate veins outside.
 - 67a. Inflorescences usually reduced to single terminal flower, sometimes with additional flowers terminating short axillary branches 60. *S. decora*
 - 67b. Inflorescences a panicle with at least some (but usually all) flowers in leaf axils.
 - 68a. Corolla lobes not apiculate.
 - 69a. Calyx more than 2/3 as long as corolla.
 - 70a. Corolla 1–1.5 cm in diam.; nectaries with simple fimbriae 61. *S. diluta*
 - 70b. Corolla 1.5–2 cm in diam.; nectaries with compound fimbriae 62. *S. pseudochinensis*
 - 69b. Calyx 1/2–2/3 as long as corolla.
 - 71a. Pedicel filiform; corolla pale blue; calyx lobes linear; nectaries triangular 63. *S. yunnanensis*
 - 71b. Pedicel linear; corolla white or rarely pale blue; calyx lobes linear-lanceolate; nectaries radially elongated 64. *S. hickinii*
 - 68b. Corolla lobes apiculate.
 - 72a. Corolla white or yellow.
 - 73a. Base of stem leaf blades subamplexicaul, margin ciliolate; corolla 1.5–1.7 cm in diam. 65. *S. binchuanensis*
 - 73b. Base of stem leaf blades tapered, margin not ciliolate; corolla 0.8–1.2 cm in diam. 66. *S. punicea*
 - 72b. Corolla pale blue or dark purple.
 - 74a. Corolla dark purple 66. *S. punicea*
 - 74b. Corolla pale blue.
 - 75a. Stem leaf bases auriculate, subamplexicaul; inflorescences many-flowered panicles formed by the whole plant; pedicel stout, to 4 cm; corolla lobes 9–15 mm 67. *S. franchetiana*
 - 75b. Stem leaf bases cuneate, not subamplexicaul; inflorescences a narrow panicle with many ± fascicled flowers; pedicel slender, 0.3–0.5 cm; corolla lobes 5–7 mm 68. *S. fasciculata*

1. *Swertia handeliana* Harry Smith, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 106. 1926.

矮瘴牙菜 ai zhang ya cai

Perennials 2–4 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems 2–5, erect, cespitose, striate, simple. Leaves mostly basal, crowded in a rosette, slightly shorter than stems; petiole flattened, 0.8–1.8 cm; leaf blade ovate to suborbicular, 4–7 × 3–5.5 mm, base narrowed, apex rounded, midvein distinct. Stem leaves sessile, spatulate to obovate, 4–6 × 2.5–4 mm, both ends obtuse. Flowers terminal, solitary, 4-merous. Pedicel erect, 5–13 mm at anthesis, elongated to 2 cm in fruit. Calyx lobes green,

foliose, ovate-lanceolate to ovate-elliptic, 3.5–4.5 mm, margin scabrous, apex obtuse, veins 3–5. Corolla pale blue, 8–10 mm in diam., tube ca. 0.5 mm; lobes oblong, 8–10 mm, apex obtuse and mucronate. Nectaries 1 per corolla lobe, reduced to a flat gland patch without raised margin or fimbriae. Filaments ca. 5.5 mm; anthers ovoid, 0.9–1 mm. Style short; stigma lobes capitate. Capsules ovoid-ellipsoid, ca. 1 cm. Seeds light brown, broadly ellipsoid, 0.7–0.8 mm, almost smooth. Fl. and fr. Aug–Nov.

• Grasslands on hillsides, alpine meadows; 3500–4500 m. SE Xizang, NW Yunnan.

2. *Swertia divaricata* Harry Smith, Notes Roy. Bot. Gard.

Edinburgh 26: 256. 1965.

叉序獐牙菜 cha xu zhang ya cai

Perennials 50–70 cm tall. Stems erect, robust, striate, simple. Basal leaves absent. Lower stem leaves long petiolate; leaf blade elliptic, 12–14 × 4–5.5 cm, apex obtuse, veins 7; middle to upper leaves sessile or short petiolate; leaf blade elliptic-lanceolate to triangular-lanceolate, 4–8 × 2.5–5 cm, apex obtuse. Inflorescences panicles of cymes, divaricate, many flowered. Flowers 5-merous. Pedicel arcuate, 2–2.5 cm. Calyx lobes lanceolate, ca. 5 mm, thick herbaceous, apex acuminate, veins 3. Corolla blackish purple, with green spots, 1–1.2 cm in diam., tube 1–1.5 mm; lobes elliptic to ovate-lanceolate, 1–1.2 cm × 4.5–5 mm, apex obtuse. Nectaries 2 per corolla lobe, close together, oblong, with narrowly raised margin and 1 to few fimbriae at base. Filaments ca. 6 mm, base fimbriate-barbate; anthers ellipsoid, ca. 2 mm. Style very short; stigma lobes oblong. Capsules ellipsoid, 1–1.2 cm. Seeds light brown, ellipsoid, 1.2–2 mm, irregularly longitudinally rugose, narrowly winged on edges. Fl. and fr. Sep.

- Woodland margin in valleys; ca. 2400 m. NW Yunnan.

3. *Swertia erythrosticta* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 503. 1881.

红直獐牙菜 hong zhi zhang ya cai

Perennials 20–50 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, robust, striate, simple. Basal leaves withered at anthesis. Stem leaves with petiole flattened, to 7 cm, shorter toward apex, base connate into a sheath; blade oblong, ovate-elliptic, or ovate, 5–11(–12.5) × 1–3.5 cm, smaller toward apex, base narrowed, apex obtuse, veins 3–5. Inflorescences panicles of cymes, (5–)10–45 cm, narrow, many flowered. Flowers 5-merous. Pedicel somewhat arcuate, 1–2 cm. Calyx lobes lanceolate, 5–10 mm, margin narrowly membranous, apex acuminate. Corolla pale yellow-green, with or without brown spots, 1.2–1.5(–2) cm in diam., tube 1–1.5 mm; lobes oblong to ovate-oblong, 0.8–1.7 cm × (1.5–)3–6 mm, apex obtuse. Nectaries 1 per corolla lobe, deeply cupular to almost tubular, fimbriae 1.5–2 mm. Filaments 5–7 mm, base fimbriate-barbate; anthers ovoid, 2–2.5 mm. Style short, distinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 1–1.5 cm. Seeds light brown, ellipsoid, 0.8–1 mm, wings discoid. Fl. and fr. Aug–Oct.

1500–4300 m. Gansu, Hebei, Hubei, Nei Mongol, Qinghai, Shanxi, Sichuan [Korea].

- 1a. Corolla with brown spots 3a. var. *erythrosticta*
1b. Corolla without brown spots 3b. var. *epunctata*

3a. *Swertia erythrosticta* var. *erythrosticta*

红直獐牙菜 (原变种) hong zhi zhang ya cai (yuan bian zhong)

Corolla pale yellow-green, with brown spots.

Beside streams, grasslands on dry hillsides, scattered forests, alpine meadows; 1500–4300 m. Gansu, Hebei, Hubei, Nei Mongol, Qinghai, Shanxi, Sichuan [Korea].

3b. *Swertia erythrosticta* var. *epunctata* T. N. Ho & S. W. Liu, Acta Biol. Plateau Sin. 1: 46. 1982.

素色獐牙菜 su se zhang ya cai

Corolla without brown spots.

- Beside streams, meadows on hillsides; 2900–3000 m. E Qinghai.

4. *Swertia emeiensis* Ma ex T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 75. 1980.

峨眉獐牙菜 e mei zhang ya cai

Perennials 20–30 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems somewhat flexuose to erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves withered at anthesis. Stem leaves alternate; petiole flattened, 4–6.5 cm, shorter toward apex. Lower stem leaf blades broadly elliptic, 2–15 × 5.5–6.5 cm, base obtuse to rounded, apex obtuse, veins 9–11 and arcuate; middle to upper leaf blades decreasing in size toward stem apex, sessile, ovate-lanceolate, 2–4.5 × 0.5–1.6 cm, base rounded and subamplexicaul, apex acuminate, veins 3–5. Inflorescences racemelike cymes, (1–)3–7-flowered. Flowers 4- (or 5)-merous. Calyx lobes linear-lanceolate, 1.7–2.5 cm, apex acuminate, midvein slender. Corolla pale yellow-green, with brown veins, 2.5–4 cm in diam., tube 2–3 mm; lobes oblong, 2.8–3.2 cm, apex acuminate and caudate. Nectaries 2 per corolla lobe, orbicular, with few hispid fimbriae 3–3.5 mm. Filaments 1.2–1.3 cm, base fimbriate-barbate; anthers ellipsoid, 3–3.5 mm. Ovary ellipsoid, 8–9 mm. Style indistinct; stigma lobes suborbicular. Fl. Aug–Sep.

- Forests; ca. 2600 m. Sichuan (Emei Shan).

5. *Swertia calycina* Franchet, Bull. Soc. Bot. France 46: 311. 1899.

叶萼獐牙菜 ye e zhang ya cai

Perennials 8–30 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves petioles flattened and 4–6 cm; leaf blade usually folded, linear-oblong, 3.5–7 × 0.5–2 cm, base narrowed, apex obtuse, veins 3–7. Stem leaves alternate, sessile, subamplexicaul; lower stem leaf blades similar to basal leaves; middle to upper leaves ovate-oblong to ovate, 2.5–4 × 0.7–1.2 cm, base rounded and decurrent into narrow wings along stem, apex acute, veins 3–5. Inflorescences racemelike, 5- or more flowered. Flowers 5-merous. Pedicel spreading, 3–5.5 cm, stout. Calyx slightly unequal, shorter than to longer than corolla; lobes green, foliose, ovate-lanceolate to ovate, rarely narrowly lanceolate, (0.8–)1–1.6(–2.5) cm, 3–10 mm wide at base, base rounded to cordate, apex acuminate to acute, veins 1–3. Corolla pale yellow, 1.5–2(–3) cm in diam., tube 1.5–2 mm; lobes ovate-oblong, 1–2.5(–2.9) × 0.5–1.1(–2) cm, margin entire or erose, apex obtuse. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 2–2.5 mm. Filaments 1–1.3 cm, base fimbriate-barbate; anthers blue, ellipsoid, 2–3 mm. Style indistinct; stigma lobes suborbicular. Capsules

ovoid-ellipsoid, 1.3–1.5 cm. Seeds light brown, subglobose, 1–1.2 mm in diam., both ends with narrow irregular wings. Fl. and fr. Jul-Sep.

- Hillsides; 2600–4000 m. SW Sichuan, NW Yunnan.

6. *Swertia forrestii* Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 258. 1965.

紫萼獐牙菜 *zi e zhang ya cai*

Perennials 20–25 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves petioles flattened, 1.5–5.5 cm; leaf blade folded, narrowly oblong to lanceolate, 4–10 × 0.8–1.5 cm, base narrowed and decurrent into wings of petiole, apex obtuse, veins 3–7. Stem leaves alternate, sessile, ± lanceolate, 1.5–2.5 cm × 6–10 mm, base rounded, subamplexicaul, and decurrent into narrow wings along stem, apex acute, veins 3–5. Inflorescences racemelike, 6–20 cm, 4- or more flowered. Flowers 5-merous. Pedicel spreading, 1.2–3 cm, stout. Calyx lobes green, sometimes tinged blue-purple, ovate-lanceolate, 1.1–1.6 cm × 4–7 mm, slightly unequal, foliose, base rounded to cordate, apex acute, veins 1–3. Corolla dark blue to blue-purple, 1.5–2 cm in diam., tube 1.5–2 mm; lobes ovate-lanceolate, 1.3–1.8 cm × 5–6 mm, margin entire, apex acute. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 2–2.5 mm. Filaments 7–8 mm, base fimbriate-barbate; anthers blue, ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ellipsoid, 8–10 mm. Seeds light brown, subglobose, both ends and edges with irregular narrow wings. Fl. Aug.

- Scrub, alpine meadows; 3400–4200 m. NW Yunnan.

7. *Swertia obtusa* Ledebour, Mém. Acad. Imp. Sci. St. Pétersbourg Hist. Acad. 5: 526. 1812.

互叶獐牙菜 *hu ye zhang ya cai*

Perennials 15–40(–60) cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Leaves alternate. Basal and lower stem leaves with petiole slender and 6–11 cm; leaf blade oblong, 4–9 × 2–4 cm, base narrowed, apex obtuse, veins 1–3. Middle to upper stem leaves sessile, narrowly elliptic to elliptic-lanceolate, 2–4.5 cm × 6–10 mm, base rounded and subamplexicaul, apex obtuse, veins 1–3. Inflorescences slender, many-flowered thyrses 8.5–21 cm. Flowers 5-merous. Pedicel 1.2–3 cm, elongated in fruit. Calyx lobes linear-lanceolate, 8–10 mm, apex acuminate, veins 3. Corolla blue, 1.2–1.6 cm in diam., tube 1.5–2 mm; lobes narrowly elliptic to elliptic, 1.1–1.6 cm, apex obtuse. Nectaries 2 per corolla lobe, cupular, with 2–3 mm pilose fimbriae. Filaments 7–7.5 mm, base fimbriate-barbate; anthers blue, narrowly ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 1.3–1.5 cm, as long as persistent corolla. Seeds light brown, broadly ellipsoid to subglobose, 2–2.5 mm in diam., discoid winged. Fl. and fr. Aug-Sep.

Beside streams, forests; 2100–2500 m. Xinjiang (Altay region) [Kazakhstan, Mongolia, Russia].

8. *Swertia perennis* Linnaeus, Sp. Pl. 1: 226. 1753.

北温带獐牙菜 *bei wen dai zhang ya cai*

Swertia manshurica (Komarov) Kitagawa; *S. perennis* var. *manshurica* Komarov.

Perennials 60–100 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal and lower stem leaves alternate; petiole flattened, 8–17 cm; leaf blade oblong to elliptic, 6–13 × 3.5–5.5 cm, base narrowed, apex obtuse, veins 3–5. Middle to upper stem leaves opposite; petiole short, connate, sheathing stem; leaf blade oblong, 5–8 × 2–3 cm, base narrowed, apex obtuse, veins 1–3. Inflorescences dense, many-flowered thyrses. Flowers 5-merous. Pedicel 2–3.5 cm. Calyx lobes narrowly lanceolate, 8–10 mm, apex acuminate, veins 3–5. Corolla pale purple to blue-purple, 1.5–2 cm in diam., tube 1.5–2 mm; lobes narrowly ovate-oblong, 1.3–1.6 cm, apex obtuse. Nectaries 2 per corolla lobe, cupular, long fimbriate. Filaments 6–8 mm, base fimbriate-barbate; anthers blue, ellipsoid, 1.5–2 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid, as long as persistent corolla. Seeds light brown, compressed, suborbicular, 1.5–2 mm in diam., discoid winged. Fl. and fr. Sep.

Shady slopes, meadows; ca. 300 m. Jilin [North America, SW Asia, Europe].

9. *Swertia veratroides* Maximowicz ex Komarov, Fl. Manshur. 3: 276. 1907.

藜芦獐牙菜 *li lu zhang ya cai*

Perennials 45–100 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal and lower stem leaves alternate; petiole winged, 7–14 cm; leaf blade broadly elliptic, 8.5–11.5 × 6.5–8 cm, base truncate and decurrent into wings of petiole, apex obtuse to rounded, veins 5–7. Middle to upper stem leaves opposite; petiole short, connate; leaf blade elliptic, (3.5–)6–9 × 1.2–2.5 cm, both ends obtuse, veins 1–3. Inflorescences many-flowered thyrses 15–25 cm. Flowers 5-merous. Pedicel 1.5–3 cm. Calyx lobes triangular-lanceolate, 6–8 mm, apex acuminate, veins 3. Corolla pale yellow, with blue spots, 1.5–1.8 cm in diam., tube 1.5–2 mm; lobes elliptic-lanceolate, 1.2–1.4 cm × 5–6.5 mm, apex obtuse. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 1.5–2 mm. Filaments flattened, 6–8 mm, base glabrous or fimbriate-barbate; anthers blue, narrowly ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ellipsoid to broadly ellipsoid, as long as persistent corolla. Seeds brown, compressed, suborbicular, 1–1.2 mm in diam., discoid winged. Fl. and fr. Jul-Sep.

Meadows; 1600–1700 m. Heilongjiang, Jilin, Liaoning [Korea, Russia].

10. *Swertia connata* Schrenk, Nov. Pl. Sp. 1: 37. 1841.

短筒獐牙菜 duan tong zhang ya cai

Swertia obtusa Ledebour var. *qingheensis* T. N. Ho & S. W. Liu.

Perennials to 1 m tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, simple. Basal and lower stem leaves alternate; petiole flattened, 6–21 cm; leaf blade spatulate-oblong to oblong, 11–15 × 4–8 cm, base narrowed, apex obtuse, veins 5–7. Upper stem leaves opposite, sessile or short petiolate; leaf blade oblong, (3–)6–8 × 0.8–3.5 cm, both ends obtuse, veins 1–3. Inflorescences many-flowered thyrses 15–25 cm. Flowers 5-merous. Pedicel 1.5–2.5 cm. Calyx lobes lanceolate to oblong, 4–8 × 1.5–2 mm, apex acute, midvein distinct. Corolla pale yellow, sometimes with blue spots, 1–1.5 cm in diam., tube 1.5–2 mm; lobes oblong, 8–11 × 3–5 mm, apex acute to obtuse. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 1.5–2 mm. Filaments 7–9 mm, base fimbriate-barbate; anthers ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ellipsoid, 1–1.3 cm. Seeds brown, compressed, suborbicular, 2.5–3 mm in diam., discoid winged. Fl. and fr. Jul-Aug.

Hillsides, forest margins; 1600–2600 m. Xinjiang [Kazakhstan, Mongolia, Russia].

11. *Swertia graciliflora* Gontscharow, Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vyssh. Rast. 1: 161. 1933.

细花獐牙菜 xi hua zhang ya cai

Perennials 10–20 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, simple, base sheathed by blackish remains of old petioles. Basal leaves 3 or 4 pairs; petiole flattened, 2–2.5 cm; leaf blade linear-elliptic to oblanceolate, 2.5–6 × 0.6–1.7 cm, base narrowed, apex obtuse to rounded, veins 3–5. Stem leaves 1 or 2 pairs, sessile or short petiolate; leaf blade bractlike, ovate-elliptic, 1–2 cm × 4–7 mm, both ends obtuse, veins 1–3. Inflorescences narrow, interrupted, many-flowered thyrses 4–10 cm. Flowers 5-merous. Pedicel suberect, 0.8–2 cm. Calyx lobes lanceolate, 7–8 mm, margin narrowly membranous, apex acuminate, veins indistinct. Corolla blue or blue-purple, tube 1.5–2 mm; lobes narrowly oblong, 8–11 mm, margin erose, apex obtuse to rounded. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 2–2.5 mm. Filaments 7–9 mm, base fimbriate-barbate; anthers blue, narrowly ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, as long as persistent corolla. Seeds brown, ellipsoid, 1–1.3 mm, longitudinally rugose. Fl. and fr. Jul-Aug.

Valleys, beside streams, alpine meadows; 2500–4500 m. Xinjiang [Tajikistan].

12. *Swertia marginata* Schrenk, Bull. Sci. Acad. Imp. Sci. Saint-Petersbourg 10: 353. 1842.

膜边獐牙菜 mo bian zhang ya cai

Perennials 15–35 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, simple, base sheathed by blackish remains of old petioles. Basal leaves 3

or 4 pairs; petiole flattened, 3–7.5 cm; leaf blade linear-elliptic to oblanceolate, 3–8 × 0.8–2.5 cm, base narrowed, apex obtuse, veins 3–5. Stem leaves 1 or 2 pairs, sessile or short petiolate; leaf blade bractlike, linear-elliptic to ovate-elliptic, 1.5–3.5 cm × 4–10 mm, both ends obtuse, veins 1–3. Inflorescences narrow, interrupted, many-flowered thyrses 8–15 cm. Flowers 5-merous. Pedicel 0.5–1.5 cm. Calyx lobes lanceolate, 8–10 mm, margin broadly membranous and distinct, apex acuminate, veins 3. Corolla yellow, blue on middle of outer surface, 1.3–1.5 cm in diam., tube 1.5–2 mm; lobes oblong to narrowly so, 1–1.2 cm, margin erose, apex rounded. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 3–4 mm. Filaments 7–9 mm, base fimbriate-barbate; anthers blue, ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes oblong to suborbicular. Capsules narrowly ovoid, as long as persistent corolla. Seeds brown, ellipsoid, 1.2–2 mm, longitudinally rugose. Fl. and fr. Aug-Sep.

Grasslands on hillsides; 2500–3000 m. W Gansu, N Xinjiang [Kashmir, Kazakhstan, Kyrgyzstan, Mongolia, Russia (E Siberia), Tajikistan].

13. *Swertia bifolia* Batalin, Trudy Imp. S.-Peterburgsk. Bot. Sada 13: 378. 1894.

二叶獐牙菜 er ye zhang ya cai

Swertia heterantha Ling.

Perennials 10–30 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, simple, base sheathed by blackish remains of old petioles. Basal leaves 1 or 2 pairs; petiole flattened, 2.5–4 cm, base connate; leaf blade oblong to ovate-oblong, 1.5–6 × 0.7–3 cm, base narrowed, apex obtuse to rounded, veins 3–7. Stem leaves 2 or 3 pairs, sessile, bractlike, ovate to ovate-triangular, 0.7–1.8 cm × 4–6 mm, base obtuse, apex acute, veins 1–3. Inflorescences racemelike, 2–8(–13)-flowered. Flowers 5-merous. Pedicel spreading to erect, 0.5–5.5 cm. Calyx lobes lanceolate to ovate, 8–11 mm, apex acuminate, veins 3–5. Corolla dark blue, tube 1.5–2 mm; lobes elliptic-lanceolate to narrowly elliptic, 1.5–2(–3) cm × 5–8 mm, margin entire or sometimes erose, apex obtuse. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 3.5–4 mm. Filaments 0.9–1.1 cm, base fimbriate-barbate; anthers blue, narrowly ellipsoid, 2.5–3 mm. Style indistinct; stigma lobes ellipsoid to suborbicular. Capsules ovoid-ellipsoid, as long as to slightly longer than persistent corolla. Seeds brown, ellipsoid, 1.2–1.5 mm, longitudinally rugose. Fl. and fr. Jul-Sep.

• Scrub meadows, swamp meadows, alpine meadows, forests; 2800–4300 m. SE Gansu, Qinghai, Shaanxi (Taibei Shan), NW Sichuan, SE Xizang.

14. *Swertia przewalskii* Pissjaukova, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 21: 300. 1961.

祁连獐牙菜 qi lian zhang ya cai

Perennials 8–25 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves 1 or 2 pairs; petiole flattened, 1.5–5 cm, base connate; leaf

blade spatulate, elliptic, or ovate-elliptic, 1.6–6 × 0.7–2.2 cm, base cuneate to rounded, apex obtuse, veins 3–5. Stem leaves 1 or 2 pairs, sessile, bractlike, ovate-oblong, 1–2 cm × 2–5 mm, base obtuse and subamplexicaul, apex obtuse, veins 1–3. Inflorescences racemelike, 3–8 cm, 3–9-flowered. Flowers 5-merous. Pedicel spreading to erect, 0.5–5 cm. Calyx elongated in fruit; lobes narrowly lanceolate, 8–11 mm, margin distinctly membranous, apex acuminate. Corolla pale yellow-green, blue to brown in middle of outer surface, 1–2 cm in diam., tube 1.5–2 mm; lobes lanceolate (0.6–)0.9–1.5 cm × 5–7 mm, apex acuminate to acute. Nectaries 2 per corolla lobe, cupular, with fimbriae 1–1.5 mm. Filaments flattened, 7–9 mm, base short fimbriate-barbate; anthers blue, narrowly ellipsoid to cylindrical, 1.2–3.2 mm. Ovary horizontally grooved. Style indistinct; stigma lobes ellipsoid to suborbicular. Capsules ovoid-ellipsoid, as long as persistent corolla. Seeds dark brown, broadly ellipsoid to subglobose, 0.9–1.1 mm, longitudinally rugose. Fl. and fr. Jul-Sep.

• Moist places, swamp meadows, scrub, alpine meadows; 3000–4200 m. NE Qinghai.

15. *Swertia wolfgangiana* Grüning, Repert. Spec. Nov. Regni Veg. 12: 309. 1913.

华北獐牙菜 hua bei zhang ya cai

Swertia obtusipetala Grüning.

Perennials 8–55 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves 1 or 2 pairs; petiole flattened, 2.5–6 cm, base connate; leaf blade oblong to elliptic, 2–9 × 1–3 cm, base narrowed, apex obtuse to rounded, veins 3–5. Stem leaves 1 or 2 pairs, sessile, bractlike, ovate-oblong, 1.5–3 cm × 5–10 mm, base obtuse and subamplexicaul, apex obtuse, veins 1–3. Inflorescences racemelike, (1–)3–9-flowered. Flowers 5-merous. Pedicel spreading to erect, 2–5 cm. Calyx lobes ovate-lanceolate, 0.8–1.3 cm × 3–5 mm, margin membranous, apex acute. Corolla pale yellow-green, blue in middle of outer surface, 1.5–3 cm in diam., tube 1.5–2 mm; lobes oblong to elliptic, 1.5–2 cm, apex obtuse to rounded and erose. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 3–4 mm. Filaments 0.8–1.2 cm, base short fimbriate-barbate; anthers blue, ellipsoid, 3–4 mm. Style indistinct; stigma lobes ellipsoid to suborbicular. Capsules ellipsoid, as long as persistent corolla. Seeds dark brown, ellipsoid, 1–1.2 mm, longitudinally rugose. Fl. and fr. Jul-Sep.

• Moist places, swamp meadows, scrub, alpine meadows; 1500–5300 m. S Gansu, W Hubei, Qinghai, Shanxi, Sichuan, E Xizang.

16. *Swertia cuneata* Wallich ex D. Don, London Edinburgh Philos. Mag. & J. Sci. 8: 77. 1836.

楔叶獐牙菜 xie ye zhang ya cai

Swertia asterocalyx T. N. Ho & S. W. Liu.

Perennials 15–30 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Leaves mostly

basal; petiole winged, 1.2–3 cm; leaf blade spatulate to obovate, 1.5–3.5 × 0.9–1.2 cm, base narrowed and decurrent into wings of petiole, apex rounded, veins 3–7, arcuate. Middle to upper stem leaves 2 or 3 pairs, sessile or short petiolate; leaf blade narrowly elliptic, 2–5.5 cm × 6–11 mm, base narrowed, apex obtuse, veins 3–5. Inflorescences racemelike, 5–7-flowered. Flowers 5-merous. Pedicel spreading, 2.7–7 cm. Calyx lobes usually spreading, oblong-spatulate to elliptic, 6–9 mm, base usually distinctly contracted into a claw, margin dark brown and slightly revolute, apex rounded. Corolla pale blue, 2–3 cm in diam.; tube 1.5–2 mm, base bearing 5 bundles of yellow hairs; lobes ovate-elliptic, 1.5–2 cm, apex obtuse. Nectaries 2 per corolla lobe, linear-oblong, radially elongated, with pilose fimbriae 2.5–3 mm. Filaments 9–10 mm; anthers ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 0.9–1.2 cm. Seeds brown, subglobose, ca. 2 mm; seed coat reticulate. Fl. and fr. Sep-Oct.

Alpine meadows; 3600–4700 m. SW Xizang [W India, Nepal, Sikkim].

17. *Swertia kingii* J. D. Hooker, Hooker's Icon. Pl. 15: 34. 1883.

黄花獐牙菜 huang hua zhang ya cai

Perennials 70–100 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, robust, striate, simple, base sheathed by blackish remains of old petioles. Basal and lower stem leaves long petiolate; petiole flattened, 5–13 cm, base connate; blade broadly elliptic, 17–31 × 5–9 cm, base narrowed, apex obtuse, veins 7–9. Middle to upper stem leaves many pairs, sessile or short petiolate; leaf blade ovate-lanceolate to ovate, 3–10 × 0.7–4 cm, base obtuse, apex acute to obtuse, veins 3–7. Inflorescences narrow, dense, interrupted, many-flowered thyrses ca. 25 cm. Flowers 5-merous. Pedicel spreading to erect, to 3 cm, robust. Calyx lobes ovate-lanceolate, 1.1–1.3 cm, margin sparsely serrulate, apex acute. Corolla pale yellow-green, with blue streaks, 2–2.5 cm in diam., tube 1.5–2 mm; lobes oblong to obovate-oblong, 1.5–1.7 cm, apex obtuse to rounded and erose. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 2–3 mm. Filaments 8–10 mm; anthers blue, ellipsoid, 3–3.5 mm. Style indistinct; stigma lobes suborbicular. Capsules cylindrical to ovoid, 1–1.8 cm. Seeds brown, longitudinally rugose. Fl. Aug-Sep.

Alpine meadows; 3400–3800 m. S Xizang [Nepal].

18. *Swertia endotricha* Harry Smith, Notes Roy. Bot. Gard. Edinburgh 26: 256. 1965.

直毛獐牙菜 zhi mao zhang ya cai

Perennials 15–20 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves petioles flattened, 3–5 cm, base connate; leaf blade oblong to elliptic, 3–5 × 1.7–2 cm, base narrowed, apex obtuse, veins 3–5. Stem leaves 3 or 4 pairs, sessile, narrowly ovate, 1–2.5 × 0.7–1.2 cm, base obtuse, apex acuminate to obtuse, veins 1–3. Inflorescences racemelike, 6–11-flowered. Flowers 5-merous. Pedicel erect, to 2.5 cm. Calyx lobes narrowly lanceolate, 1–

1.2 cm, apex acuminate, veins 3. Corolla blackish purple, 2.5–3 cm in diam., tube 1.5–2 mm; lobes lanceolate, 1.2–1.4 cm, apex acuminate, veins 3. Nectaries 2 per corolla lobe, widely spaced, cupular, pilose, base with erect fimbriae to 5 mm. Filaments ca. 7.5 mm; anthers ellipsoid, ca. 3 mm. Style indistinct; stigma lobes suborbicular. Fl. Aug.

- Hillsides. Yunnan (Jinsha Jiang valley).

19. *Swertia rotundiglandula* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 77. 1980.

圆腺獐牙菜 yuan xian zhang ya cai

Perennials 12–18 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves petioles flattened, 2–2.5 cm, base connate; leaf blade ovate, 3–3.5 cm, base obtuse and decurrent into wings of petiole, apex acute. Middle stem leaves sessile or short petiolate; leaf blade similar to basal leaves but smaller, 2–3 × 0.6–2.3 cm; upper leaves sessile, bractlike, narrowly oblong to elliptic, 1–1.2 cm × 4–5 mm. Inflorescences racemelike, (1- or) 2–5-flowered. Flowers 5-merous. Pedicel spreading, 2–4 cm. Calyx lobes lanceolate, 6–8 mm, apex acuminate, veins 3. Corolla pale yellow-green, with purple spots, 1.4–1.8 cm in diam., tube 1.5–2 mm; lobes obovate, 1.2–1.5 cm, base contracted into a claw, apex rounded. Nectaries 2 at middle of each corolla lobe, orbicular, close to each other, with inflexed fimbriae 1–2 mm. Filaments 5–6 mm, base few barbate; anthers ellipsoid, 2–2.5 mm. Ovary ellipsoid, 6–7 mm. Style indistinct; stigma lobes suborbicular. Fl. May–Jun.

- Hillsides; ca. 3100 m. Xizang–Yunnan border (Taxui Shan region).

20. *Swertia asarifolia* Franchet, Bull. Soc. Bot. France 46: 311. 1899.

细辛叶獐牙菜 xi xin ye zhang ya cai

Swertia atrovioleacea Harry Smith.

Perennials 12–25 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves petioles flattened, 2–2.5 cm, base connate; leaf blade ± spatulate, 3.5–6 × 1.5–3.3 cm, base narrowed, apex obtuse to rounded, veins 5–7, arcuate. Middle stem leaves sessile, oblong to ovate, 4–8 × 1.5–3.5 cm, base obtuse, apex acute to obtuse, veins 3–5; upper leaves sessile, bractlike, ovate, 1.5–2.5 cm × 4–12 mm, base rounded and subamplexicaul, apex obtuse, veins 1–3. Inflorescences many-flowered panicles. Flowers 5-merous. Pedicel bent near apex, 1.8–5 cm. Calyx lobes narrowly lanceolate, 6–8 mm, apex acuminate; veins 3–5, indistinct. Corolla dark purple, 1.4–1.8 cm in diam., tube 1.5–2 mm; lobes ovate-elliptic, 8–10 mm, base obtuse, apex obtuse and few dentate. Nectaries 2 per corolla lobe, orbicular, widely spaced to crowded, with inflexed fimbriae 1–2 mm. Filaments ca. 7 mm, base few barbate; anthers ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 0.8–1.2 cm. Seeds brown, longitudinally rugose. Fl. Aug–Sep.

- Grasslands, gravel slopes; 3400–4600 m. NW Yunnan.

21. *Swertia elata* Harry Smith, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 106. 1926.

高獐牙菜 gao zhang ya cai

Perennials 40–100 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves petioles flattened, 5–10 cm, base connate; leaf blade linear-elliptic to narrowly lanceolate, 10–16 × 2–3 cm, base narrowed and decurrent into wings of petiole, apex obtuse, veins 5–7. Middle stem leaves petiole flattened, 2–4 cm, connate; leaf blade 7–12 × 1.2–2 cm, base narrowed, apex acute, veins 3–5; upper leaves sessile, bractlike, linear to lanceolate, 1–3 × 0.7–1.2 cm, base obtuse and subamplexicaul, apex acuminate, veins 1–3. Inflorescences narrow, interrupted, many-flowered thyrses 21–45 cm. Flowers 5-merous. Pedicel nodding to erect, to 2 cm, terete, striate. Calyx lobes narrowly lanceolate, 6–8 mm, apex acuminate; veins 3–5, indistinct. Corolla dark purple, 1–1.3 cm in diam., tube 1.5–2 mm; lobes ovate-elliptic, 8–10 mm, base obtuse, apex obtuse and few dentate. Nectaries 2 at middle of each corolla lobe, orbicular, widely spaced to crowded, with inflexed fimbriae 1–2 mm. Filaments ca. 7 mm, base few barbate; anthers ellipsoid, 2–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 0.8–1.2 cm. Seeds brown, longitudinally rugose. Fl. and fr. Jun–Sep.

- Grasslands on hillsides, scrub, alpine meadows; 3200–4600 m. SW Sichuan, NW Yunnan.

22. *Swertia gyacaensis* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 77. 1980.

加查獐牙菜 jia cha zhang ya cai

Perennials 5–15 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal and lower stem leaves with petiole flattened, 1–1.7 cm, base connate; leaf blade linear-elliptic to lanceolate, 2–4 cm × 5–11 mm, base narrowed, apex obtuse, midvein distinct. Middle to upper stem leaves sessile, 1.2–3.5 cm × 3–8 mm, base obtuse and subamplexicaul, apex obtuse, midvein distinct. Inflorescences racemelike, 3–7 cm, (1–)3–7-flowered. Flowers 5-merous. Pedicel spreading to erect, blue-purple to purple, 1–2.2 cm. Calyx lobes linear to linear-lanceolate, 7–9 mm, margin pale blue, narrow, and membranous, apex acuminate; veins 3, indistinct. Corolla blue-purple, 1.5–2 cm in diam., tube 1.5–2 mm; lobes oblong, 0.9–1.3 cm, margin smooth or erose, apex acuminate. Nectaries 2 per corolla lobe, widely spaced to crowded, cupular, with pilose fimbriae 2.5–3 mm. Filaments 7–8 mm, base few barbate; anthers blue, narrowly ellipsoid, 2–2.5 mm. Ovary ovoid-ellipsoid, 6–7 mm. Style indistinct; stigma lobes suborbicular. Fl. Aug–Sep.

- Alpine meadows; ca. 4300 m. Xizang (Gyaca Xian).

23. *Swertia wardii* C. Marquand, J. Linn. Soc., Bot. 48: 208.

1929.

葶叶獐牙菜 wei ye zhang ya cai

Perennials 30–80 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves petioles flattened, 4–15 cm, base connate; leaf blade lanceolate to narrowly elliptic, 3.5–14 × 2–3 cm, base narrowed, apex acute to obtuse, veins 5–7. Stem leaves sessile or with connate short petioles; leaf blade lanceolate to narrowly elliptic, 1.5–10 × 0.5–1.8 cm, base obtuse to rounded, apex obtuse, midvein distinct. Inflorescences paniculate or racemelike. Flowers 5-merous. Calyx lobes lanceolate to ovate-lanceolate, 7–10 mm, margin narrow, white or pale blue, and membranous, apex acute, veins 3–5 outside. Corolla pale blue to pale blue gray, 1.4–1.6 cm in diam., tube 1.5–2 mm; lobes lanceolate to elliptic-lanceolate, (1–)1.3–1.5 cm, to 1.9 cm in fruit, margin erose, apex obtuse. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 2–2.5 mm. Filaments 8–9 mm, base few barbate; anthers blue, narrowly ellipsoid, 2.5–3 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 1.2–1.5 cm. Seeds dark brown, broadly ellipsoid, 1.3–1.6 mm, longitudinally rugose. Fl. and fr. Jul-Sep.

3800–5200 m. Xizang [Bhutan, Sikkim].

- 1a. Inflorescences paniculate; pedicel to 7.5 cm in fruit 23a. var. *wardii*
- 1b. Inflorescences racemelike; pedicel to 10 cm in fruit 23b. var. *rigida*

23a. *Swertia wardii* var. *wardii*

葶叶獐牙菜 (原变种) wei ye zhang ya cai (yuan bian zhong)

Swertia phragmitiphylla T. N. Ho & S. W. Liu.

Inflorescences paniculate, many flowered, usually 20–40 cm. Pedicel spreading to somewhat arcuate, not rigid, 1.2–3 cm, elongated to 7.5 cm in fruit.

Swamps, scrub, forests, alpine meadows; 3800–5200 m. SE Xizang [Bhutan, Sikkim].

23b. *Swertia wardii* var. *rigida* (T. N. Ho & S. W. Liu) T. N. Ho, Novon 4: 372. 1994.

硬杆獐牙菜 ying gan zhang ya cai

Swertia phragmitiphylla T. N. Ho & S. W. Liu var. *rigida* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 79. 1980.

Inflorescences racemelike. Pedicel erect, rigid, to 10 cm in fruit.

• Scrub slopes. Xizang (Yadong Xian).

24. *Swertia tibetica* Batalin, Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 175. 1895.

大药獐牙菜 da yao zhang ya cai

Perennials 30–100 cm tall. Rhizomes blackish, short,

with few slightly fleshy rootlets. Stems erect, robust, striate, simple, base sheathed by blackish remains of old petioles. Leaves mostly basal; petiole flattened, 2–7 cm, base connate; leaf blade narrowly oblong to elliptic-spatulate, 4.5–13.5 × 1–3.5 cm, base narrowed, apex acute to obtuse, veins 5–7(–9). Stem leaves 4–6 pairs, sessile or short petiolate with base connate; leaf blade elliptic-spatulate to ovate, 4–9 × 1–3 cm, base narrowed, apex acute, veins 3–5. Inflorescences racemelike, 5–7-flowered. Flowers 5-merous. Pedicel erect, 7–8.5 cm. Calyx lobes lanceolate, 1.7–2 cm, margin narrowly membranous, apex acuminate, veins 1–3. Corolla yellow, 2.5–3.5 cm in diam., tube 1.5–2 mm; lobes oblong to ovate-oblong, 2.5–2.8 cm, apex obtuse and erose. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 2–2.5 mm. Filaments 1–1.2 cm, base few barbate; anthers narrowly ellipsoid, 2–3 mm. Style indistinct; stigma lobes suborbicular. Capsules narrowly ellipsoid, 2–2.5 cm. Seeds brown, broadly ellipsoid, longitudinally rugose, winged on edges. Fl. and fr. Jul-Nov.

• Stream-sides, grasslands on hillsides, gravel slopes, forests, forest margins; 3200–4800 m. W Sichuan, NW Yunnan.

25. *Swertia younghusbandii* Burkill, J. Proc. Asiat. Soc. Bengal 2: 325. 1906.

少花獐牙菜 shao hua zhang ya cai

Perennials 5–30 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Basal leaves petioles flattened, 1–2.5 cm, base connate; leaf blade linear-elliptic, 2.5–4.5 cm × 6–8 mm, base narrowed, apex obtuse, veins 1–3. Stem leaves sessile, 2.5–6 cm × 3–7 mm, base obtuse to rounded and subamplexicaul, apex obtuse, midvein distinct. Flower solitary and terminal, rarely 2 or 3(–6) in apparent raceme, 5-merous. Pedicel purple, erect, 3.5–10.5 cm. Calyx lobes linear to linear-lanceolate, 1.1–2 cm, apex acuminate, veins 1–3. Corolla yellow, blue in middle of outer surface, 2.5–3.2 cm in diam., tube 1.5–2 mm; lobes elliptic to ovate-elliptic, 2–2.5 cm, apex obtuse to rounded. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 4.5–5 mm. Filaments 1–1.2 cm, base few barbate; anthers blue, ellipsoid, 2.5–3 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 0.8–1.2 cm. Fl. Sep.

Scrub meadows, alpine meadows; 4300–5400 m. S and SE Xizang [Sikkim].

26. *Swertia souliei* Burkill, J. Proc. Asiat. Soc. Bengal 2: 326. 1906.

康定獐牙菜 kang ding zhang ya cai

Swertia pauciflora Harry Smith; *S. subspeciosa* Burkill.

Perennials 8–35 cm tall. Rhizomes blackish, short, with few slightly fleshy rootlets. Stems erect, striate, simple, base sheathed by blackish remains of old petioles. Leaves mostly basal; petiole flattened, 3–7 cm, base connate; leaf blade linear-elliptic to narrowly elliptic, 3–10 cm × 5–13 mm, base narrowed, apex obtuse, veins 3–5. Stem leaves 2 or 3 pairs, sessile, ovate-lanceolate, 1.4–4.5 cm × 4–8 mm, base obtuse and subamplexicaul, apex acute to obtuse, veins 1–3.

Inflorescences racemelike, 5–11(–15)-flowered. Flowers 5-merous. Pedicel erect, 1–4.5 cm. Calyx lobes lanceolate, 0.9–1.4 cm, apex acuminate, veins 3–5. Corolla yellow, 2–2.6 cm in diam., tube 1.5–2 mm; lobes lanceolate, 1.6–2 cm, base obtuse, apex caudate and sometimes erose. Nectaries 2 per corolla lobe, cupular, with pilose fimbriae 3–4 mm. Filaments 8–11 mm, base few barbate; anthers blue, narrowly ellipsoid, 2–3 mm. Style indistinct; stigma lobes broadly ellipsoid. Capsules ellipsoid, as long as persistent corolla. Seeds light brown, broadly ellipsoid to subglobose, 1.2–1.5 mm, longitudinally rugose, both ends winged. Fl. and fr. Aug.

- Alpine meadows; 3700–4400 m. W Sichuan.

27. *Swertia multicaulis* D. Don, Prodr. Fl. Nepal. 128. 1825.

多茎獐牙菜 duo jing zhang ya cai

Perennials 8–12 cm tall. Taproot 5–10 mm in diam. Stems ascending, many, cespitose, striate, simple; caudex sheathed by blackish remains of old petioles. Leaves mostly basal, in a rosette; petiole flattened, 5–10 mm, base connate; leaf blade spatulate to oblong-spatulate, 1.5–3.5 cm × 5–12 mm, base narrowed, margin scabrous, apex obtuse to rounded, veins 3–7 distinct and arcuate. Stem leaves 1 or 2 pairs, sessile, bractlike, elliptic, 7–10 × 3–5 mm, both ends obtuse, midvein distinct. Inflorescences racemelike or umbel-like. Flowers 4-merous. Calyx lobes lanceolate to oblong, 5–7 mm, margin scabrous, apex acute to obtuse, midvein distinct. Corolla pale blue to purple, 1.5–2.2 cm in diam., tube 1.5–2 mm; lobes oblong, (0.8–)1–1.2 cm, apex obtuse. Nectaries 1 per corolla lobe, oblong to rhomboid, margin raised with erect stiff fimbriae 2–2.5 mm. Filaments 5–7 mm; anthers dark blue, ovoid, 1.5–2.5 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 1.2–1.5 cm. Seeds brown, subglobose, almost smooth. Fl. and fr. Jun-Sep.

3600–4700 m. Xizang [Bhutan, Nepal, Sikkim].

- 1a. Pedicel 2–4.5 cm 27a. var. *multicaulis*
1b. Pedicel to 6.5 cm 27b. var. *umbellifera*

27a. *Swertia multicaulis* var. *multicaulis*

多茎獐牙菜 (原变种) duo jing zhang ya cai
(yuan bian zhong)

Inflorescences racemelike, 1–3- (or 4)-flowered. Pedicel spreading, 2–4.5 cm.

Alpine meadows; 3600–4400 m. S Xizang [Bhutan, Nepal, Sikkim].

27b. *Swertia multicaulis* var. *umbellifera* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 79. 1980.

伞花獐牙菜 san hua zhang ya cai

Inflorescences umbel-like, 5–7-flowered. Pedicel to 6.5 cm.

- Alpine meadows; 4300–4700 m. SW Xizang.

28. *Swertia scapiformis* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 80. 1980.

花亭獐牙菜 hua ting zhang ya cai

Perennials 5–7 cm tall. Taproot 7–10 mm in diam. Stems ascending, many, scapiform, cespitose, striate, simple, naked, papillate along striae; caudex sheathed by blackish remains of old petioles. All leaves basal, in a rosette, short petiolate; leaf blade oblong-spatulate, 1.5–3 cm × 3–5 mm, base narrowed, margin ciliolate, apex obtuse, veins 1–3. Flowers solitary on naked scape, 4-merous. Calyx lobes elliptic-spatulate, 8–10 mm, margin ciliolate, apex obtuse and with a recurved tip, midvein distinct. Corolla dark blue to blue-purple, 1.5–2.2 cm in diam., tube 1.5–2 mm; lobes oblong, 1–1.2 cm, apex obtuse and emarginate. Nectaries 1 per corolla lobe, rhomboid, margin raised and with inflexed stiff fimbriae 1–1.5 mm. Filaments ca. 8 mm; anthers yellow, ellipsoid, ca. 2 mm. Ovary ovoid-ellipsoid to ellipsoid, ca. 8 mm. Style indistinct; stigma lobes suborbicular. Fl. Aug.

- Hilltops; 4500–4600 m. Xizang (Cona Xian).

29. *Swertia conaensis* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 81. 1980.

错那獐牙菜 cuo na zhang ya cai

Perennials 5–7 cm tall. Taproot 7–10 mm in diam. Stems ascending, many, scapiform, cespitose, striate, simple, naked, puberulent along striae; caudex sheathed by blackish remains of old petioles. All leaves basal, in a rosette; petiole 5–6 cm; leaf blade oblong-spatulate, puberulent, base narrowed, margin ciliolate, apex obtuse to rounded, veins 3. Flowers solitary on naked scape, 4-merous. Calyx lobes narrowly oblong, 8–10 mm, puberulent, apex obtuse; veins 3, indistinct. Corolla dark blue, 1.2–1.4 cm in diam., tube 1.5–2 mm; lobes lanceolate, 8–10 mm, puberulent, apex obtuse and erose. Nectaries blue, 1 per corolla lobe, orbicular, reduced to a gland patch without raised margin or fimbriae. Filaments blue, 5–6 mm; anthers yellow, ellipsoid, ca. 1.5 mm. Ovary ovoid-ellipsoid to ellipsoid, ca. 6 mm. Style indistinct; stigma lobes suborbicular. Fl. Aug.

- Hilltops; ca. 4600 m. Xizang (Cona Xian).

30. *Swertia splendens* Harry Smith, Bull. Brit. Mus. (Nat. Hist.), Bot. 4: 250. 1970.

光亮獐牙菜 guang liang zhang ya cai

Perennials ca. 40 cm tall. Taproot 7–10 mm in diam. Stems single, erect, robust, angular, sparsely puberulent along striae. Basal leaves petioles flattened, 8–12 cm, base connate; leaf blade spatulate to obovate, 8–12 × 4.5–5.5 cm, base narrowed, margin irregularly laciniate, apex obtuse to rounded, veins 7. Stem leaves in whorls of 3–6, sessile, bractlike, oblong to ovate, 2–4 × 1–1.5 cm, both ends obtuse, veins 3–5. Inflorescences a conical thyrse or verticillasterlike, many flowered, 3-whorled. Flowers 4-merous. Pedicel spreading, 1–2 cm, somewhat 4-angled. Calyx lobes broadly ovate to triangular-cordate, 1.3–1.6 cm × 8–10 mm, margin irregularly laciniate, apex acute, veins 1–3. Corolla brick red drying yellow-green, campanulate, tube 2–3 mm; lobes broadly obovate, 2.3–2.5 × ca. 2 cm, margin lacerate, apex rounded. Nectaries 1 per corolla lobe, orbicular, with ca. 1 mm inflexed fimbriae. Filaments 0.9–1.1 cm; anthers

ellipsoid, 2.5–3.5 mm. Ovary ovoid-ellipsoid, 1–1.2 cm. Style indistinct; stigma lobes suborbicular. Fl. Jul.

• Gravel slopes; ca. 4000 m. Xizang (Moindawang).

31. *Swertia verticillifolia* T. N. Ho & S. W. Liu, *Acta Phytotax. Sin.* 18: 81. 1980.

轮叶獐牙菜 lun ye zhang ya cai

Perennials 80–100 cm tall. Taproot stout. Stems single, erect, robust, 1.2–2.5 cm in diam., angular. Leaves mostly basal, in a rosette; petiole flattened, 4–6 cm, base connate; leaf blade spatulate, 4–7 × 2.5–3.5 cm, base narrowed, apex rounded, veins 5–7, arcuate. Stem leaves in whorls of 4–6, sessile or short petiolate; leaf blade elliptic to ovate-elliptic, to ca. 12 × 3.5 cm, base narrowed to obtuse, apex acuminate, veins 5–7, arcuate. Inflorescences verticillasterlike, many flowered. Flowers 4-merous, nodding. Pedicel to 6 cm, striate. Calyx lobes broadly elliptic to broadly ovate, 1–1.5 × 0.9–1.7 cm, base obtuse to subcordate and overlapping, apex rounded; veins 9–11, arcuate. Corolla pale yellow-green, with dark purple veins, campanulate, 3–3.5 cm in diam., tube 2–3 mm; lobes broadly obovate, 2–2.5 cm, margin irregularly crenulate, apex rounded to truncate. Nectaries 1 per corolla lobe, ovate-triangular, naked. Filaments 1.2–1.4 cm; anthers yellow, ellipsoid, 4–5 mm. Ovary ovoid-ellipsoid, 1–1.2 cm. Style indistinct; stigma lobes suborbicular. Capsules ovoid, 2.2–2.7 cm. Seeds dark brown, ellipsoid, ca. 2 mm, both ends winged. Fl. and fr. Jul-Sep.

• Scrub; 3800–4200 m. SE Xizang.

32. *Swertia hookeri* C. B. Clarke in J. D. Hooker, *Fl. Brit. India* 4: 127. 1883.

粗壮獐牙菜 cu zhuang zhang ya cai

Perennials 25–80 cm tall. Taproot stout. Stems single, erect, robust, 6–13 mm in diam., angular. Leaves mostly basal, in a rosette; petiole flattened, 1–2 cm, base connate; leaf blade elliptic-spatulate to oblong, 6–20 × 2–5 cm, base narrowed, apex rounded; veins 3–5, arcuate. Stem leaves in whorls of 3–6; sessile or short petiolate, base free or slightly connate; leaf blade ovate-spatulate, ovate-oblong, or ovate, 7.5–12 × 2–3 cm, apex acuminate to obtuse; veins 5–7, arcuate. Inflorescences verticillasterlike, many flowered. Flowers 4-merous, sometimes nodding. Pedicel erect, 3–5 cm, striate. Calyx lobes ovate-elliptic to ovate, 0.8–1.5 cm × 5–7 mm, base obtuse, apex acute, veins 1–3. Corolla pale blue-green to pale purple, with blue veins, campanulate, 2–2.5 cm in diam., tube 2–3 mm; lobes oblong to oblong-spatulate, 1.2–1.7 × 0.8–1.1 cm, apex rounded to truncate. Nectaries 1 per corolla lobe, orbicular, naked. Filaments 6–7 mm; anthers blue, ellipsoid, 2.5–3 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid, 1.2–1.8 cm. Seeds dark brown, compressed, ca. 3.2 mm in diam., discoid winged. Fl. and fr. Jul-Aug.

Meadows; 4000–4200 m. Xizang [Bhutan, Nepal, Sikkim].

33. *Swertia virescens* Harry Smith, *Bull. Brit. Mus. (Nat. Hist.)*, Bot. 4: 244. 1970.

绿花獐牙菜 lu hua zhang ya cai

Perennials 15–20 cm tall. Taproot stout. Stems single, erect, robust, angular. Leaves mostly basal, in a rosette; petiole flattened, to 1.5 cm, base connate; leaf blade oblong to spatulate, 5–10 × 1–4 cm, base narrowed, apex rounded, veins 5–7. Stem leaves in whorls of 3–6, sessile, ovate-oblong to ovate, 3–5 × 1–2 cm, apex obtuse, veins 3–5. Inflorescences verticillasterlike, many flowered. Flowers 4-merous. Pedicel nodding, striate, to 2 cm. Calyx lobes ovate, 5–10 × 4–8 mm, apex acute, veins 1–3. Corolla pale yellow-green, with purple veins, campanulate, 1.6–2 cm in diam., tube 2–3 mm; lobes cuneate-obovate, 1.5–2 cm × 5–10 mm, apex rounded and erose. Nectaries 1 per corolla lobe, orbicular, naked. Filaments 7–8 mm; anthers ovoid, 0.5–1 mm. Style indistinct; stigma lobes suborbicular. Capsules narrowly ovoid, 1.2–1.6 cm. Seeds ovoid, wingless. Fl. Jun.

Alpine meadows; 4300–4600 m. Xizang (Zayü Xian) [Bhutan].

34. *Swertia patens* Burkill, *J. Proc. Asiat. Soc. Bengal* 7: 82. 1911.

斜茎獐牙菜 xie jing zhang ya cai

Pleurogyne mairei H. Léveillé; *P. mairei* var. *rubropunctata* H. Léveillé; *P. vaniotii* H. Léveillé.

Perennials 10–15 cm tall. Roots 3–4 mm in diam., fibrous. Stems ascending, 5–7-cespitose, subquadrangular, narrowly winged and papillate on angles, simple. Leaves mostly basal, crowded in a rosette, short petiolate; leaf blade narrowly spatulate to oblanceolate, 1.5–6.5 cm × 4–5 mm including petiole, base narrowed, apex obtuse, midvein distinct. Stem leaves sessile or short petiolate; leaf blade narrowly linear, narrowly elliptic, or spatulate, 1.5–3.8 cm × 2–4 mm, base narrowed, apex acuminate to obtuse, midvein distinct. Cymes terminal and axillary, few flowered. Flowers 4-merous. Pedicel erect, 1–2.2 cm, thick. Calyx lobes green, bractlike, base rounded to cordate, apex acuminate, unequal; 2 lobes ovate-lanceolate, 2–2.8 cm × 5–9 mm; other 2 lobes lanceolate, 1–2 cm × to 5 mm; veins 3–7, indistinct. Corolla white, with purple veins, 2.5–3 cm in diam., tube 1–2 mm; lobes ovate-oblong, 1.3–1.5 cm × to 6 mm, apex obtuse and mucronate. Nectaries 2 per corolla lobe, pocket-shaped, with a triangular scale and many short fimbriae. Filaments ca. 7 mm; anthers blue, ellipsoid, ca. 2.5 mm. Ovary ovoid-ellipsoid, 8–10 mm. Style short, distinct; stigma lobes capitate. Fl. Jul-Aug.

• Grassland slopes; 1100–2600 m. S Sichuan, NE Yunnan.

35. *Swertia luquanensis* S. W. Liu in T. N. Ho, *Novon* 4: 372. 1994.

禄劝獐牙菜 lu quan zhang ya cai

Perennials 5–6(–18) cm tall. Roots 3–4 mm in diam., fibrous. Stems prostrate to ascending, 5–7-cespitose, subquadrangular, narrowly winged and papillate on angles, simple. Leaves mostly basal, crowded in a rosette; petiole short; leaf blade linear-oblong, 2–6 cm × 2–3 mm including petiole, base narrowed, apex acute, midvein distinct. Stem leaves sessile, linear, to 3 cm × 2 mm, base narrowed, apex acuminate, midvein distinct. Inflorescences racemelike, few flowered. Flowers 4-merous. Pedicel erect, 7–12 mm, slender.

Calyx lobes not bractlike, lanceolate, 8–11 × 2–3 mm, unequal, both ends obtuse, margin scabrous and slightly revolute; veins 3, indistinct. Corolla pale yellow, ca. 1.5 cm in diam., tube 1–2 mm; lobes ovate, 8–9 × ca. 4 mm, apex acute. Nectaries 2 per corolla lobe, pocket-shaped, with a triangular scale and many short fimbriae. Filaments ca. 5 mm; anthers blue, ellipsoid, ca. 1.5 mm. Ovary ovoid-ellipsoid, 8–10 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid, ca. 8 mm. Seeds brown, subglobose; seed coat smooth.

• Grassland slopes; ca. 2500 m. NE Yunnan.

36. *Swertia dichotoma* Linnaeus, Sp. Pl. 1: 227. 1753.

歧伞獐牙菜 qi san zhang ya cai

Annuals 5–12 cm tall. Roots stout, fibrous. Stems ascending to erect, subquadrangular, narrowly winged on angles, dichotomously branched from base. Basal leaves with petiole 0.8–2 cm; leaf blade spatulate, 0.7–1.5 cm × 5–9 mm, base obtuse, apex rounded, veins 3–5. Stem leaves sessile or short petiolate; leaf blade ovate-lanceolate, 0.6–2.2 cm × 3–12 mm, base rounded to truncate, apex acute, veins 1–3. Flowers in forks of stems, 4-merous. Pedicel slender, somewhat nodding, 0.7–3 cm, 4-angled, narrowly winged on angles. Calyx lobes broadly ovate, 3–4 mm, margin scabrous, apex acute; veins 1–3, indistinct. Corolla white, sometimes with or without purple spots, tube ca. 0.5 mm; lobes ovate, 5–8 mm, apex obtuse. Nectaries 2 per corolla lobe, brown, orbicular, squamose, produced into a very short spur on back of corolla lobe. Filaments ca. 2 mm, base short fimbriate; anthers blue, ellipsoid, ca. 0.5 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid-ellipsoid. Seeds yellow, ellipsoid; seed coat smooth. Fl. and fr. May-Jul.

1000–3100 m. Gansu, Hebei, Heilongjiang, Hubei, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, N Sichuan, Xinjiang [Japan, Kazakhstan, Mongolia, Russia (Siberia)].

- 1a. Corolla without purple spots 36a. var. *dichotoma*
1b. Corolla with purple spots 36b. var. *punctata*

36a. *Swertia dichotoma* var. *dichotoma*

歧伞獐牙菜 (原变种) qi san zhang ya cai (yuan bian zhong)

Anagallidium dichotomum (Linnaeus) Grisebach, Gen. Sp. Gent. 312. 1839.

Corolla white, without spots.

Stream banks, slopes, forest margins; 1000–3100 m. Gansu, Hebei, Heilongjiang, Hubei, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, N Sichuan, Xinjiang [Japan, Kazakhstan, Mongolia, Russia (Siberia)].

36b. *Swertia dichotoma* var. *punctata* T. N. Ho & S. W. Liu in J. X. Yang, Fl. Tsinling. 1(4): 397. 1983.

紫斑歧伞獐牙菜 zi ban qi san zhang ya cai

Corolla white, with purple spots.

• Hillsides. S Shaanxi.

37. *Swertia shintenensis* Hayata, Icon. Pl. Formosan. 6: 31. 1916.

新店獐牙菜 xin dian zhang ya cai

Annuals 45–70 cm tall. Roots stout, fibrous. Stems erect, simple. Basal leaves with petiole flattened, 3–3.5 cm; leaf blade elliptic, 15–19 × 8–10 cm, base cuneate and decurrent into wings of petiole, apex acute; veins distinct, pinnate. Lower stem leaves with petiole to 2 cm; leaf blade elliptic, to 11 × 4 cm; middle to upper leaves sessile, ovate, to 7 × 3 cm, base cordate and subamplexicaul, apex acute, veins distinct. Inflorescences many-flowered thyrses, rounded, lax, spreading, to 45 cm. Flowers 4- or 5-merous, nodding. Pedicel 1.6–3 cm, slightly thickened at apex. Calyx tube 2–2.5 mm; lobes spreading, ovate to ovate-triangular, 3–3.5 mm, margin narrowly membranous, apex acute. Corolla pale yellow, with dark spots, 1.5–1.7 cm in diam., tube 3–3.5 mm; lobes narrowly oblong, 1.7–1.9 cm, apex acute. Nectaries 1 per corolla lobe, suborbicular, reduced to a naked gland patch. Filaments slightly flattened, 6–7 mm; anthers yellow, narrowly ellipsoid, ca. 5 mm. Style distinct, ca. 2 mm; stigma lobes capitate. Capsules ellipsoid, 1.7–1.9 cm. Seeds pale yellow, ellipsoid, ca. 0.5 mm; seed coat warty. Fl. and fr. Oct-Dec.

Forest margins; ca. 900 m. N Taiwan [Japan].

38. *Swertia cordata* (Wallich ex G. Don) C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 123. 1883.

心叶獐牙菜 xin ye zhang ya cai

Ophelia cordata Wallich ex G. Don, Gen. Hist. 4: 178. 1837.

Annuals 30–60 cm tall. Roots yellow, fibrous. Stems erect, subquadrangular, with wings on angles, branched. Basal leaves withered at anthesis. Stem leaves sessile, ovate to ovate-cordate, 0.8–2.3 × 0.5–1.2 cm, base cordate and subamplexicaul, margin scabrous, apex acute, veins 3–5. Inflorescences narrow, dense, many-flowered thyrses 13–40 cm. Flowers 5-merous. Pedicel 3–10 mm, striate. Calyx tube 1–2 mm; lobes lanceolate to ovate-lanceolate, 5.5–7 mm, margin scabrous and usually slightly revolute, apex acute, veins 3. Corolla pale purple, with dark purple veins, 1–1.5 cm in diam., tube 1–2 mm; lobes narrowly elliptic to elliptic-lanceolate, 8–10 mm, apex acute. Nectaries 1 per corolla lobe, rhomboid to orbicular, reduced to a naked gland patch. Filaments ca. 5 mm; anthers ellipsoid, ca. 5 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid-ellipsoid, 6–8 mm. Seed coat cristate. Fl. Sep-Oct.

Grassland slopes; 1700–4000 m. Xizang, Yunnan [Bhutan, E India, Kashmir, Myanmar, Nepal, Sikkim].

39. *Swertia bimaculata* (Siebold & Zuccarini) J. D. Hooker & Thomson ex C. B. Clarke, J. Linn. Soc., Bot. 14: 449. 1875.

獐牙菜 zhang ya cai

Ophelia bimaculata Siebold & Zuccarini, Abh. Math.-

Phys. Cl. Königl. Bayer. Akad. Wiss. 4(3): 159. 1846; *Silene esquirolii* H. Léveillé; *Swertia bimaculata* var. *macrocarpa* Nakai; *S. platyphylla* Merrill.

Annuals 30–140(–200) cm tall. Roots yellow, fibrous. Stems erect, 2–6 mm in diam., branched. Basal leaves withered at anthesis. Stem leaves sessile or short petiolate; leaf blade broadly elliptic to ovate-lanceolate, 3.5–9 × 1–4(–5) cm, base narrowly tapered to obtuse, apex acuminate; veins 3–5, arcuate. Inflorescences panicles of cymes, lax, spreading branched, many flowered, to 50 cm. Flowers 5-merous. Pedicel spreading to erect, 0.6–4 cm, stout, terete. Calyx tube 1–2 mm; lobes narrowly oblanceolate to narrowly elliptic, 3–6 mm, base narrowed, margin slightly revolute and membranous, apex acuminate; veins 3–5, indistinct. Corolla yellow or white, with purple spots, to 2.5 cm in diam., tube 1–2 mm; lobes oblong to elliptic, 1–1.5 cm, base narrowed, apex acuminate to acute. Nectaries 2 per corolla lobe, yellow-green, orbicular, reduced to a naked gland patch without raised margin. Filaments 5–6.5 mm; anthers ellipsoid, ca. 2.5 mm. Style indistinct; stigma lobes capitate. Capsules narrowly ovoid, to 2.3 cm. Seeds brown, globose; seed coat warty. Fl. and fr. Jun–Nov.

Beside streams, swamp, meadows, scrub, forests; 200–3000 m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan, Zhejiang [Bhutan, India, Japan, Malaysia, Myanmar, Nepal, Sikkim, Vietnam].

40. *Swertia matsudae* Hayata ex Satake, J. Jap. Bot. 17: 722. 1941.

细叶獐牙菜 xi ye zhang ya cai

Annuals to 80 cm tall. Roots yellow, fibrous. Stems erect, ca. 2.5 mm in diam., striate, branched. Leaves sessile or short petiolate; leaf blade linear-lanceolate to lanceolate, 3–6 cm × 4–7 mm including petiole, base obtuse, apex acuminate, veins 3. Inflorescences panicles of cymes, lax, spreading branched, many flowered. Flowers 5-merous. Pedicel spreading to erect, 1.5–2 cm, terete. Calyx tube 1–2 mm; lobes lanceolate to ovate-lanceolate, 4–5 mm, apex acuminate, veins 3 outside. Corolla yellow, tube 1–2 mm; lobes oblong, 7–8.5 mm, slightly crenate, apex acute. Nectaries 2 per corolla lobe, orbicular, reduced to a naked gland patch. Filaments ca. 3 mm; anthers ellipsoid, 1.5–2 mm. Style short, distinct; stigma lobes capitate. Capsules narrowly ovoid, ca. 1.3 cm. Seeds ellipsoid; seed coat smooth.

• Grassland slopes, forests; 2300–3000 m. Taiwan.

41. *Swertia oculata* Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 140. 1890.

鄂西獐牙菜 e xi zhang ya cai

Annuals 30–40 cm tall. Roots yellow, fibrous. Stems erect, subquadrangular, branched. Leaves sessile, linear to linear-lanceolate, 1.5–6 cm × 2–5 mm, base narrowed, margin slightly revolute, apex acuminate, midvein distinct. Inflorescences panicles of cymes, lax, spreading branched, many flowered, to 30 cm. Flowers 5-merous. Pedicel erect, to 3 cm, slender, subquadrangular. Calyx tube 1–2 mm; lobes linear to linear-oblong, 2–5 mm, unequal, apex obtuse, midvein slender. Corolla white, with yellow-green spots, 3–8

mm in diam., tube 1–2 mm; lobes elliptic-lanceolate, 5.5–6.5 mm, apex acuminate and apiculate. Nectaries 2 per corolla lobe, yellow-green, orbicular, reduced to a naked gland patch. Filaments ca. 3.5 mm; anthers ellipsoid, ca. 1 mm. Style short, distinct; stigma lobes capitate. Capsules narrowly ovoid, ca. 8 mm. Seeds brown, ellipsoid to globose, 1–1.5 mm in diam.; seed coat warty. Fl. and fr. Aug–Sep.

• Slopes, scrub; ca. 1500 m. Guizhou, W Hubei, E Sichuan.

42. *Swertia patula* Harry Smith in Handel-Mazzetti, Symb. Sin. 7: 986. 1936.

开展獐牙菜 kai zhan zhang ya cai

Annuals 5–15 cm tall. Roots yellow, fibrous. Stems ascending, striate, branched from base so whole plant is somewhat caespitose. Basal leaves withered at anthesis; petiole short; leaf blade oblanceolate to spatulate, 1–2.5 cm × 2–5 mm, base narrowed, apex obtuse, veins 1–3. Stem leaf blades linear to linear-lanceolate, 0.7–1.8 cm × 1.5–3 mm, base narrowed, apex acuminate, midvein distinct. Inflorescences usually reduced to a single flower, sometimes racemelike. Flowers 4-merous. Pedicel erect, 1.5–2 cm, terete, base with a pair of bractlets. Calyx tube 1–2 mm; lobes narrowly linear-lanceolate, 1–1.8 cm, apex acute and apiculate, midvein distinct. Corolla white, rarely pale purple, with purple veins, to 2.5 cm in diam., tube 1–2 mm; lobes spatulate-oblong to elliptic, 1.2–1.7 cm, base narrowed, apex rounded and mucronate. Nectaries 2 per corolla lobe, yellow-green, pocket-shaped with an orbicular scale, glabrous or with many tomentose short fimbriae. Filaments 6–8 mm; anthers blue, ellipsoid, ca. 2 mm. Ovary ovoid-ellipsoid, 6–7 mm. Style short, distinct; stigma lobes capitate. Fl. Jul–Sep.

• Gravel slopes, scrub, forest margins, forests; 1400–3400 m. SW Sichuan, NW Yunnan.

43. *Swertia leducii* Franchet, Bull. Soc. Bot. France 46: 316. 1899.

蒙自獐牙菜 meng zi zhang ya cai

Swertia mileensis T. N. Ho & W. L. Shi.

Annuals 15–45 cm tall. Roots yellow, fibrous. Stems basally erect, subquadrangular, branched throughout so whole plant is pyramidal. Leaves sessile, linear, narrowly oblong, or lanceolate, 0.4–4 cm × 2–4 mm, base narrowed, apex acute, veins 3. Flowers solitary, terminal, 4-merous. Pedicel erect, 0.4–3 cm, terete, base with a pair of bractlets. Calyx tube 1–2 mm; lobes linear-lanceolate, 6–10 mm, apex acute, primary veins 1–3. Corolla pale blue, ca. 1 cm in diam., tube 1–2 mm; lobes oblong to ovate-lanceolate, 7–12 mm, apex acute and apiculate. Nectaries 2 per corolla lobe, yellow-green, pocket-shaped with an orbicular scale and many minutely papillose short fimbriae. Filaments 4.5–6 mm; anthers blue, ellipsoid, 2–2.5 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid-ellipsoid to ellipsoid, to 1 cm. Seeds dark brown, ovoid, ca. 0.6 mm in diam. Fl. and fr. Sep–Nov.

• Grasslands on hillsides; 1300–1700 m. S Yunnan.

44. *Swertia angustifolia* Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 127. 1825.

狭叶獐牙菜 xia ye zhang ya cai

Annuals 20–80 cm tall. Roots yellow, fibrous. Stems erect, subquadrangular, narrowly winged on angles, branched. Leaves sessile, lanceolate to elliptic-lanceolate, 2–6 cm × 3–12 mm, both ends attenuate, veins 1–3. Inflorescences panicles of cymes, spreading branched, many flowered. Flowers 4-merous. Pedicel erect, 3–7 mm. Calyx tube 1–2 mm; lobes linear-lanceolate, 6–8 mm, apex acute, midvein 1–3. Corolla white or pale yellow, with brown spots, 8–9 mm in diam., tube 1–2 mm; lobes 4–6.5 mm, apex obtuse and apiculate. Nectaries 1 per corolla lobe, pocket-shaped, with an orbicular scale and many minutely hairy short fimbriae at apex of pocket. Filaments 3.5–4 mm; anthers ellipsoid, ca. 1 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid, 5–7 mm. Seeds brown, ellipsoid, ca. 0.6 mm. Fl. and fr. Aug–Nov.

100–3300 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Sikkim, Vietnam].

- 1a. Calyx longer than corolla at anthesis 44a. var. *angustifolia*
1b. Calyx ca. 2/3 as long as corolla at anthesis 44b. var. *pulchella*

44a. *Swertia angustifolia* var. *angustifolia*

狭叶獐牙菜 (原变种) xia ye zhang ya cai (yuan bian zhong)

Swertia angustifolia var. *hamiltoniana* Burkill.

Calyx longer than corolla at anthesis. Corolla lobes elliptic to ovate. Fl. and fr. Aug–Sep.

Edge of cultivated land, wastelands, grasslands; 100–3300 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Yunnan [Bhutan, Kashmir, Myanmar, Nepal, Sikkim, Vietnam].

44b. *Swertia angustifolia* var. *pulchella* (D. Don) Burkill, J. Proc. Asiat. Soc. Bengal 2: 375. 1906.

美丽獐牙菜 mei li zhang ya cai

Ophelia pulchella D. Don, London Edinburgh Philos. Mag. & J. Sci. 8: 77. 1836; *Swertia affinis* C. B. Clarke; *S. esquirolii* H. Léveillé; *S. vacillans* Maximowicz.

Calyx ca. 2/3 as long as corolla at anthesis. Corolla lobes ovate-oblong. Fl. and fr. Aug–Nov.

Edge of cultivated land, wastelands, grasslands; 100–3300 m. Fujian, Guangdong, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Yunnan [Bhutan, India, Kashmir, Nepal, Sikkim].

45. *Swertia nervosa* (Wallich ex G. Don) C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 125. 1883.

叶脉獐牙菜 ye mai zhang ya cai

Agathotes nervosa Wallich ex G. Don, Gen. Hist. 4: 177. 1837; *Swertia cavaleriei* H. Léveillé.

Annuals 30–100 cm tall. Roots yellow-brown, fibrous. Stems erect, 2–5 mm in diam., subquadrangular, narrowly

winged on angles, branched. Leaves sessile or subsessile, lanceolate, narrowly elliptic, or elliptic, 1.6–7.5 × 0.4–2.3 cm, both ends attenuate, veins 1–3. Inflorescences panicles of cymes, spreading branched, many flowered. Flowers 4-merous. Pedicel erect, 0.5–2 cm. Calyx tube 1–2 mm; lobes free, foliose, linear-lanceolate, 0.8–1.7 cm, apex acuminate, veins 3 and prominent. Corolla pale yellow-green, with purple veins, 1.5–1.8 cm in diam., tube 1–2 mm; lobes linear-lanceolate, 6–8 mm, apex obtuse and apiculate. Nectaries 1 per corolla lobe, pocket-shaped, with an orbicular scale, and many papillose, short fimbriae at apex of pocket. Filaments 4.5–6 mm; anthers yellow, ellipsoid, ca. 2 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid, 6–8 mm. Seeds dark brown, ellipsoid, ca. 0.6 mm; seed coat spongy. Fl. and fr. Sep–Dec.

Beside streams, hillsides, scrub, scattered forests; 400–2600 m. SE Gansu, Guangxi, Guizhou, SW Shaanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Sikkim].

46. *Swertia arisanensis* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 203. 1911.

阿里山獐牙菜 a li shan zhang ya cai

Swertia alata Hayata (1908), not (Royle ex D. Don) C. B. Clarke (1883).

Annuals to 90 cm tall. Roots yellow-brown, fibrous. Stems erect, to 8 mm in diam., subquadrangular, narrowly winged on angles, branched. Basal leaves withered at anthesis. Stem leaves sessile or subsessile, lanceolate to oblong, 4–8 × to 3 cm, thin herbaceous, base rounded, apex acute to obtuse, veins 3; uppermost leaves much smaller; leaf blade lanceolate, apex acuminate. Inflorescences panicles of cymes, spreading branched, many flowered. Flowers 4-merous. Pedicel erect, 0.5–1.5 cm, thickened apically, with narrow wings. Calyx tube 1–2 mm; lobes lanceolate, 5–10 mm, apex acuminate; veins 3, prominent. Corolla pale yellow-green, veins purple, tube 1–2 mm; lobes lanceolate, 6–8 mm, apex acuminate. Nectaries 1 per corolla lobe, pocket-shaped, with an orbicular scale and many, minutely hairy, short fimbriae at apex of pocket. Filaments ca. 3 mm; anthers ellipsoid, ca. 1 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid-ellipsoid, ca. 1 cm. Seeds brown, ovoid, ca. 0.6 mm; seed coat rugose. Fl. and fr. Oct–Nov.

• Forests; 2000–3000 m. C and E Taiwan.

47. *Swertia rosularis* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 83. 1980.

莲座獐牙菜 lian zuo zhang ya cai

Perennials 5–15 cm tall. Caudex blackish, with slender pale yellow and fibrous rootlets. Stems ascending to erect, slender, subquadrangular, simple. Leaves mostly basal, in a rosette, spatulate to obovate, 0.9–2.1 cm × 2–4 mm including long petiole, base narrowed, apex obtuse to rounded, midvein distinct. Stem leaves 2 or 3 pairs; petiole short; leaf blade spatulate to spatulate-elliptic, to 1.7 cm × 3 mm, base narrowed, apex obtuse to rounded, midvein distinct. Inflorescences panicles of cymes, many flowered, spreading branched. Flowers 5-merous. Pedicel erect, to 5 mm, slender. Calyx tube ca. 0.5 mm; lobes linear-subulate, ca. 2 mm, margin narrowly membranous, apex acuminate, midvein

indistinct. Corolla white, 2–3 mm in diam., tube ca. 0.5 mm; lobes lanceolate to ovate-lanceolate, 3–3.5 mm, apex acute. Nectaries 1 per corolla lobe, cupular, with a narrow scale, and few, long fimbriae. Filaments ca. 2 mm; anthers ovoid, ca. 0.5 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid, ca. 5 mm. Seeds dark brown, subglobose, ca. 0.3 mm; seed coat warty. Fl. and fr. Aug–Nov.

- Hillsides; 1200–1300 m. Sichuan (Emei Shan).

48. *Swertia tenuis* T. N. Ho & S. W. Liu, Fl. Reipubl. Popularis Sin. 62: 396. 1988.

细瘦獐牙菜 xi shou zhang ya cai

Swertia gracilis Franchet (1899), not Kunth (1818).

Annuals 8–30 cm tall. Roots yellow, slender, fibrous. Stems erect, slender, branched from middle. Basal leaves withered at anthesis. Stem leaves sessile; lower leaves oblong to elliptic, 0.9–1.5 cm × 1.5–2.5 mm, base narrowed, apex obtuse, midvein distinct; middle to upper leaves linear to linear-lanceolate, 5–12 × 1–2 mm, base narrowed, apex obtuse, midvein distinct. Inflorescences panicles of cymes, many flowered. Flowers 5-merous. Pedicel erect, filiform, 4–12 mm. Calyx tube ca. 0.5 mm; lobes linear, 2.5–4 mm, apex acuminate, midvein indistinct. Corolla pale blue, 3–5 mm in diam., tube ca. 0.5 mm; lobes ovate-oblong to ovate-lanceolate, 4–6 mm, apex acute. Nectaries 1 per corolla lobe, cupular, with a narrow scale, and few long fimbriae. Filaments ca. 3.5 mm; anthers ellipsoid, ca. 0.3 mm. Style short, distinct; stigma lobes capitate. Capsules ovoid, ca. 5 mm. Seeds light brown, subglobose, ca. 0.3 mm. Fl. and fr. Aug–Nov.

- Grassland slopes, forests; 1200–3500 m. S Sichuan, NW Yunnan.

49. *Swertia pianmaensis* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 82. 1980.

片马獐牙菜 pian ma zhang ya cai

Perennials 20–40 cm tall. Caudex blackish, stout, with few slender fibrous rootlets. Stems ascending to erect, slender, striate, branched from base. Leaves mostly basal; petiole short; leaf blade oblong, broadly obovate, or suborbicular, 1.5–6.5 × 1–3.5 cm, base narrowed, apex obtuse to rounded, veins 3–5. Stem leaves sessile, ovate, 1.3–2 × 0.6–1.3 cm, base rounded, apex acute, veins 1–3. Inflorescences panicles of cymes, many flowered, narrow. Flowers 4-merous. Pedicel erect, to 2.5 cm, slender. Calyx tube ca. 0.5 mm; lobes narrowly elliptic, 6–8 mm, apex acute; veins 1–3, indistinct. Corolla dark purple, 3–5 mm in diam., tube ca. 0.5 mm; lobes ovate, 6–8 mm, apex acute and caudate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale, and raised margin with many long fimbriae. Filaments 4–4.5 mm; anthers yellow, ellipsoid, ca. 1.2 mm. Style distinct, linear, ca. 2 mm; stigma lobes capitate. Capsules ovoid, ca. 5 mm. Seeds light brown, subglobose, ca. 0.3 mm. Fl. Jul.

- Forests. Yunnan (Lushui Xian).

50. *Swertia membranifolia* Franchet, Bull. Soc. Bot. France

46: 319. 1899.

膜叶獐牙菜 mo ye zhang ya cai

Annuals to 60 cm tall. Roots yellow, ca. 5 mm in diam. Stems erect, subquadrangular, narrowly winged on angles, branched from base. Basal leaves withered at anthesis; petiole flattened, ca. 3 cm; leaf blade oblanceolate to elliptic, 2–3.5 × 1–1.5 cm, thin herbaceous, base narrowed, apex acute to obtuse, veins 5 and prominent. Stem leaves sessile, narrowly elliptic to ovate-lanceolate, 1.5–8 × to 2 cm, thin herbaceous, base obtuse and subamplexicaul, apex acuminate, veins 3–5. Inflorescences panicles of cymes, many flowered, spreading, to 27 cm. Flowers 4-merous. Pedicel erect, 3–15 mm, to 2.5 cm for terminal flowers, slender. Calyx elongated in fruit, tube ca. 0.5 mm; lobes lanceolate to ovate-lanceolate, 2–3 mm, apex acute, veins 1–3 and indistinct. Corolla pale yellow-green, 3–5 mm in diam., tube ca. 0.5 mm; lobes ovate, 3–5 mm, apex acute and caudate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many long fimbriae. Filaments ca. 2 mm; anthers ovoid, ca. 1 mm. Style distinct, linear, ca. 2 mm; stigma lobes capitate. Capsules ovoid, 7–9 mm. Seeds light brown, subglobose, ca. 0.7 mm; seed coat smooth. Fl. and fr. Aug.

- Hillsides, wet and shady valleys; 2500–2700 m. NW Yunnan.

51. *Swertia macrosperma* (C. B. Clarke) C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 123. 1883.

大籽獐牙菜 da zi zhang ya cai

Ophelia macrosperma C. B. Clarke, J. Linn. Soc., Bot. 14: 448. 1875; *Swertia randaiensis* Hayata; *S. scandens* H. Léveillé.

Annuals 30–100 cm tall. Roots yellow, ca. 5 mm in diam. Stems erect, subquadrangular, narrowly winged on angles, branched from middle. Basal and lower stem leaves withered at anthesis, petiolate; leaf blade spatulate, 2–6.5 × to 1.5 cm, base narrowed, margin entire or denticulate, apex obtuse, veins 1–3. Middle stem leaves sessile, lanceolate, oblong, ovate, or rarely obovate, 0.4–4.5 × 0.3–1.5(–2) cm, base obtuse, apex acute, veins 3–5. Inflorescences panicles of cymes, many flowered, spreading branched. Flowers 5- or rarely 4-merous. Pedicel erect, 4–15 mm, slender. Calyx tube ca. 0.5 mm; lobes ovate-elliptic, 2.5–4 mm, apex acute, midvein distinct. Corolla white or pale blue, 3–5 mm in diam., tube ca. 0.5 mm; lobes elliptic, 4–8 mm, apex obtuse. Nectaries 2 per corolla lobe, cupular, with a narrow scale and few long fimbriae. Filaments 4–5 mm; anthers ellipsoid, ca. 1.5 mm. Style indistinct; stigma lobes capitate. Capsules ovoid, 5–6 mm. Seeds 3–4 per capsule, brown, ellipsoid to subglobose, 1.5–2 mm; seed coat smooth. Fl. and fr. Jul–Nov.

Beside streams, grasslands on hillsides, scrub, mixed forests, bamboo thickets; 1400–4000 m. Guangxi, Guizhou, Hubei, Sichuan, Taiwan, Yunnan [Bhutan, India, Myanmar, Nepal, Sikkim].

52. *Swertia zayuensis* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 84. 1980.

察隅獐牙菜 cha yu zhang ya cai

Annuals 15–25 cm tall. Roots yellow, slender. Stems

erect, 2–4 mm in diam., striate, branched. Basal leaves petioles flattened, 3.5–4.5 cm; leaf blade spatulate, 1.5–2 × to 1.3 cm, base narrowed, apex obtuse, veins 1–3. Stem leaves sessile, elliptic to ovate-elliptic, ca. 3 × 1.5 cm, base obtuse to cuneate, apex obtuse to rounded, veins 1–3. Inflorescences panicles of cymes, many flowered, spreading branched. Flowers 5-merous. Pedicel erect, to 6 mm, slender. Calyx tube ca. 0.5 mm; lobes elliptic to elliptic-spatulate, 2.5–4 mm, base narrowed, apex acute, veins indistinct. Corolla pale yellow-green, tinged pale purple, 3–5 mm in diam., tube ca. 0.5 mm; lobes ovate, 4–6 mm, apex acute and apiculate. Nectaries 2 per corolla lobe, cupular, with a narrow scale and many long fimbriae. Filaments ca. 3 mm; anthers blue, ovoid, ca. 1 mm. Ovary ovoid-ellipsoid, ca. 5 mm, with many ovules. Style indistinct; stigma lobes capitate. Fl. Jul.

• Shady slopes; 2400 m. Xizang (Zayü Xian).

53. *Swertia alba* T. N. Ho & S. W. Liu, *Acta Biol. Plateau Sin.* 1: 46. 1982.

白花獐牙菜 bai hua zhang ya cai

Annuals 15–40 cm tall. Roots yellow, ca. 5 mm in diam. Stems erect, 1–2 mm in diam., subquadrangular, branched. Basal leaves withered at anthesis. Stem leaves sessile, oblong, 1.5–3 × 0.6–1 cm, base obtuse and subamplexicaul, margin ciliolate, apex acute to rounded, veins 3. Inflorescences panicles of cymes, many flowered, narrow. Flowers 5-merous. Pedicel erect, 2–15 mm, slender. Calyx tube ca. 0.5 mm; lobes linear-lanceolate, 2–5 mm, margin ciliolate, apex acuminate, midvein distinct. Corolla white or pale yellow, 3–5 mm in diam., tube ca. 0.5 mm; lobes ovate-lanceolate, 4–6(–7) mm, apex acuminate and apiculate. Nectaries 2 per corolla lobe, cupular, with a narrow scale and many ca. 1 mm fimbriae. Filaments flattened, 2–2.5 mm; anthers ellipsoid, ca. 1.5 mm. Ovary ovoid-ellipsoid, 4–5 mm, with many ovules. Style indistinct; stigma lobes capitate. Fl. Aug.

• Hillsides; ca. 2500 m. Sichuan (Muli Zangzu Zishixian), Yunnan (Zhongdian Xian).

54. *Swertia tetrapetala* Pallas, *Fl. Ross.* 1(2): 99. 1789.

卵叶獐牙菜 luan ye zhang ya cai

Ophelia tetrapetala (Pallas) Grossheim; *Swertia wilfordii* A. Kerner.

Annuals 20–30 cm tall. Roots yellow, stout. Stems erect, 1–2 mm in diam., subquadrangular, branched. Basal leaves withered at anthesis. Stem leaves sessile, ovate-triangular, 1–2.7 × 0.4–1.5 cm, base cordate and subamplexicaul, apex acute, veins 3. Inflorescences panicles of cymes, many flowered, narrow. Flowers 4-merous. Pedicel erect, to 2 cm, slender. Calyx tube 1–1.5 mm; lobes linear-lanceolate, 5–7 mm, apex acute, midvein distinct. Corolla purple, 1.2–1.5 cm in diam., tube 1–1.5 mm; lobes elliptic, 6–8 mm, apex acute. Nectaries 2 per corolla lobe, radially elongated, margin raised with many compound fimbriae. Filaments 5–7 mm; anthers ellipsoid, ca. 1 mm. Style indistinct; stigma lobes capitate. Capsules ovoid-ellipsoid, 6–9 mm. Seeds subglobose; seed coat warty. Fl. Aug-Sep.

Meadows; ca. 700 m. Jilin (Changbai Shan) [Japan, Korea, E Russia].

55. *Swertia davidii* Franchet, *Nouv. Arch. Mus. Hist. Nat.*, sér. 2, 10: 72. 1887–88.

川东獐牙菜 chuan dong zhang ya cai

Swertia longipes Franchet.

Perennials (5–)15–60 cm tall. Rhizomes slender, with few rootlets. Stems ascending to erect, subquadrangular, narrowly winged on angles, branched. Basal and lower stem leaves petiolate; leaf blade linear-elliptic, 1.3–7 cm × 2–5 mm including petiole, base narrowed, apex obtuse, veins 1–3. Middle to upper stem leaves sessile or short petiolate; leaf blade linear, linear-lanceolate, or linear-elliptic, 1.5–3 cm × 1–3 mm, base obtuse, apex acuminate to obtuse, midvein distinct. Inflorescences panicles of cymes, many flowered, to 36 cm. Flowers 4-merous. Pedicel erect, 0.5–3.5 cm, slender. Calyx tube 1–1.5 mm; lobes linear-lanceolate, 5–7 mm, apex acuminate, veins 1–3. Corolla pale blue, with blue veins, 1.2–1.5 cm in diam., tube 1–1.5 mm; lobes ovate-lanceolate to ovate, 7–11 mm, apex acuminate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many long fimbriae. Filaments 5–7 mm; anthers ellipsoid, ca. 1 mm. Style indistinct; stigma lobes capitate. Capsules ellipsoid, 0.8–1.2 cm. Seeds subglobose; seed coat warty. Fl. Sep-Nov.

• Beside streams, wet places, meadows, mixed forests; 900–1200 m. W Hubei, W Hunan, E Sichuan, Yunnan (Jingdong Xian).

56. *Swertia kouitchensis* Franchet, *Bull. Soc. Bot. France* 46: 320. 1899.

贵州獐牙菜 gui zhou zhang ya cai

Swertia elongata T. N. Ho & S. W. Liu.

Annuals 30–60 cm tall. Roots yellow, stout. Stems erect, subquadrangular, narrowly winged on angles, branched. Leaves sessile or subsessile, lanceolate, ca. 5 × 1.5 cm, both ends attenuate, veins 1–3. Inflorescences panicles of cymes, many flowered, spreading. Flowers 4 (or 5)-merous. Pedicel erect, 4–15 mm, elongated to 6.5 cm in fruit. Calyx tube 1–1.5 mm; lobes unequal, narrowly elliptic, 0.7–2 cm, apex acute and apiculate, midvein distinct. Corolla pale yellow to pale yellow-green, 1–1.2 cm in diam., tube 1–1.5 mm; lobes elliptic to ovate-elliptic, 6–12 mm, apex acuminate and apiculate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many long fimbriae. Filaments 6–8 mm; anthers ellipsoid, ca. 0.8 mm. Style indistinct; stigma lobes capitate. Capsules ovoid, 1–1.3 cm. Seeds light brown, subglobose, 0.7–0.9 mm; seed coat smooth. Fl. and fr. Aug-Nov.

• Beside streams, grassland slopes, forests; 700–2000 m. S Gansu, Guizhou, Hubei, S Shaanxi, E Sichuan, NE Yunnan.

57. *Swertia mussoitii* Franchet, *Bull. Soc. Bot. France* 46: 316. 1899.

川西獐牙菜 chuan xi zhang ya cai

Annuals 15–60 cm tall. Roots yellow, stout. Stems erect, 2–5 mm in diam., subquadrangular, narrowly winged on

angles, branched from base so whole plant is pyramidal. Leaves sessile, narrowly lanceolate to ovate-lanceolate, 0.8–3.5 cm × 3–10 mm, base cordate and subamplexicaul, apex obtuse, midvein distinct. Inflorescences many-flowered panicles formed by whole plant. Flowers 4-merous. Pedicel erect, to 5 cm, subquadrangular. Calyx tube 1–1.5 mm; lobes linear-lanceolate to lanceolate, 4–7 mm, apex acute, veins 3. Corolla 0.8–1.3 cm in diam., tube 1–1.5 mm; lobes lanceolate, 7–9 mm, apex acuminate and apiculate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many long fimbriae. Filaments 6–8 mm; anthers ellipsoid, ca. 0.8 mm. Style indistinct; stigma lobes capitate. Capsules ovoid-ellipsoid, 0.8–1.4 cm. Seeds dark brown, ellipsoid to subglobose, 0.8–1 mm; seed coat reticulate. Fl. and fr. Jul-Oct.

• 1900–3800 m. SW Qinghai, NW Sichuan, E Xizang, Yunnan (Dêqên Xian).

- 1a. Corolla dark purple 57a. var. *mussotii*
1b. Corolla pale yellow-green to pale
yellow 57b. var. *flavescens*

57a. *Swertia mussotii* var. *mussotii*

川西獐牙菜 (原变种) chuan xi zhang ya cai (yuan
bian
zhong)

Corolla dark purple.

• Beside streams, hillsides, scrub, forests; 1900–3800 m. SW Qinghai, NW Sichuan, E Xizang, Yunnan (Dêqên Xian).

57b. *Swertia mussotii* var. *flavescens* T. N. Ho & S. W. Liu, Acta Biol. Plateau Sin. 1: 47. 1982.

黄花川西獐牙菜 huang hua chuan xi zhang ya cai

Corolla pale yellow-green to pale yellow.

• Beside streams, hillsides, scrub; 3500–3700 m. SW Qinghai, NW Sichuan.

58. *Swertia tozanensis* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30(1): 204. 1911.

塔山獐牙菜 ta shan zhang ya cai

Annuals 15–25 cm tall. Roots yellow, stout. Stems erect, slender, subquadrangular, branched. Leaves subsessile to short petiolate; leaf blade oblong-lanceolate to lanceolate, 1.5–3 cm × 5–7 mm, base narrowed, apex obtuse, veins pinnate. Inflorescences panicles of cymes, spreading branched, many flowered. Flowers 4-merous. Pedicel erect, 1–2 cm, subquadrangular. Calyx tube 1–1.5 mm; lobes slightly recurved, linear to linear-lanceolate, 3–5 mm, apex obtuse to acute, midvein distinct. Corolla white, pale blue, or pale blue-green, tube 1–1.5 mm; lobes oblong, 5–6 mm, apex obtuse to acute. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale, and raised margin with few fimbriae. Filaments 3–4 mm; anthers ovoid, ca. 0.8 mm. Style indistinct; stigma lobes capitate. Capsules ovoid-ellipsoid, 8–11 mm. Seeds brown, subglobose, 0.5–0.7 mm in diam.; seed coat warty. Fl. and fr. Aug-Nov.

• Forests; 2300–3500 m. Taiwan (Jiayi Xian).

59. *Swertia delavayi* Franchet, Bull. Soc. Bot. France 46: 323. 1899.

丽江獐牙菜 li jiang zhang ya cai

Annuals 10–40 cm tall. Roots yellow, stout. Stems erect, slender, subquadrangular, narrowly winged on angles, branched. Basal leaves withered at anthesis, short petiolate; leaf blade spatulate to oblong-spatulate, 1.5–3 cm × 6–7 mm including petiole, base narrowed, apex obtuse, midvein distinct. Stem leaves subsessile, linear to narrowly elliptic, 1.3–3.5 cm × 2–7 mm, base narrowed, apex acute, veins 1–3. Inflorescences usually reduced to a single flower. Flower 5-merous. Pedicel erect, 1.5–4 cm, stout. Calyx tube 2–3 mm; lobes bractlike, unequal, 3 ovate and 0.9–2.5 cm × 6–12 mm, 2 ovate-lanceolate and 0.7–1.6 cm × 3–4 mm, base cordate, apex obtuse, reticulate veins purple. Corolla blue-purple, 2.5–3 cm in diam., tube 2–3 mm; lobes ovate-oblong to ovate, 0.9–1.6 cm × 3–5 mm, apex obtuse. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale, and raised margin with many compound fimbriae. Filaments ca. 6 mm; anthers ellipsoid, ca. 2 mm. Ovary ellipsoid, 5–7 mm. Style ca. 2 mm; stigma lobes capitate. Fl. Aug-Oct.

• Gravel slopes, forests; 1900–4000 m. S Sichuan, NW Yunnan.

60. *Swertia decora* Franchet, Bull. Soc. Bot. France 46: 317. 1899.

观赏獐牙菜 guan shang zhang ya cai

Annuals 2–15 cm tall. Roots yellow, stout. Stems erect, slender, subquadrangular, narrowly winged on angles, branched. Basal and lower stem leaves short petiolate; leaf blade spatulate to elliptic, 0.7–1.3 cm × 2.5–5 mm including petiole, base narrowed, apex obtuse, midvein prominent. Upper stem leaves sessile, linear to linear-lanceolate, 0.6–1.8 cm × 1–3.5 mm, base narrowed, margin slightly revolute, apex acute, midvein prominent. Inflorescences usually reduced to a single flower. Flowers 5-merous. Pedicel erect, 1.2–6 cm, stout. Calyx tube 2–3 mm; lobes linear-lanceolate, 0.8–1.6 cm, equal, base obtuse, slightly revolute, apex acute, midvein prominent. Corolla rose, 2.5–3 cm in diam., tube 2–3 mm; lobes ovate-oblong to elliptic, 1.1–1.7 cm, apex rounded and mucronate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale, and raised margin with many compound fimbriae. Filaments 6–8 mm; anthers ellipsoid, ca. 2 mm. Ovary elliptic, 5–7 mm. Style ca. 2 mm; stigma lobes capitate. Fl. Aug-Nov.

• Grassland slopes; 1800–2900 m. S Sichuan, Yunnan.

61. *Swertia diluta* (Turczaninow) Benth & J. D. Hooker, Gen. Pl. 2: 817. 1876.

北方獐牙菜 bei fang zhang ya cai

Annuals 20–70 cm tall. Roots yellow, stout. Stems erect, 2–4 mm in diam., subquadrangular, narrowly winged on angles, branched. Leaves sessile, linear to linear-lanceolate,

1–4.5 cm × 2–9 mm, both ends attenuate, midvein prominent. Inflorescences panicles of cymes, many flowered, spreading branched. Flowers 5-merous. Pedicel erect, to 1.5 cm, 4-angled. Calyx tube 1–1.5 mm; lobes linear, 6–12 mm, apex acuminate, midvein distinct. Corolla white, pale blue, or pale lilac, 1–1.5 cm in diam.; tube 1–1.5 mm; lobes elliptic-lanceolate, 6–11 mm, apex acute. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many simple fimbriae. Filaments 6–8 mm; anthers ellipsoid, 1.5–2 mm. Style indistinct; stigma lobes capitate. Capsules ovoid, 1–1.2 cm. Seeds dark brown, ellipsoid, 0.6–0.8 mm; seed coat warty. Fl. Aug-Oct.

100–3100 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, N Sichuan, Xinjiang [Japan, Korea, Mongolia, Russia (Siberia)].

1a. Corolla pale blue 61a. var. *diluta*
1b. Corolla pale yellow 61b. var. *tosaensis*

61a. *Swertia diluta* var. *diluta*

北方獐牙菜 (原变种) bei fang zhang ya cai (yuan bian zhong)

Sczukinia diluta Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 13: 166. 1840; *Ophelia chinensis* Bunge ex Grisebach.

Corolla pale blue. $2n = 18, 20$, or 24 .

Edges of cultivated land, wet and shady slopes, valleys; 100–2600 m. Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, N Sichuan, Xinjiang [Japan, Korea, Mongolia, Russia].

61b. *Swertia diluta* var. *tosaensis* (Makino) H. Hara, J. Jap. Bot. 25: 89. 1950.

日本獐牙菜 ri ben zhang ya cai

Swertia tosaensis Makino, Bot. Mag. (Tokyo) 17: 54. 1903.

Corolla pale yellow. $2n = 20$.

Hillsides; 800–3100 m. Hebei, Nei Mongol, Ningxia, NE Qinghai, Shaanxi, Shandong, Shanxi [Japan, Korea].

62. *Swertia pseudochinensis* H. Hara, J. Jap. Bot. 25: 89. 1950.

瘤毛獐牙菜 liu mao zhang ya cai

Annuals 10–15 cm tall. Roots yellow, stout. Stems erect, 2–3 mm in diam., subquadrangular, narrowly winged on angles, branched. Leaves sessile, linear to linear-lanceolate, ca. 3.5 cm × 6 mm, both ends attenuate, midvein prominent. Inflorescences panicles of cymes, many flowered, spreading. Flowers 5-merous. Pedicel erect, to 2 cm, 4-angled. Calyx tube 1–1.5 mm; lobes linear, to 1.5 cm, apex acuminate, midvein distinct. Corolla blue-purple, with dark blue veins, 1.5–2 cm in diam., tube 1–1.5 mm; lobes lanceolate, 0.9–1.6 cm, apex acuminate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale, and raised margin with many long compound fimbriae. Filaments 6–8 mm; anthers

narrowly ellipsoid, 2.5–3 mm. Style indistinct; stigma lobes capitate. Fl. Aug-Sep.

Beside streams, hillsides, scrub, forests; 500–1600 m. Hebei, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi [Japan, Korea].

63. *Swertia yunnanensis* Burkill, J. Proc. Asiat. Soc. Bengal 2: 320. 1906.

云南獐牙菜 yun nan zhang ya cai

Annuals 5–40 cm tall. Roots yellow, stout. Stems erect, subquadrangular, narrowly winged on angles, branched. Basal and lower stem leaves subsessile, lanceolate, rarely oblanceolate, 7–12 × 2–3.5 mm, base narrowed, apex obtuse, midvein distinct. Middle to upper stem leaves sessile, linear to linear-lanceolate, 0.3–1.7 cm × 0.5–3 mm, both ends attenuate, midvein distinct. Inflorescences panicles of cymes, many flowered, spreading. Flowers 5-merous. Pedicel erect, 6–13 mm, filiform. Calyx tube 1–1.5 mm; lobes linear, 4–7 mm, apex acuminate, midvein distinct. Corolla pale blue, 1–1.2 cm in diam., tube 1–1.5 mm; lobes elliptic, 7–12 mm, apex acuminate. Nectaries 2 per corolla lobe, triangular-lamellate, lacinate. Filaments 5–6 mm; anthers oblong, 1.5–2 mm. Ovary narrowly ellipsoid. Style indistinct; stigma lobes capitate. Fl. Sep-Oct.

• Grassland slopes, scrub, forests; 1100–3800 m. W Guizhou, Sichuan, Yunnan.

64. *Swertia hickinii* Burkill, J. Proc. Asiat. Soc. Bengal 2: 320. 1906.

浙江獐牙菜 zhe jiang zhang ya cai

Annuals 15–35 cm tall. Roots yellow, stout. Stems erect, subquadrangular, narrowly winged on angles, branched. Leaves subsessile, lanceolate, linear-elliptic, or spatulate, 0.7–2.6 cm × 1–7 mm, base narrowed, apex acute, midvein distinct. Inflorescences panicles of cymes, many flowered, spreading. Flowers 5-merous. Pedicel erect, 7–11 mm, slender. Calyx tube 1–1.5 mm; lobes linear-lanceolate, 3–6 mm, apex acuminate, midvein distinct. Corolla white, rarely pale blue, 1–1.2 cm in diam., tube 1–1.5 mm; ovate-lanceolate to ovate, 5–9 mm, apex obtuse. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many 3–5 mm fimbriae. Filaments 4–5 mm; anthers ellipsoid, 1–1.5 mm. Ovary ovoid, 4.5–5.5 mm. Style indistinct; stigma lobes capitate. Fl. Oct-Nov.

• Edges of cultivated land, grasslands, forests, valleys; 100–1600 m. Anhui, Fujian, Guangxi, Hunan, Jiangsu, Jiangxi, Zhejiang.

65. *Swertia binchuanensis* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 84. 1980.

宾川獐牙菜 bin chuan zhang ya cai

Annuals 20–45 cm tall. Roots yellow, stout. Stems erect, 2–3 mm in diam., subquadrangular, narrowly winged on angles, branched. Basal leaves withered at anthesis. Stem leaves sessile, lanceolate to ovate-lanceolate, 2–3.2 cm × 6–10 mm, base obtuse and subamplexicaul, margin ciliolate and slightly revolute, acute, veins 3. Inflorescences panicles of

cymes, many flowered, spreading. Flowers 5-merous. Pedicel erect, 0.5–2.5 cm, subquadrangular. Calyx tube 1–1.5 mm; lobes lanceolate, 6–11 mm, margin ciliate and slightly revolute, apex acuminate and apiculate, veins 3. Corolla yellow, 1.5–1.7 cm in diam., tube 2–3 mm; lobes ovate-lanceolate, 1–1.3 cm, apex acuminate and apiculate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many long fimbriae. Filaments 4–5 mm; anthers ellipsoid, 1.5–2 mm. Ovary ovoid-ellipsoid, 5–8 mm. Style indistinct; stigma lobes capitate. Fl. Sep–Nov.

- Hillsides. Yunnan (Binchuan Xian).

66. *Swertia punicea* Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 140. 1890.

紫红獐牙菜 *zi hong zhang ya cai*

Annuals 15–80 cm tall. Roots yellow, stout. Stems erect, 2–7 mm in diam., subquadrangular, narrowly winged on angles, branched. Basal leaves withered at anthesis. Stem leaves sessile, linear-lanceolate, lanceolate, or narrowly elliptic, to 6 × 1.8 cm, base narrowed, apex acuminate to acute, veins 1–3 and prominent. Inflorescences panicles of cymes, many flowered, spreading. Flowers 5-merous. Pedicel erect, to 3.2 cm, subquadrangular. Calyx tube 1–1.5 mm; lobes linear-lanceolate to lanceolate, 4–7 mm, apex acuminate to acute, midvein distinct. Corolla yellow or dark purple, 0.8–1.2 cm in diam., tube 1–1.5 mm; lobes lanceolate, 6–10 mm, apex acuminate and apiculate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many long fimbriae. Filaments 4–6 mm; anthers ellipsoid, 1.5–2 mm. Style indistinct; stigma lobes capitate. Capsules ovoid-ellipsoid, 1.2–1.5 cm. Seeds pale yellow, ellipsoid, 0.5–0.6 mm; seed coat warty. Fl. and fr. Aug–Nov.

- 400–3800 m. Guizhou, W Hubei, Hunan, Sichuan, Yunnan.

1a. Corolla dark purple 66a. var. *punicea*
1b. Corolla yellow 66b. var. *lutescens*

66a. *Swertia punicea* var. *punicea*

紫红獐牙菜 (原变种) *zi hong zhang ya cai*
(yuan bian zhong)

Swertia duclouxii Burkill.

Corolla dark purple.

- Beside streams, grassland slopes, scrub, forests; 400–3800 m. Guizhou, W Hubei, Hunan, Sichuan, Yunnan.

66b. *Swertia punicea* var. *lutescens* Franchet ex T. N. Ho, Acta Biol. Plateau Sin. 1: 47. 1982.

淡黄獐牙菜 *dan huang zhang ya cai*

Corolla yellow.

- Beside streams, hillsides; 1900–3000 m. C and NW Yunnan.

67. *Swertia franchetiana* Harry Smith, Bull. Brit. Mus. (Nat. Hist.), Bot. 4: 251. 1970.

抱茎獐牙菜 *bao jing zhang ya cai*

Swertia stricta Franchet (1900), not Collett & Hemsley (1890).

Annuals 15–40 cm tall. Roots yellow, stout, fibrous. Stems erect, 2–7 mm in diam., subquadrangular, narrowly winged on angles, branched. Basal leaves withered at anthesis, long petiole; leaf blade spatulate, 1–1.5 cm, base narrowed, apex obtuse, midvein distinct. Stem leaves sessile, lanceolate to ovate-lanceolate, 1.5–3.7 cm × 2–8 mm, base auriculate and subamplexicaul as well as decurrent into narrow wings on stem, apex acuminate; veins 1–3, prominent. Inflorescences many-flowered panicles formed by whole plant. Flowers 5-merous. Pedicel erect, to 4 cm, stout, subquadrangular. Calyx tube 1–1.5 mm; lobes linear-lanceolate, 7–12 mm, apex acuminate, midvein distinct. Corolla pale blue, 1–1.2 cm in diam., gray, tube 1–1.5 mm; lobes lanceolate to ovate-lanceolate, 1–1.5 cm, apex acuminate and apiculate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale, and raised margin with many long fimbriae. Filaments 5–7 mm; anthers dark blue, linear, 2–2.5 mm. Style indistinct; stigma lobes capitate. Capsules ovoid-ellipsoid, 1.2–1.6 cm. Seeds pale yellow, subglobose, ca. 0.5 mm in diam.; seed coat reticulate. Fl. and Aug–Nov.

- Beside streams, hillsides, scrub, forest margins; 2200–3600 m. S Gansu, Qinghai, Sichuan, Xizang.

68. *Swertia fasciculata* T. N. Ho & S. W. Liu, Fl. Reipubl. Popularis Sin. 62: 403. 1988.

簇花獐牙菜 *cu hua zhang ya cai*

Swertia hypericoides Diels (1912), not Kunth (1818).

Annuals 15–40 cm tall. Roots yellow, fibrous. Stems erect, subquadrangular, branched. Basal leaves withered at anthesis. Stem leaves sessile, oblanceolate to oblong, 1–2.5 × 3–6 cm, base narrowed, margin slightly revolute, apex acute; veins 3, abaxially prominent. Inflorescences a narrow panicle, with many ± fascicled flowers. Flowers 5-merous. Pedicel erect, 3–5 mm, slender, subquadrangular. Calyx tube 1–1.5 mm; lobes lanceolate to narrowly oblong, 4–5 mm, margin ciliate and slightly revolute, apex acute and apiculate, midvein distinct. Corolla pale blue, tube 1–1.5 mm; lobes lanceolate, 5–7 mm, apex acuminate and apiculate. Nectaries 2 per corolla lobe, radially elongated, with a narrow scale and raised margin with many long fimbriae. Filaments 3–5 mm; anthers ellipsoid, 1–1.5 mm. Style indistinct; stigma lobes capitate. Capsules ovoid-ellipsoid, 7–10 mm. Seeds pale yellow, subglobose, 0.5–0.7 mm in diam., almost smooth. Fl. and fr. Jul–Nov.

- Hillsides, forest margins; 2500–3500 m. NW Yunnan.

69. *Swertia tetraptera* Maximowicz, Bull. Acad. Imp. Sci. Saint-Petersbourg 27: 503. 1881.

四数獐牙菜 *si shu zhang ya cai*

Swertia dimorpha Batalin; *S. pusilla* Diels.

Annuals 5–30 cm tall. Roots yellow, fibrous. Stems 1 to few, robust, erect, 2–3.5 mm in diam., subquadrangular, with larger flowers, and numerous weak branches from base, with flowers 1/4–1/3 as large as those of robust stems. Basal and

lower stem leaves withered at anthesis; petiole 1–5 cm; leaf blade oblong to elliptic, 0.9–3 × (0.8–)1–1.8 cm, thin herbaceous, base narrowed, apex obtuse, veins 3 and abaxially prominent. Middle to upper stem leaves sessile, ovate-lanceolate, 1.5–4 × 1–1.5 cm, base rounded and subamplexicaul, apex acute; veins 3–5, abaxially prominent. Inflorescences panicles of cymes, many flowered, spreading. Flowers 4-merous. Pedicel 0.5–6 cm, slender. Calyx lobes basally narrowed, apex acute, veins 3. Corolla pale yellow-green, sometimes tinged purple; lobes apically obtuse and erose. Nectaries 2 per corolla lobe, oblong, double door-shaped, each with a very narrow scale and few irregular divisions. Anthers yellow, ellipsoid. Style indistinct; stigma lobes capitate. Seeds pale yellow, subglobose, almost smooth. Flowers on robust stems: calyx tube 0.5–1 mm; lobes lanceolate to ovate-lanceolate, 6–8 mm. Corolla tube 0.5–1 mm; lobes ovate, 0.9–1.2 cm. Filaments 2–3.5 mm; anthers 0.5–1.5 mm. Capsules ovoid-ellipsoid, 1–1.4 cm. Seeds 1–1.2 mm. Flowers on weak branches: calyx tube 0.3–0.5 mm; lobes broadly ovate, 1.5–4 mm. Corolla tube 0.3–0.5 mm; lobes ovate, 2.5–5 mm. Filaments 2–3.5 mm; anthers 0.5–1.5 mm. Capsules broadly ovoid to subglobose, 4–5 mm. Seeds less than 0.1 mm. Fl. and fr. Jul-Sep.

• Beside streams, wet slopes, scrub, scattered forests; 2000–4000 m. Gansu, Qinghai, Sichuan, Xizang.

70. *Swertia hispidicalyx* Burkill, J. Proc. Asiat. Soc. Bengal 2: 321. 1906.

毛萼獐牙菜 mao e zhang ya cai

Annuals 5–25 cm tall. Roots yellow, fibrous. Stems procumbent to ascending, branched. Basal leaves withered at anthesis. Stem leaves sessile, lanceolate to narrowly elliptic, 0.9–1.5 cm × 2–5 mm, base obtuse and subamplexicaul, margin slightly revolute, apex obtuse, veins 1–3. Inflorescences many-flowered panicles formed by the whole plant. Flowers 5-merous. Pedicel erect, to 3.5 cm, subquadrangular. Calyx tube 1–1.5 mm; lobes ovate-lanceolate to ovate, 7–9 mm, apex acute, veins 3. Corolla pale purple, 1–1.2 cm in diam., tube 1–1.5 mm; lobes ovate, 7–11 mm, apex acute to obtuse. Nectaries 2 per corolla lobe, pocket-shaped and opening toward base of corolla, with a suborbicular scale and many short fimbriae. Filaments 5–7 mm, basally much enlarged, free; anthers ellipsoid, 1–1.5 mm. Style 3–4 mm, slender; stigma lobes capitate. Capsules ovoid-ellipsoid, 1.2–1.6 cm. Seeds dark brown, ellipsoid, 0.8–1 mm; seed coat smooth. Fl. and fr. Aug-Oct.

3400–5200 m. Xizang [Nepal].

- 1a. Margin of leaf blades and calyx lobes ciliate 70a. var. *hispidicalyx*
 1b. Margin of leaf blades and calyx lobes glabrous 70b. var. *minima*

70a. *Swertia hispidicalyx* var. *hispidicalyx*

毛萼獐牙菜 (原变种) mao e zhang ya cai (yuan bian zhong)

Margin of leaf blades and calyx lobes ciliate.

Beside streams, wet meadows, hillsides, alpine meadows; 3400–5200 m. Xizang [Nepal].

70b. *Swertia hispidicalyx* var. *minima* Burkill, J. Proc. Asiat. Soc. Bengal 2: 321. 1906.

小毛萼獐牙菜 xiao mao e zhang ya cai

Margin of leaf blades and calyx lobes glabrous.

• Beside streams, meadows, scrub; 3700–4800 m. SE and W Xizang.

71. *Swertia ciliata* (D. Don ex G. Don) B. L. Burtt, Notes Roy. Bot. Gard. Edinburgh 26: 272. 1965.

普兰獐牙菜 pu lan zhang ya cai

Ophelia ciliata D. Don ex G. Don, Gen. Hist. 4: 178. 1837; *O. purpurascens* Wallich ex D. Don.

Annuals 30–50 cm tall. Roots yellow, fibrous. Stems erect, subquadrangular, branched. Leaves sessile or short petiolate; leaf blade lanceolate to ovate-lanceolate, 0.8–4.5 × 0.3–2 cm, thin herbaceous, base obtuse, margin slightly revolute, apex acute, veins 3–5. Inflorescences panicles of cymes, many flowered, spreading. Flowers 5-merous. Pedicel erect, to 2.5 cm, filiform. Calyx tube 1–1.5 mm; lobes reflexed at anthesis, lanceolate, 5–7 × 1.5–2 mm, slightly unequal, margin and midvein dark purple, apex acuminate. Corolla dirty purple, with 2 purple spots above each nectary, 1–1.2 cm in diam., tube 1–1.5 mm; lobes spreading at anthesis, ovate-lanceolate, 6–7 mm, apex acuminate. Nectaries 1 per corolla lobe, horseshoe-shaped, naked. Filaments dark purple, 4–5 mm, basally much enlarged and connate; anthers blue-purple, ellipsoid, 1–1.5 mm. Style 3–4 mm, slender; stigma lobes capitate. Capsules ovoid, 7–10 mm. Seeds pale yellow, subglobose, 0.3–0.5 mm in diam.; seed coat smooth to warty. Fl. and fr. Jul-Sep. $2n = 20$.

Beside streams, hillsides; 3600–3700 m. SW Xizang [Afghanistan, India, Kashmir, Nepal, Sikkim].

72. *Swertia cincta* Burkill, J. Proc. Asiat. Soc. Bengal 2: 319. 1906.

西南獐牙菜 xi nan zhang ya cai

Swertia alboviolacea H. Léveillé; *S. purpurascens* (Wallich ex D. Don) C. B. Clarke var. *violaceocincta* Franchet.

Annuals 30–100(–150) cm tall. Roots yellow, fibrous. Stems erect, 3–5 mm in diam., branched. Basal leaves withered at anthesis. Stem leaves petioles short, puberulent; leaf blade lanceolate to elliptic-lanceolate, 2.5–7.5 × 0.5–2 cm, puberulent, both ends attenuate, margin ciliate, veins 3–5. Inflorescences panicles of cymes, many flowered, spreading, to 60 cm. Pedicel erect, 0.3–1.8 cm, terete, with puberulent striae; flower nodding, 5-merous. Calyx tube 1–1.5 mm; lobes ovate-lanceolate, 0.9–1.5 cm × 3–6 mm, slightly unequal, margin ciliate, apex acuminate and caudate, veins 1–3. Corolla pale yellow-green, with 2 blackish purple spots above each nectary, these sometimes joined into a ± continuous ring; tube 1–1.5 mm; lobes ovate-lanceolate, 0.7–1.4 cm, margin

ciliolate, apex acuminate and caudate. Nectaries 1 per corolla lobe, horseshoe-shaped, naked. Filaments 5–7 mm, basally much enlarged and connate; anthers narrowly ellipsoid, 2–2.5 mm. Style 3–4 mm, slender; stigma lobes capitate. Capsules ovoid-ellipsoid, 1.2–2.3 cm. Seeds pale yellow, ellipsoid, 0.9–1.1 mm; seed coat reticulate. Fl. and fr. Aug–Nov.

• Wet slopes, scrub, forests; 1400–3800 m. Guizhou, Sichuan, Yunnan.

73. *Swertia pubescens* Franchet, Bull. Soc. Bot. France 46: 313. 1899.

毛獐牙菜 mao zhang ya cai

Annuals 30–90 cm tall, whole plant puberulent. Roots yellow, fibrous. Stems erect, 2–3 mm in diam., striate, branched. Leaves sessile, ovate-lanceolate, 2–6 × 0.4–1.5 cm, base cordate and subamplexicaul, apex acute, veins 3–5. Inflorescences panicles of cymes, many flowered, spreading. Pedicel 0.5–2 cm, terete, with puberulent striae. Flowers nodding, 5-merous, 1.5–2 cm in diam. Calyx tube 1–1.5 mm; lobes bractlike, apically acute, 3–7-veined, unequal; 2 larger lobes ovate-lanceolate, 1–2 × to 1.5 cm; 3 smaller lobes linear-lanceolate to lanceolate, 8–10 × ca. 5 mm. Corolla white, with 2 blackish purple spots above each nectary, these sometimes joined into a ± continuous ring; tube 1–1.5 mm; lobes ovate-oblong, 1–1.5 cm, lacerulate, apex obtuse. Nectaries 1 per corolla lobe, horseshoe-shaped, naked. Filaments 7–9 mm, basally much enlarged but free, puberulent; anthers dark purple, narrowly ellipsoid, 2–2.5 mm. Ovary ovoid-ellipsoid, 8–9 mm. Style 3–4 mm, slender; stigma lobes capitate. Fl. Aug–Nov.

• Beside streams, hillsides, scrub; 2800–4100 m. NW Yunnan.

74. *Swertia paniculata* Wallich, Pl. Asiat. Rar. 3: t. 205. 1832.

宽丝獐牙菜 kuan si zhang ya cai

Swertia dilatata C. B. Clarke.

Annuals 80–120 cm tall. Roots yellow, fibrous. Stems erect, 1.5–4 mm in diam., striate, branched. Basal leaves withered at anthesis. Stem leaves subsessile, lanceolate, 2–5.5 cm × 4–14 mm, abaxially puberulent, adaxially sometimes glabrous, base obtuse, margin ciliolate, apex acuminate; veins 1–3, prominent. Inflorescences panicles of cymes, many flowered, spreading, to 70 cm. Pedicel erect, 0.6–1.5 cm,

terete, striate. Flower 5-merous. Calyx tube 1–1.5 mm; lobes ovate-lanceolate, 6–10 × 2–5 mm, slightly unequal, papillate, margin ciliolate, apex acuminate; veins 1–3, indistinct. Corolla pale yellow-green, with 2 blackish purple spots above each nectary, tube 1–1.5 mm; lobes ovate, 6–8 mm, apex acute. Nectaries 1 per corolla lobe, horseshoe-shaped, naked. Filaments 4–5 mm, basally much enlarged but free; anthers purple, ellipsoid, 1–1.5 mm. Style 2.5–3.5 mm, slender; stigma lobes capitate. Capsules ovoid, 8–10 mm. Seeds pale yellow, ellipsoid; seed coat smooth. Fl. and fr. Aug–Sep.

Scrub slopes, forests; 2800–3300 m. S and SW Xizang, Yunnan [Bhutan, India, Kashmir, Myanmar, Nepal, Sikkim].

75. *Swertia racemosa* (Wallich ex Grisebach) C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 124. 1883.

藏獐牙菜 zang zhang ya cai

Ophelia racemosa Wallich ex Grisebach, Gen. Sp. Gent. 319. 1839; *Kingdon-wardia codonopsidoides* C. Marquand; *K. racemosa* (Wallich ex Grisebach) T. N. Ho.

Annuals 8–40 cm tall. Roots yellow, fibrous. Stems dark purple, erect, striate, sometimes with ascending branches from lower and middle nodes. Leaves sessile, linear-lanceolate to lanceolate, 1.5–5 × 0.4–1.6 cm, base auriculate and subamplexicaul, margin ciliate, veins 1–3, strigose when young but becoming glabrous. Inflorescences panicles of cymes, many flowered, spreading. Flowers 5-merous. Pedicel erect, to 1 cm, terete, with puberulent striae. Calyx tube campanulate, 2.5–3.5 mm, densely strigose outside; lobes triangular-lanceolate, margin ciliate, apex acuminate to acute, unequal, 3 larger and 7–11 mm, 2 smaller and 5–7 mm, midvein slender. Corolla pale blue to pale blue-purple, densely strigose outside; tube campanulate, 2.5–3.5 mm; lobes ovate-elliptic, 6–7.5 mm, margin ciliolate, apex acute. Nectaries 1 per corolla lobe, oblong and opening toward base of corolla, with a narrow scale and few divisions. Filaments basally white, apically blue, flattened subulate, 4.5–5.5 mm, basally much enlarged and connate; anthers blue, ellipsoid, 1–1.2 mm. Style 1.5–2 mm, slender; stigma lobes capitate. Capsules ovoid-ellipsoid, 5–6 mm. Seeds pale yellow, ellipsoid, 1–1.2 mm; seed coat smooth. Fl. and fr. Aug–Sep.

Meadows, scrub; 3200–4400 m. SE Xizang [Bhutan, N India, Nepal, Sikkim].

15. LOMATOGONIUM A. Braun, Flora 13: 221. 1830.

肋柱花属 lei zhu hua shu

Pleurogyne Eschscholtz ex Chamisso & Schlechtendal; *Swertia* subgen. *Lomatogonium* (A. Braun) Satake; *Pleurogynella* Ikonnikov.

Herbs annual or perennial. Roots fibrous or woody; primary root with few secondary rootlets or rhizomes and with few fleshy adventitious rootlets. Stems prostrate, ascending, or erect, striate or angled, branched or simple. Inflorescences few- to many-flowered, terminal and axillary cymes, sometimes flowers solitary and terminal. Flowers (4- or) 5- (or 10)-merous. Pedicel usually longer than flower. Calyx and corolla rotate, lobed nearly to base or with a distinct tube. Corolla lobes dextrorse in flower bud, distinctly 2-colored when corolla opens. Nectaries 2, at base of corolla lobes. Stamens inserted at base of corolla tube; filaments somewhat flattened; anthers blue, rarely yellow, shorter than or rarely as long as filaments. Ovary ensiform, cylindrical, or ovoid-ellipsoid. Style absent; stigma lobes ± decurrent along carpel sutures. Capsules 2-valved, many seeded. Seed coat almost smooth.

Eighteen species: North America, temperate Asia, Europe; 16 species in China.

- 1a. Perennials.
- 2a. Corolla lobes broadly obovate, to 1 cm wide, apex rounded; calyx lobes apically subrounded.
- 3a. Stem leaves more than 1 pair; flowers always erect, in a 2–6-flowered terminal racemelike inflorescence 2. *L. oreocharis*
- 3b. Stem leaves absent or reduced to 1 pair; flowers usually nodding at anthesis, solitary or rarely with 1 or 2 additional axillary flowers 3. *L. stapfii*
- 2b. Corolla lobes narrowly oblong, elliptic, or elliptic-lanceolate, to 0.6 cm wide, apex obtuse; calyx lobes apically obtuse or acute.
- 4a. Corolla dark blue, without lines, lobes narrowly oblong; stem leaves oblong-spatulate to oblong, base obtuse; stem simple 1. *L. perenne*
- 4b. Corolla pale blue, with distinct deep blue lines, lobes elliptic-lanceolate to elliptic; stem leaves lanceolate to broadly lanceolate, base subamplexicaul; stem fastigiately branched from base 4. *L. longifolium*
- 1b. Annuals.
- 5a. Nectaries without a raised margin, yellow; corolla white; stem branched only apically 16. *L. micranthum*
- 5b. Nectary with a lamellate margin, white; corolla pale blue to blue-purple (white tinged blue in *L. forrestii* var. *bonatianum*); stem often branched from base and sometimes at middle, rarely simple.
- 6a. Calyx and corolla tubes distinct, (1.5–)2–3 mm; ovary ovoid-ellipsoid; marginal lamellae not connate.
- 7a. Anthers 1–1.5 mm, ovoid, yellow 13. *L. brachyantherum*
- 7b. Anthers 1.5–2.5 mm, ellipsoid, blue.
- 8a. Calyx lobes obovate-spatulate, base narrowed, sinus between lobes rounded 15. *L. chumbicum*
- 8b. Calyx lobes linear or ovate-oblong to narrowly ovate, base not narrowed, sinus between lobes acute.
- 9a. Stem leaves obovate; calyx lobes ovate-oblong to narrowly ovate 14. *L. gamosepalum*
- 9b. Stem leaves and calyx lobes linear 12. *L. zhongdianense*
- 6b. Calyx and corolla tubes indistinct, 1–1.5 mm; ovary not ovoid-ellipsoid; nectary base connate into a tube pointed outward.
- 10a. Apex of stem leaf blades acute to obtuse.
- 11a. Calyx lobes ovate to elliptic or rarely lanceolate; basal leaves short petiolate 5. *L. carinthiacum*
- 11b. Calyx lobes ovate-lanceolate or linear to linear-lanceolate; basal leaves sessile.
- 12a. Inflorescences racemelike, usually in many-flowered panicles; calyx lobes ovate-lanceolate; stem leaf base rounded to subcordate 6. *L. bellum*
- 12b. Inflorescences cymose, few flowered; calyx lobes linear to linear-lanceolate; stem leaf base obtuse 7. *L. macranthum*
- 10b. Apex of stem leaf blades acuminate.
- 13a. Corolla lobes to 2.5 cm; calyx as long as or slightly shorter than corolla 9. *L. rotatum*
- 13b. Corolla to 1.6(–1.8) cm; calyx 1/2–2/3 as long as corolla.
- 14a. Stems 2–7 cm, simple or few branched; leaf blade papillose; pedicel filiform; corolla lobe apex acute to obtuse; calyx lobes with a black margin 11. *L. sikkimense*
- 14b. Stems 12–40 cm, much branched; leaf blade not papillose; pedicel linear; corolla lobe apex acuminate; calyx lobes without a black margin.
- 15a. Stems and pedicels glabrous; leaf blade lanceolate to elliptic 8. *L. forrestii*
- 15b. Stems and pedicels densely papillose; leaf blade linear 10. *L. lijiangense*

1. *Lomatogonium perenne* T. N. Ho & S. W. Liu in J. X. Yang, Fl. Tsinling. 1(4): 396. 1983.

塑根肋柱花 su gen lei zhu hua

Perennials 8–25 cm tall. Rhizomes horizontal or poorly defined, sheathed by a few blackish remains of old petioles. Stems erect, slender, angular, simple. Basal leaves short petiolate; leaf blade spatulate to oblong, 0.6–1.5(–2.1) cm × 3–5(–8.5) mm, base cuneate, margin papillate, apex obtuse, veins 3–5. Stem leaves subsessile to short petiolate; leaf blade oblong-spatulate to oblong, rarely ovate-oblong, 0.6–1.6 cm × 3–6 mm, base obtuse, margin papillate, apex obtuse, midvein distinct. Inflorescences racemelike, 3–5(–7)-flowered. Pedicel spreading to erect, 2.5–5.6 cm, slender. Calyx tube less than

1.5 mm; lobes linear-spatulate, rarely linear-oblong to narrowly elliptic, 4.5–8 × 1–2(–3.5) mm, base narrowed, apex acute to obtuse, veins 3 outside. Corolla dark blue, tube less than 1.5 mm; lobes narrowly oblong, 1.2–1.7 cm × 4–6 mm, apex obtuse. Nectary connate at base into a tube pointed outward, apex lamellate, margin lobed. Filaments 5–7 mm; anthers blue, ellipsoid, 2–3 mm. Ovary cylindrical, 0.9–1.3 cm, apex subacuminate to obtuse. Stigma lobes decurrent to middle of ovary. Capsules narrowly ellipsoid, ca. 1.3 cm. Seeds brown, subcylindric, small. Fl. and fr. Aug–Oct.

• Scrub, alpine and subalpine meadows; 3900–4400 m. Qinghai (Jigzhi Xian), Shaanxi (Taibai Shan), W Sichuan, E Xizang, NW Yunnan.

2. *Lomatogonium oreocharis* (Diels) C. Marquand, J. Linn. Soc., Bot. 48: 207. 1929.

圆叶肋柱花 yuan ye lei zhu hua

Pleurogyne oreocharis Diels, Notes Roy. Bot. Gard. Edinburgh 5: 222. 1912; *Lomatogonium cuneifolium* Harry Smith.

Perennials 7–20 cm tall. Rhizomes well developed, horizontal, sheathed by a few blackish remains of old petioles, usually branched. Stems ascending to erect, angular, simple. Leaf blade broadly ovate to orbicular, 0.6–1.9 cm × 5–12 mm, margin scabrous, apex rounded, veins 1–3. Basal leaves with petiole slender, 5–10 mm; leaf blade base rounded, abruptly contracted into petiole. Stem leaves subsessile to short petiolate; leaf blade obovate to orbicular, base cuneate. Inflorescences racemelike, 2–6-flowered. Flower 5-merous. Pedicel spreading to erect, 1.5–4 cm, angular. Calyx tube less than 1.5 mm; lobes spatulate to obovate, 6–8 × 3–5 mm, slightly unequal, base narrowed, margin scabrous, apex subrounded, veins 3 outside. Corolla pale blue, with conspicuous dark blue lines, 2–2.7 cm in diam., tube less than 1.5 mm; lobes broadly obovate, 1.5–2 × to 1 cm, apex rounded. Nectary connate at base into a tube pointed outward, apex lamellate, margin lobed. Filaments 0.8–1.2 cm; anthers blue, ellipsoid, 2–3 mm. Ovary cylindrical, 1–1.5 cm, apex subacuminate to obtuse. Stigma lobes decurrent to apical part of ovary. Capsules ovoid-ellipsoid, to 1.9 cm. Seeds light brown, globose, 0.7–0.9 mm in diam. Fl. and fr. Aug–Oct.

• Meadows, scrub, forests; 3000–4800 m. SE Xizang, NW Yunnan.

3. *Lomatogonium stapfii* (Burkill) Harry Smith in S. Nilsson, Grana Palynol. 7(1): 145. 1967.

垂花肋柱花 chui hua lei zhu hua

Swertia stapfii Burkill, J. Proc. Asiat. Soc. Bengal 2: 325. 1906.

Perennials 4–7 cm tall. Rhizomes well developed, horizontal, sheathed by a few blackish remains of old petioles, usually branched. Stems erect, angular, scapiform. Leaves mostly basal; leaf blade spatulate to obovate, 5–11 × 5–7 mm, base narrowed into a short petiole, margin scabrous, apex rounded, veins 1–3. Stem leaves absent or if present then only a pair of small obovate leaves. Flowers terminal, solitary, nodding, rarely with 1 or 2 additional axillary flowers. Flower 5-merous. Pedicel 1.5–3 cm, angular. Calyx tube less than 1.5 mm; lobes spatulate to obovate, 4–6 mm, slightly unequal, base narrowed, margin scabrous, apex subrounded, veins indistinct. Corolla pale blue, with conspicuous dark blue lines, ca. 3 cm in diam., tube less than 1.5 mm; lobes broadly obovate, 1.2–1.8 × to 1 cm, apex rounded. Nectary connate at base into a tube pointed outward, apex lamellate, margin lobed. Filaments to 1 cm; anthers blue, ellipsoid, 2–3 mm. Ovary cylindrical, 0.9–1.3 cm, apex subacuminate to obtuse. Stigma lobes decurrent to apical part of ovary. Fl. Aug.

Alpine meadows; 4500–5000 m. S and SE Xizang [Bhutan, E India].

4. *Lomatogonium longifolium* Harry Smith in Handel-Mazzetti, Symb. Sin. 7: 982. 1936.

长叶肋柱花 chang ye lei zhu hua

Perennials 8–25 cm tall. Rhizomes horizontal, sheathed by a few blackish remains of old petiole. Stems erect, angular, slender, fastigiate branched. Basal leaves petioles flattened; leaf blade spatulate to oblong, 1.5–3.5 cm × 5–8 mm, base cuneate, apex obtuse, midvein distinct. Stem leaves subsessile to short petiolate; leaf blade lanceolate to broadly lanceolate, 1.5–3.5 cm × 5–8 mm, base subamplexicaul, apex acuminate to obtuse, midvein distinct. Inflorescences racemelike, 5–7-flowered. Pedicel spreading to erect, rigid, to 6 cm. Calyx tube less than 1.5 mm; lobes linear-spatulate, 7–9 × 1–1.2 mm, base obtuse, apex acute, midvein distinct. Corolla pale blue, with conspicuous dark lines, 2–2.7 cm in diam., tube less than 1.5 mm; lobes elliptic-lanceolate to elliptic, 1.1–1.5 cm × 5–6 mm, apex obtuse. Nectary connate at base into a tube pointed outward, apex lamellate, margin lobed. Filaments 8–10 mm; anthers blue, narrowly ellipsoid, ca. 3.5 mm. Ovary cylindrical, 1–1.1 cm, apex subacuminate to obtuse. Stigma lobes decurrent to middle of ovary. Capsules ovoid-ellipsoid, to 1.4 cm. Seeds light brown, subglobose, ca. 0.2 mm in diam. Fl. and fr. Aug–Nov.

• Beside streams, grassy slopes, alpine scrub and meadows; 3400–4200 m. S Sichuan, E Xizang, NW Yunnan.

5. *Lomatogonium carinthiacum* (Wulfen) Reichenbach, Flora 13: 221. 1830.

肋柱花 lei zhu hua

Swertia carinthiaca Wulfen in Jacquin, Misc. Austriac. 2: 53. 1781; *Pleurogyne carinata* Edgeworth; *P. carinthiaca* (Wulfen) Grisebach var. *cordifolia* Franchet.

Annuals 3–30 cm tall. Stems ascending to erect, angular, branched from base, glabrous. Basal leaves short petiolate; leaf blade spatulate, 1.5–2 cm × 6–8 mm, base narrowed, apex rounded, midvein distinct. Stem leaves sessile, lanceolate, elliptic, or ovate-elliptic, 0.4–2 cm × 3–7 mm, base obtuse, apex acute to obtuse, midvein distinct. Cymes lax, terminal and axillary. Flowers 5-merous, variable in size. Pedicel spreading to erect, to 6 cm, angular, glabrous. Calyx tube 1–1.5 mm; lobes elliptic to ovate or rarely lanceolate, 4–8(–11) × 1.5–2.5 mm, base obtuse, apex obtuse to rarely acute, veins 1–3. Corolla blue, usually 0.8–2 cm in diam., tube 1–1.5 mm; lobes elliptic to ovate-elliptic, 0.8–1.4 cm, apex acute. Nectary connate at base into a tube pointed outward, apex lamellate, margin lobed. Filaments 5–7 mm; anthers blue, ellipsoid, 2–2.5 mm. Ovary ovoid-ellipsoid, apex triangular acute. Stigma lobes triangular, decurrent to apical part of ovary. Capsules cylindrical, as long as persistent corolla. Seeds brown, subglobose, ca. 1 mm in diam. Fl. and fr. Aug–Oct. $2n = 40$.

Beside streams, grassland slopes, alpine scrub and meadows; 400–5400 m. Gansu, Hebei, Qinghai, Shanxi, Sichuan, Xizang, NW Yunnan [Afghanistan, India, Japan, Kyrgyzstan, Mongolia, Pakistan, Russia, Tajikistan; Europe].

6. *Lomatogonium bellum* (Hemsley) Harry Smith in S. Nilsson, Grana Palynol. 7(1): 145. 1967.

美丽肋柱花 mei li lei zhu hua

Swertia bella Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 138. 1890.

Annuals 7–40 cm tall. Stems erect, angular, few to much branched from base; branches crowded, glabrous. Leaves sessile; lower to middle stem leaves ovate to subcordate, 1.6–2.8 cm × 5–11 mm; upper leaves ovate-lanceolate; base of all leaves rounded to subcordate and subamplexicaul, apex acute, midvein abaxially distinct. Inflorescences racemelike, usually in many-flowered panicles. Flowers 5-merous. Pedicel spreading to erect, to 13 cm, angular, glabrous. Calyx tube 1–1.5 mm; lobes ovate-lanceolate, 0.7–1.7 cm × 2–4.5 mm, base obtuse, apex acute, midvein distinct. Corolla pale blue, with dark blue lines, 1.5–2.5 cm in diam., tube 1–1.5 mm; lobes obovate-oblong, elliptic, or narrowly oblong-ovate, 1.3–2 cm, apex acuminate to obtuse. Nectary connate at base into a tube pointed outward, apex lamellate, margin lobed. Filaments 8–11 mm; anthers blue, narrowly ellipsoid, ca. 4 mm. Ovary ensiform to ovoid-ellipsoid, 1–1.5 cm, apex triangular acute. Stigma lobes triangular, decurrent to apical part of ovary. Capsules narrowly obovoid-ellipsoid, 1.8–2.2 cm. Seeds brown, ellipsoid, 0.6–0.8 mm in diam.; seed coat scabrous. Fl. and fr. Aug–Oct.

• Grassland slopes, wet and shady places, forests; 1300–3200 m. W Hubei, S Shaanxi, E Sichuan, Yunnan.

7. *Lomatogonium macranthum* (Diels & Gilg) Fernald, Rhodora 21: 197. 1919.

大花肋柱花 da hua lei zhu hua

Pleurogyne macrantha Diels & Gilg in Futterer, Durch Asien, Bot. Repr. 3: 17. 1903; *Swertia deltoidea* Burkill.

Annuals 7–35 cm tall. Stems ascending, angular, few branched from base, glabrous. Basal leaves sessile, lanceolate, ovate-lanceolate, or ovate-triangular, 0.7–2.7 cm × 2–12 mm, base obtuse, apex rounded, midvein distinct. Stem leaves sessile, smaller toward apex, lanceolate, elliptic, or ovate-elliptic, 0.4–2 cm × 3–7 mm, base obtuse, apex acute to obtuse, veins indistinct or only midvein abaxially distinct. Cymes lax, terminal and axillary. Flowers 5-merous. Pedicel spreading to arcuate, to 9 cm, angular, glabrous. Calyx tube 1–1.5 mm; lobes linear to linear-lanceolate, 7–11 mm, base obtuse, margin scabrous, apex acuminate, veins 1–3. Corolla pale blue-purple, with dark blue lines, 2–2.5 cm in diam., tube 1–1.5 mm; lobes oblong to ovate-elliptic, 1.3–2 cm, apex acuminate. Nectary connate at base into a tube pointed outward, apex lamellate, margin lobed. Filaments 8–11 mm; anthers blue, narrowly ellipsoid, 3–3.5 mm. Ovary ensiform to ovoid-ellipsoid, apex triangular acute. Stigma lobes triangular, decurrent to apical part of ovary. Capsules narrowly ovoid-ellipsoid to ellipsoid, as long as persistent corolla. Seeds dark brown, ellipsoid, 0.7–0.9 mm in diam.; seed coat scabrous. Fl. and fr. Aug–Oct.

Beside streams, hillsides, scrub, forests, alpine meadows; 2500–4800 m. Gansu, Qinghai, W Sichuan, E Xizang [Bhutan, Nepal, Sikkim].

8. *Lomatogonium forrestii* (I. B. Balfour) Fernald, Rhodora 21: 197. 1919.

云南肋柱花 yun nan lei zhu hua

Annuals 3–32 cm tall. Stems ascending to erect, angular, much branched from base, glabrous. Leaves sessile, lanceolate to elliptic, 0.7–3 cm × 2–5 mm, base narrowed, apex acuminate and mucronate, midvein abaxially distinct. Inflorescences racemelike, usually in many-flowered panicles. Flowers 5-merous. Pedicel spreading to erect, 0.5–3.5 cm, slender, angular, glabrous. Calyx tube 1–1.5 mm; lobes linear to linear-lanceolate, 4–8 mm, base obtuse, apex acuminate, midvein distinct. Corolla white tinged blue or pale blue, tube 1–1.5 mm; lobes ± elliptic, 0.7–1.6 cm, apex acuminate. Nectaries connate at base into a tube pointed outward, apex lamellate, margin lobed. Filaments 6–7 mm; anthers blue, ellipsoid, 3–4 mm. Ovary ensiform to obovoid-ellipsoid, 5–11 mm, apex triangular acute. Stigma lobes triangular, decurrent to apical part of ovary. Capsules ellipsoid, as long as persistent corolla. Seeds brown, globose, ca. 0.5 mm in diam. Fl. and fr. Aug–Oct.

• 2000–4000 m. Guizhou, Sichuan, Yunnan.

- 1a. Plants 3–6 cm tall 8c. var. *densiflorum*
1b. Plants 12–32 cm tall.
2a. Corolla pale blue 8a. var. *forrestii*
2b. Corolla white tinged blue 8b. var. *bonatianum*

8a. *Lomatogonium forrestii* var. *forrestii*

云南肋柱花 (原变种) yun nan lei zhu hua (yuan bian zhong)

Pleurogyne forrestii I. B. Balfour, Notes Roy. Bot. Gard. Edinburgh 4: 78. 1907; *Lomatogonium saccatum* Harry Smith.

Corolla pale blue; lobes elliptic, 0.7–1.3(–1.5) cm.

• Beside streams, grasslands, scrub, forests, alpine meadows; 2300–3800 m. SW Sichuan, NW Yunnan.

8b. *Lomatogonium forrestii* var. *bonatianum* (Burkill) T. N. Ho, Acta Biol. Plateau Sin. 1: 43. 1982.

云贵肋柱花 yun gui lei zhu hua

Swertia bonatiana Burkill, J. Proc. Asiat. Soc. Bengal 7: 81. 1911.

Corolla white tinged pale blue; lobes broadly elliptic, 1.4–1.6 cm.

• Beside streams, grassy slopes, alpine meadows; 2000–4000 m. Guizhou, S Sichuan, N Yunnan.

8c. *Lomatogonium forrestii* var. *densiflorum* S. W. Liu & T. N. Ho, Acta Phytotax. Sin. 30: 311. 1992.

密花肋柱花 mi hua lei zhu hua

Plants 3–6 cm tall. Flowers usually to 30, rarely fewer, compact.

- Grassy slopes; ca. 3100 m. Yunnan (Dali Xian).

9. *Lomatogonium rotatum* (Linnaeus) Fries ex Nyman, *Consp. Fl. Eur.* 3: 500. 1881.

辐状肋柱花 fu zhuang lei zhu hua

Annuals 15–40 cm tall. Stems erect, angular, much branched; branches crowded, glabrous. Leaves sessile, linear to broadly lanceolate, 1.5–4.3 × 0.2–0.4 cm, base obtuse, apex acuminate, midvein abaxially and adaxially distinct. Inflorescences racemelike, usually in many-flowered panicles. Flowers 5-merous. Pedicel spreading to erect, to 8 cm, angular, glabrous. Calyx tube 1–1.5 mm; lobes linear to linear-lanceolate, 0.8–2.2(–2.7) cm, apex acuminate, midvein distinct. Corolla pale blue, with dark blue lines, 2–3 cm in diam., tube 1–1.5 mm; lobes elliptic-lanceolate to elliptic, 1.5–2.5 cm, apex acuminate to obtuse. Nectary connate at base into a tube pointed outward, apex lamellate, margin lobed. Filaments 6–8 mm; anthers blue, narrowly ellipsoid, 3–4.5 mm. Ovary ensiform to obconic, 1.2–1.4 cm, apex triangular acute. Stigma lobes triangular, decurrent to base of ovary. Capsules narrowly ellipsoid to obovoid-ellipsoid, 1.5–2.5 cm. Seeds light brown, globose, 0.3–0.4 mm in diam.; seed coat smooth. Fl. and fr. Aug-Sep.

1100–4200 m. Gansu, Guizhou, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan [Japan, Kazakhstan, Mongolia, Russia; North America, Europe].

- 1a. Stems branched from base or middle;
calyx as long as corolla; panicle lax 9a. var. *rotatum*
1b. Stems branched apically; calyx
slightly shorter than corolla; panicle
crowded 9b. var. *floribundum*

9a. *Lomatogonium rotatum* var. *rotatum*

辐状肋柱花 (原变种) fu zhuang lei zhu hua (yuan bian zhong)

Swertia rotata Linnaeus, *Sp. Pl.* 1: 226. 1753.

Stem branched from base or middle. Leaves linear, linear-lanceolate, or lanceolate. Panicle lax. Calyx as long as corolla. $2n = 10$.

Beside streams, hillsides, grasslands, scrub; 1400–4200 m. Gansu, Guizhou, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan [Japan, Kazakhstan, Mongolia, Russia; Europe, North America].

9b. *Lomatogonium rotatum* var. *floribundum* (Franchet) T. N. Ho, *Fl. Reipubl. Popularis Sin.* 62: 336. 1988.

密序肋柱花 mi xu lei zhu hua

Pleurogyne rotata var. *floribunda* Franchet, *Bull. Soc. Bot. France* 46: 309. 1899.

Stem branched apically. Leaves broadly lanceolate. Panicle crowded. Calyx slightly shorter than corolla. Fl. and fr. Aug-Sep.

- Beside streams, shady places, scrub; 1100–3400 m. Hebei,

Nei Mongol, NE Qinghai, Shanxi.

10. *Lomatogonium lijiangense* T. N. Ho, *Acta Biol. Plateau Sin.* 1: 44. 1982.

丽江肋柱花 li jiang lei zhu hua

Annuals 35–40 cm tall. Stems erect, angular, branched from middle, densely papillate. Leaves sessile, linear, 1–3.5 cm × 3–5 mm, base obtuse, margin ciliolate and revolute when dry, apex acuminate, midvein abaxially distinct. Inflorescences racemelike, usually in many-flowered panicles. Flowers 5-merous. Pedicel spreading to erect, 0.8–2 cm, angular, papillate. Calyx tube 1–1.5 mm; lobes linear to linear-lanceolate, 7–10 mm, base obtuse, apex acuminate, midvein distinct. Corolla blue, tube 1–1.5 mm; lobes elliptic to ovate-elliptic, 1.2–1.6(–1.8) cm, apex acuminate. Nectary connate at base into a tube pointed outward, apex lamellate, margin lobed. Filaments 6–8 mm; anthers blue, linear, 3–5 mm. Ovary ensiform to obovoid-ellipsoid, 1–1.5 cm, apex triangular acute. Stigma lobes triangular, decurrent to middle of ovary. Capsules ovoid-ellipsoid, as long as persistent corolla. Seeds brown, globose, ca. 0.5 mm in diam. Fl. and fr. Nov.

- Hillsides; 2200–3200 m. Yunnan (Lijiang Naxizu Zizhixian).

11. *Lomatogonium sikkimense* (Burkill) Harry Smith in S. Nilsson, *Grana Palynol.* 7(1): 145. 1967.

锡金肋柱花 xi jin lei zhu hua

Swertia sikkimensis Burkill, *J. Proc. Asiat. Soc. Bengal* 2: 322. 1906.

Annuals 2–7 cm tall. Stems ascending to erect, angular, few branched with short branches or simple, glabrous. Leaves sessile, linear to linear-lanceolate, 0.9–1.7 cm × 1.5–2.5 mm, abaxially papillate, base obtuse, margin revolute when dry, apex acuminate, midvein distinct. Inflorescences racemelike, usually in many-flowered panicles. Flowers 5-merous. Pedicel spreading to erect, filiform, to 1 cm, glabrous. Calyx tube 1–1.5 mm; lobes linear to linear-lanceolate, 7–9 mm, base obtuse, apex acuminate, midvein distinct. Corolla dark blue, tube 1–1.5 mm; lobes ovate-elliptic, 0.9–1.1 cm, apex acute. Nectary connate at base into a tube pointed outward, apex lamellate, margin lobed. Filaments 3.5–4.5 mm; anthers blue, ellipsoid, ca. 2 mm. Ovary obovoid-ellipsoid, 5–6 mm, apex triangular acute. Stigma lobes triangular, decurrent to middle of ovary. Fl. Sep.

Grasslands on hillsides; 3900–5100 m. Xizang (Yadong Xian) [Bhutan, Nepal, Sikkim].

12. *Lomatogonium zhongdianense* S. W. Liu & T. N. Ho, *Acta Phytotax. Sin.* 30: 314. 1992.

中甸肋柱花 zhong dian lei zhu hua

Annuals 15–20 cm tall. Stems prostrate to ascending, angular, much branched from base; branches slender, glabrous. Leaves sessile, linear, 1–1.6 cm × 1–3 mm, base obtuse, apex acuminate. Inflorescences racemelike, few to many flowered. Flowers 5-merous. Pedicel spreading, (0.5–)2–4 (–6) cm, slender, glabrous. Calyx tube 2–3 mm;

lobes linear, 5–7 mm, apex acuminate. Corolla blue-gray, 0.8–1.2 cm in diam., tube 2–3 mm; lobes ovate, 6–11 mm, apex acuminate. Nectaries lamellate, margin lobed. Filaments 5–6 mm; anthers blue, ellipsoid, 1.5–2 mm. Ovary narrowly ovoid-ellipsoid, 0.9–1.1 cm, apex acuminate. Stigma lobes decurrent to apical part of ovary. Fl. Sep.

• Hillsides; 3300 m. Yunnan (Zhongdian Xian).

13. *Lomatogonium brachyantherum* (C. B. Clarke) Fernald, *Rhodora* 21: 197. 1919.

短药肋柱花 duan yao lei zhu hua

Pleurogyne brachyanthera C. B. Clarke in J. D. Hooker, *Fl. Brit. India* 4: 120. 1883; *P. diffusa* Maximowicz; *P. thomsonii* C. B. Clarke; *Swertia carinthiaca* Wulfen var. *afghanica* Burkill; *S. clarkei* Knoblauch; *S. lloydoides* Burkill.

Annuals 2–15 cm tall. Stems prostrate, angular, much branched from base; branches slender, internodes short at base, elongated apically, glabrous. Basal and lower stem leaves short petiolate; leaf blade spatulate to spatulate-oblong, 1–1.5 cm × 2.5–3 mm, base cuneate, margin scabrous, apex obtuse, veins abaxially indistinct. Middle to upper stem leaves sessile, elliptic-lanceolate to elliptic, 3–6 × 2–3 mm, much shorter than internodes, base and apex obtuse, margin scabrous, veins abaxially indistinct. Flowers terminal, solitary, (4- or) 5-merous. Pedicel prostrate to spreading, 1.2–3.8(–6) cm, slender, angular, glabrous. Calyx tube 1.5–2 mm; lobes elliptic to narrowly ovate, 4.5–6 mm, unequal, base obtuse, margin scabrous, apex acute, midvein distinct. Corolla blue to blue-purple, 5–8 mm in diam., tube 2–3 mm; lobes broadly elliptic, 8–10 mm, apex acuminate. Nectaries close to each other, lamellate, margin lobed. Filaments 4–5.5 mm; anthers yellow, ovoid, 1–1.5 mm. Ovary ovoid-ellipsoid, 5–7 mm, apex acuminate. Stigma lobes decurrent to apical part of ovary. Capsules ellipsoid-conic. Seeds brown, nearly broadly cylindrical to subglobose, 0.5–0.7 mm in diam.; seed coat scabrous. Fl. and fr. Aug-Sep.

Beside streams, bogs, meadows around lakes, alpine meadows; 3200–5300 m. SW Gansu, Qinghai, Xizang [Afghanistan, Bhutan, India, Kashmir, Nepal, Pakistan, Sikkim].

14. *Lomatogonium gamosepalum* (Burkill) Harry Smith in S. Nilsson, *Grana Palynol.* 7(1): 145. 1967.

合萼肋柱花 he e lei zhu hua

Swertia gamosepala Burkill, *J. Proc. Asiat. Soc. Bengal* 2: 324. 1906.

Annuals 3–20 cm tall. Stems prostrate to ascending, angular, much branched from base; branches slender, glabrous. Leaves sessile, obovate, 0.5–2 cm × 3–7 mm, base obtuse, apex obtuse to rounded, midvein distinct. Cymes terminal and axillary, few to many flowered. Flowers 5-merous. Pedicel spreading to erect, to 3.5 cm, slender, unequal, glabrous. Calyx tube 2–3 mm; lobes ovate-oblong to narrowly ovate, 3–7 mm, unequal, overlapping at base, apex obtuse, veins 1–3. Corolla blue, 1–1.5 cm in diam., tube 2–3

mm; lobes ovate, 6–12 mm, apex acuminate. Nectaries lamellate, margin dentate. Filaments 3–7 mm; anthers blue, ellipsoid, 2–2.5 mm. Ovary ovoid-ellipsoid, 4–9 mm, apex acuminate. Stigma lobes decurrent to apical part of ovary. Capsules ovoid-ellipsoid, 1.2–1.4 cm. Seeds light brown, subglobose, 0.5–0.7 mm in diam. Fl. and fr. Aug-Oct.

Beside streams, scrub, forests, alpine meadows; 2800–4700 m. SW Gansu, Qinghai, W Sichuan, NE Xizang [Nepal].

15. *Lomatogonium chumbicum* (Burkill) Harry Smith in S. Nilsson, *Grana Palynol.* 7(1): 145. 1967.

亚东肋柱花 ya dong lei zhu hua

Swertia chumbica Burkill, *J. Proc. Asiat. Soc. Bengal* 2: 323. 1906.

Annuals 3–20 cm tall. Stems prostrate to ascending, angular, much branched from base; branches slender, glabrous. Leaves sessile, spatulate to obovate, 5–10 × 1.5–5.5 mm, base narrowed, apex obtuse to rounded, veins 1–3. Inflorescences racemelike, few to many flowered. Flowers 5-merous. Pedicel to 3 cm, spreading to erect, slender, angular, glabrous. Calyx tube 2–3 mm; lobes obovate-spatulate, 2.5–4 × ca. 2 mm, sinus between lobes rounded, base narrowed into a claw, margin blackish and scabrous, apex rounded, veins 1–3. Corolla blue, 6–8 mm in diam., tube 2–3 mm; lobes broadly ovate, 4–8 × 4–5 mm, apex acuminate. Nectaries lamellate, margin lobed. Filaments 3–4 mm; anthers blue, ellipsoid, 1.5–2 mm. Ovary ovoid-ellipsoid, 4–5 mm, apex acuminate. Stigma lobes decurrent to apical part of ovary. Capsules ovoid-ellipsoid, 1.2–1.4 cm. Seeds light brown, subglobose, 0.5–0.7 mm in diam. Fl. Aug-Sep.

Grasslands on hillsides; 3500–4700 m. S Xizang [Bhutan, Nepal, Sikkim].

16. *Lomatogonium micranthum* Harry Smith, *J. Jap. Bot.* 56: 277. 1981.

小花肋柱花 xiao hua lei zhu hua

Annuals 6–20 cm tall. Stems erect, angular, branched apically; branches slender, glabrous. Leaves sessile; lower to middle stem leaves ovate-lanceolate, 5–10 × 2–3.5 mm, base obtuse, apex acute, midvein distinct abaxially; upper leaves linear-lanceolate, 3–5 × ca. 1 mm, apex acuminate. Inflorescences racemelike, usually in many-flowered panicles. Flowers (4- or) 5-merous. Pedicel spreading to erect, 0.6–1.5 cm, slender, angular, glabrous. Calyx tube 1.5–2 mm; lobes linear-lanceolate to narrowly ovate, 3.5–4.5 mm, base obtuse, apex acuminate, midvein distinct. Corolla white, 4–5.5 mm in diam.; tube 1–1.5 mm; lobes lanceolate to narrowly ovate, 5–6 × ca. 2 mm, apex acuminate. Nectaries yellow, naked. Filaments ca. 3 mm; anthers yellow, ellipsoid, ca. 1.2 mm. Ovary ovoid-ellipsoid, apex acuminate. Stigma lobes decurrent to apical part of ovary. Capsules ovoid-ellipsoid, ca. 7.5 mm. Seeds brown, subglobose, ca. 0.2 mm in diam. Fl. and fr. Aug-Sep.

Grassland slopes; 3000 m. SE Xizang [Nepal].

16. LOMATOGONIOPSIS T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 466. 1980.

辐花属 fu hua shu

Herbs annual. Roots fibrous. Stems prostrate, ascending to erect, terete, striate or angled, branched or simple. Inflorescences racemelike or with a solitary terminal flower. Flower 5-merous. Calyx and corolla rotate, lobed nearly to base, tube indistinct or distinct. Corolla lobes dextrorse in flower bud, distinctly 2-colored when corolla opens. Nectaries 1 at base of each corolla lobe, appendaged. Stamens inserted at base of corolla tube; filaments somewhat flattened; anthers blue, rarely yellow. Ovary 1-celled. Style absent; stigma lobes ± decurrent along apical part of ovary. Capsules 2-valved, many seeded. Seed coat almost smooth.

Three species: endemic to China (Qinghai-Tibetan Plateau).

Lomatogoniopsis is similar to *Lomatogonium*. Although T. N. Ho treats them as distinct genera, J. S. Pringle considers *Lomatogoniopsis* to be synonymous with *Lomatogonium*.

- 1a. Corolla 0.6–1 cm, lobes and appendages densely papillate; nectaries pale blue and with dark blue spots, lamellate, apex entire or 2-cleft 1. *L. alpina*
- 1b. Corolla 1.3–1.8 cm, lobes and appendages glabrous; nectaries white or pale yellow, galeate, margin erose to laciniate.
 - 2a. Stem leaves narrowly lanceolate to ovate-elliptic; corolla blue with a yellow base and dark blue veins; nectary appendage yellow, margin erose 2. *L. galeiformis*
 - 2b. Stem leaves ovate; corolla blue-purple; nectary appendages white, margin lacinate 3. *L. ovatifolia*

1. *Lomatogoniopsis alpina* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 467. 1980.

辐花 fu hua

Annuals 3–10 cm tall. Stems prostrate to ascending, angular, much branched from base, rarely simple, papillate. Basal leaves sessile, spatulate, 5–10 × 2–5 mm, base cuneate, margin ciliate, apex obtuse. Stem leaves sessile, ovate, (3–)5–11 × (1–)3–7 mm, base, margin, and apex as in basal leaves. Inflorescences (1–)3-flowered, racemelike. Pedicel purple, 1–4 cm, papillate. Calyx tube ca. 1 mm; lobes ovate-elliptic to ovate, 3.5–6.5 mm, margin ciliate, apex subrounded, veins 3. Corolla blue, tube 1–1.5 mm; lobes elliptic-lanceolate to elliptic, 5.5–9 × 4–5 mm, apex acute, densely papillate. Nectaries pale blue, with dark blue spots, narrowly elliptic, 4–6 mm, margin entire or apex 2-cleft. Filaments 3–5 mm; anthers blue, ellipsoid, 1–1.2 mm. Capsules sessile, ovoid-ellipsoid, 0.9–1.2 cm. Seeds light brown, subglobose, 0.8–1 mm in diam.; seed coat smooth. Fl. and fr. Aug-Sep.

• Alpine meadows, forest margins, scrub meadows; 3900–4300 m. S Qinghai, NE Xizang.

2. *Lomatogoniopsis galeiformis* T. N. Ho & S. W. Liu, Acta Phytotax. Sin. 18: 468. 1980.

盔形辐花 kui xing fu hua

Annuals 5–8 cm tall. Stems purple, prostrate to ascending, angular, much branched from base, papillate. Leaves sessile, slightly narrowed at base, margin ciliate, apex obtuse. Basal leaves narrowly elliptic to ovate-elliptic, 1.2–1.4 cm × 2–4 mm. Stem leaves narrowly lanceolate to ovate-elliptic, 4–6 × 1.5–2.5 mm. Flowers terminal, solitary. Pedicel

purple, 3–4.5 mm, glabrous. Calyx tube 1–1.2 mm; lobes lanceolate, 4–6.5 × 1.5–2 mm, apex acute. Corolla blue, basally yellow, with 3–5 blue veins on each lobe, tube 1.5–2 mm; lobes elliptic to ovate-elliptic, 1.3–1.6 cm, glabrous, apex rounded. Nectaries yellow, galeate, 1.5–2 mm, margin erose. Filaments 5–6 mm; anthers blue, ellipsoid, 2–2.2 mm. Capsules sessile, narrowly cylindric, to 1.3 cm. Seeds brown, globose, 0.8–1 mm in diam.; seed coat smooth. Fl. and fr. Aug-Sep.

• Bog meadows, beside streams; 4200–4400 m. Xizang (Cona Xian).

3. *Lomatogoniopsis ovatifolia* T. N. Ho & S. W. Liu, Acta Biol. Plateau Sin. 1: 45. 1982.

卵叶辐花 luan ye fu hua

Annuals 5–8 cm tall, glabrous. Stems prostrate to ascending, angular, much branched from base. Leaves sessile. Basal leaves spatulate to obovate, 1.1–1.5 cm × 3–6 mm, base narrowed into a short petiole, apex rounded; veins 1–3, abaxially distinct. Stem leaves ovate, 6–12 × 4–7 mm, base rounded, apex obtuse, midvein distinct. Flowers few, usually solitary and terminal on branches. Pedicel purple, 2–4 cm. Calyx tube less than 1 mm; lobes elliptic, 2–3 mm, base narrowed, apex obtuse to rounded, midvein distinct. Corolla blue-purple, tube ca. 1 mm; lobes elliptic, 1.1–1.4 cm × 5–6 mm, apex subrounded. Nectaries white, galeate, 2–3 mm, laciniate. Stamens inserted on corolla tube; filaments 5–6 mm; anthers pale blue, ellipsoid, 2–2.5 mm. Ovary ovoid-ellipsoid, 6–8 mm. Fl. and fr. Aug-Sep.

• Alpine meadows; 4200 m. S Xizang.

17. GENTIANOPSIS Ma, Acta Phytotax. Sin. 1(1): 7. 1951.

扁蕾属 bian lei shu

Crossopetalum Roth; *Gentiana* sect. *Crossopetalae* Froelich ex Grisebach; *Gentiana* subgen. *Eublephis* Rafinesque.

Herbs annual, biennial [or perennial]. Roots slender, fibrous. Stems subquadrangular. Flowers terminal, solitary, 4-merous; flower bud slightly flattened, 4-angled. Calyx tubular-campanulate, with triangular discontinuous intracalycular membranes, 2 outer calyx lobes narrower than and basally overlapping 2 inner lobes. Corolla tubular-campanulate to funnelform, lobes frequently toothed to fringed, plicae absent. Nectaries on corolla tube. Stamens inserted on corolla tube; anthers yellow. Capsules 2-valved, many seeded. Seeds angular-papillate.

Twenty-four species: North America, Asia, Europe; five species in China.

- 1a. Calyx lobes usually with inner lobe shorter than outer; stem leaf blades linear to narrowly lanceolate.
2a. Flowers 5–10 cm; corolla lobes 2–3 × 1–1.5 cm; stem leaf margin slightly revolute, not ciliate 4. *G. grandis*
2b. Flowers 2.5–5 cm; corolla lobes 0.6–1.2 × 0.6–0.8 cm; stem leaf margin not revolute, slightly ciliate
..... 5. *G. barbata*
- 1b. Calyx lobes equal or subequal in length; stem leaf blades lanceolate, elliptic-lanceolate, ovate-lanceolate, triangular-lanceolate, elliptic, or oblong.
3a. Calyx ca. 1/2 as long as corolla; corolla lobes basally lacinate-fringed 1. *G. paludosa*
3b. Calyx ca. 2/3 as long as corolla; corolla lobes not fringed.
4a. Corolla blue; stem leaf blades elliptic to ovate-elliptic, base cuneate 2. *G. contorta*
4b. Corolla yellow; stem leaf blades oblong, base subamplexicaul 3. *G. lutea*

1. *Gentianopsis paludosa* (Munro ex J. D. Hooker) Ma, Acta Phytotax. Sin. 1(1): 11. 1951.

湿生扁蕾 shi sheng bian lei

Annuals 3.5–40 cm tall. Stems ascending to erect. Basal leaves 3–5 pairs; petiole flattened, to 6 mm; leaf blade spatulate, 0.4–3 cm × 2–9 mm, base cuneate, margin scabrous, apex rounded, veins 1–3. Stem leaves 1–4 pairs, sessile, lanceolate to oblong, 0.5–5.5 cm × 2–14 mm, base and apex obtuse, margin scabrous, veins 1–3. Pedicel erect, 1.5–30 cm, elongated in fruit. Calyx 1–3.5 cm; lobes subequal; outer lobes narrowly triangular, 5–12 mm; inner lobes ovate, 4–10 mm; all lobes with margin membranous, apex acute, midvein strong and keeled. Corolla blue or yellowish white to yellow, sometimes pale yellow at base, broadly tubular, 1.6–6.5 cm; lobes broadly oblong, 1.2–1.7 cm, apex rounded, margin lacinate-fringed basally. Nectaries suborbicular, nodding. Filaments 1–1.5 cm; anthers ellipsoid, 2–3 mm. Style 3–4 mm. Capsules narrowly ellipsoid, as long as to longer than corolla; gynophore long. Seeds blackish, ellipsoid to subglobose, 0.8–1 mm in diam. Fl. and fr. Jul–Oct.

1100–4900 m. Gansu, Hebei, W Hubei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Sikkim].

- 1a. Stems branched throughout; stem leaf blades ovate-lanceolate to triangular-lanceolate 1b. var. *ovatodeltoidea*
1b. Stems branched from base; stem leaf blades oblong to elliptic-lanceolate.
2a. Corolla blue 1a. var. *paludosa*
2b. Corolla yellowish white to yellow
..... 1c. var. *alpina*

1a. *Gentianopsis paludosa* var. *paludosa*

湿生扁蕾 (原变种) shi sheng bian lei (yuan bian zhong)

Gentiana detonsa Rottbøll var. *paludosa* Munro ex J. D. Hooker, Hooker's Icon. Pl. 9: t. 857. 1852; *G. detonsa* var. *nana* Ling; *G. detonsa* var. *stracheyi* C. B. Clarke; *Gentianopsis longistyla* Ma.

Stem branched from base. Stem leaf blades elliptic-lanceolate to oblong. Corolla blue, sometimes pale yellow at base.

Beside streams, meadow slopes, forests; 1100–4900 m. Gansu, Hebei, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Nepal, Sikkim].

1b. *Gentianopsis paludosa* var. *ovatodeltoidea* (Burkill) Ma in T. N. Ho, Acta Biol. Plateau Sin. 1: 42. 1982.

卵叶扁蕾 luan ye bian lei

Gentiana detonsa Rottbøll var. *ovatodeltoidea* Burkill, J. Proc. Asiat. Soc. Bengal 2: 319. 1906; *Gentianella scabro-marginata* Harry Smith.

Stem branched throughout. Stem leaf blades ovate-lanceolate to triangular-lanceolate. Corolla blue, sometimes pale yellow at base.

• Meadows on hills, wet places, forests; 1100–3000 m. Gansu, Hebei, W Hubei, Nei Mongol, Qinghai, Shaanxi, Shanxi, Sichuan, NW Yunnan.

1c. *Gentianopsis paludosa* var. *alpina* T. N. Ho, Acta Biol. Plateau Sin. 1: 41. 1982.

高原扁蕾 gao yuan bian lei

Stem branched from base. Stem leaf blades oblong to elliptic-lanceolate. Corolla pale yellow-white to yellow.

• Stream banks, swamps, alpine meadows, forests; 2800–4000

m. Qinghai, Xizang.

2. *Gentianopsis contorta* (Royle) Ma, Acta Phytotax. Sin. 1(1): 14. 1951.

回旋扁蕾 hui xuan bian lei

Gentiana contorta Royle, Ill. Bot. Himal. Mts. 1: 278. 1835; *G. yamatsutae* Kitagawa; *Gentianopsis contorta* var. *wui* Ma.

Annuals 8–35 cm tall. Stems usually dark purple, erect, branched apically. Basal leaves short petiolate; leaf blade spatulate to obovate, 0.5–1.5 cm × 4–7 mm, base narrowed, margin ciliolate, apex rounded, midvein distinct. Stem leaves 2–6 pairs, sessile, elliptic to ovate-elliptic, 0.8–3 cm × 4–10 mm, base cuneate, margin ciliolate, apex obtuse to rounded, midvein distinct. Pedicel erect, (1–)2–3(–8.5) cm. Calyx 2–3 cm; lobes subequal, margin membranous; outer lobes lanceolate, 5–11 mm, apex subacuminate; inner lobes ovate-triangular to triangular, 4–10 mm, apex acute. Corolla blue to dark blue, tubular-funnelform, 2.5–5 cm × 6–10 mm; lobes elliptic, 5–13 × to 7 mm, apex rounded and sometimes crenulate, margin not fringed. Filaments to 1.5 cm; anthers ellipsoid, ca. 2 mm. Style short. Capsules cylindrical, as long as corolla; gynophore to 1.3 cm. Seeds brown, subglobose. Fl. and fr. Aug–Oct.

Slopes, forests; 1900–3600 m. Guizhou, Liaoning, Qinghai, Sichuan, Xizang, Yunnan [Japan, Nepal].

3. *Gentianopsis lutea* (Burkill) Ma, Acta Phytotax. Sin. 1(1): 13. 1951.

黄花扁蕾 huang hua bian lei

Gentiana detonsa Rottbøll var. *lutea* Burkill, J. Proc. Asiat. Soc. Bengal 2: 319. 1906.

Annuals 10–30 cm tall. Stems usually dark purple, erect, simple or apically branched. Basal leaves short petiolate; leaf blade spatulate to obovate-spatulate, 0.7–1.5 cm × 3–8 mm, base narrowed, apex obtuse to rounded. Stem leaves sessile, oblong, 1.2–4 × 0.3–1 cm, base rounded and subamplexicaul, apex obtuse, midvein distinct. Pedicel erect, to 5 cm, subquadrangular. Calyx 2–2.5 × ca. 1.2 cm; lobes subequal, 6–7 mm, with strong keeled ridges outside; outer lobes triangular-lanceolate to triangular, ca. 5 mm wide, apex acute; inner lobes ovate-triangular, to 7 mm wide, apex obtuse. Corolla pale yellow, broadly tubular, 3–4 × ca. 1 cm; lobes oblong, ca. 1 cm, margin not fringed, apex rounded and denticulate. Nectaries oblong. Filaments flattened, to 1.5 cm; anthers ellipsoid, ca. 3 mm. Style short. Capsules narrowly ellipsoid, as long as corolla; gynophore present. Seeds ellipsoid, ca. 0.5 mm. Fl. and fr. Sep–Oct.

• Gravel slopes; ca. 2300 m. Yunnan (Kunming Shi).

4. *Gentianopsis grandis* (Harry Smith) Ma, Acta Phytotax. Sin. 1(1): 9. 1951.

大花扁蕾 da hua bian lei

Gentiana grandis Harry Smith, Anz. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 63: 100. 1926.

Annuals or biennials 25–50 cm tall. Stems erect, to 5 mm in diam., usually branched from base. Basal leaves crowded, short petiolate; leaf blade spatulate to elliptic, 0.5–1.5 cm × 5–8 mm, base narrowed, apex obtuse, midvein distinct. Stem leaves 3–6 pairs, sessile, narrowly lanceolate, 4–8 cm × 3–6 mm, margin slightly revolute, apex acute, midvein distinct. Pedicel erect, 5–16 cm, subquadrangular. Calyx narrowly funnelform, 3.5–7 cm; outer lobes linear-lanceolate, 2.5–5 cm, apex caudate; inner lobes triangular-lanceolate, 1.5–2.5 cm, apex acute; all lobes with margin broadly membranous. Corolla blue, sometimes pale yellow basally, funnelform, 5–10 × 1–1.7 cm; lobes elliptic, 2–3 × 1–1.5 cm, apex obtuse and crenulate, margin long laciniate-fringed basally. Nectaries suborbicular. Filaments 1.7–2.1 cm; anthers narrowly ellipsoid, ca. 3 mm. Style linear, 3–5 mm. Capsules as long as corolla; gynophore present. Seeds brown, ellipsoid, ca. 1 mm. Fl. and fr. Jul–Oct.

• Stream and river banks in valleys, hillsides; 2000–4100 m. SW Sichuan, NW Yunnan.

5. *Gentianopsis barbata* (Froelich) Ma, Acta Phytotax. Sin. 1(1): 8. 1951.

扁蕾 bian lei

Annuals or biennials 8–40 cm tall. Stems erect, subterete, striate, branched apically. Basal leaves short petiolate; leaf blade spatulate to oblanceolate, 7–10 × 4–10 mm, base narrowed, apex obtuse, midvein distinct. Stem leaves 3–10 pairs, sessile, linear to narrowly lanceolate, 1.5–8 cm × 3–9 mm, margin slightly ciliolate, apex acuminate, midvein distinct. Pedicel erect, to 15 cm, elongated in fruit, subterete, striate. Outer calyx lobes 7–20 mm; inner calyx lobes 6–12 mm. Corolla tubular-funnelform, 2.5–5 × ca. 1.2 cm; lobes elliptic, 6–12 × 6–8 mm, margin short laciniate-fringed basally, apex rounded, denticulate, and mucronate. Nectaries suborbicular, nodding. Filaments 0.8–1.2 cm; anthers narrowly ellipsoid, ca. 3 mm. Style linear, 1–1.5 mm. Capsules as long as corolla, on a short gynophore. Seeds brown, ellipsoid, ca. 1 mm. Fl. and fr. Jul–Sep.

700–4700 m. Gansu, Guizhou, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Xizang, Yunnan [Japan, Kazakhstan, Kyrgyzstan, Mongolia, Russia].

- 1a. Basal leaves withered at anthesis; calyx slightly shorter to equaling corolla, 6–10 mm in diam.; outer lobes linear-lanceolate, inner lobes ovate-lanceolate 5a. var. *barbata*
- 1b. Basal leaves forming a well-developed rosette at anthesis; calyx ca. 1/2 as long as corolla, 3–4 mm in diam.; all lobes linear-subulate.
 - 2a. Corolla lobes pale blue to blue 5b. var. *stenocalyx*
 - 2b. Corolla lobes pale yellow 5c. var. *albiflavida*

5a. *Gentianopsis barbata* var. *barbata*

扁蕾 (原变种) bian lei (yuan bian zhong)

Gentiana barbata Froelich, *Gentiana* 114. 1796;
Gentianopsis barbata var. *sinensis* Ma.

Calyx slightly shorter to equaling corolla, 6–10 mm in diam., outer lobes linear-lanceolate, inner lobes ovate-lanceolate. Corolla pale blue to blue, basally pale yellow.

Beside streams, meadows, scrub, forests; 700–4400 m. Gansu, Guizhou, Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Xinjiang, Yunnan [Japan, Kazakhstan, Kyrgyzstan, Mongolia, Russia].

5b. *Gentianopsis barbata* var. *stenocalyx* H. W. Li in T. N. Ho, *Acta Biol. Plateau Sin.* 1: 40. 1982.

细萼扁蕾 xi e bian lei

Calyx ca. 1/2 as long as corolla, 3–4 mm in diam., lobes linear-subulate. Corolla pale blue to blue, basally pale yellow.

• River banks, beside streams, shady slopes, forest margins; 3300–4700 m. Qinghai, NW Sichuan, Xizang.

5c. *Gentianopsis barbata* var. *albiflvida* T. N. Ho, *Acta Biol. Plateau Sin.* 1: 41. 1982.

黄白扁蕾 huang bai bian lei

Calyx ca. 1/2 as long as corolla, 3–4 mm in diam., lobes linear-subulate. Corolla pale yellow.

• Swamp meadows, meadow slopes, *Juniperus* forests; 3200–4100 m. Qinghai.

18. COMASTOMA (Wettstein) Toyokuni, *Bot. Mag. (Tokyo)* 74: 198. 1961.

喉毛花属 hou mao hua shu

Gentiana sect. *Comastoma* Wettstein, *Oesterr. Bot. Z.* 46: 174. 1896.

Herbs annual with fibrous rootlets or perennial with short rhizomes. Stems branched from base (simple in *C. disepalum*). Inflorescences racemelike, sometimes reduced to a solitary terminal flower. Flowers 4- or 5-merous. Calyx lobed nearly to base, without an intracalycular membrane. Corolla tubular, tubular-funnelform, or salverform; lobes each with 1 or 2 basal scales; scales fringed with nonvascularized white fimbriae; plicae absent. Nectaries at base of corolla tube. Stamens inserted on corolla tube; filaments white. Capsules 2-valved, many seeded. Seed coat smooth.

Fifteen species: North America, Asia, Europe; 11 species in China.

- 1a. Calyx 2-lobed, enveloping corolla tube 1. *C. disepalum*
1b. Calyx 4- or 5-lobed, not enveloping corolla tube.
2a. Perennials.
3a. Leaves mostly restricted to near base of stem; stem leaves few pairs; corolla 1.4–2.5 cm, lobes each bearing 2 scales 2. *C. cyananthiflorum*
3b. Basal leaves absent or poorly developed; stem leaves 4–7 pairs; corolla 0.6–1.3 cm, lobes each bearing 1 scale 3. *C. stellariifolium*
2b. Annuals or biennials.
4a. Corolla salverform.
5a. Calyx ca. 1/2 as long as corolla, lobes falcate, apex acuminate; stem leaf blades 3–4(–6) mm wide 6. *C. falcatum*
5b. Calyx 1/4–1/3 as long as corolla, lobes erect, apex acute to obtuse; stem leaf blades 5–13 mm wide.
6a. Stem leaf blades oblong to broadly ovate; calyx lobes ovate-lanceolate to ovate; filaments pilose at base 4. *C. traillianum*
6b. Stem leaf blades lanceolate to elliptic; calyx lobes linear-lanceolate; filaments glabrous 5. *C. muliense*
4b. Corolla tubular.
7a. Stem leaf blade bases obtuse to rounded, subamplexicaul; corolla lobes shorter than tube, suberect 7. *C. pulmonarium*
7b. Stem leaf blade bases narrowed or cuneate (rounded and abruptly contracted in *C. henryi*), not amplexicaul; corolla lobes equaling tube, spreading (erect in *C. henryi*).
8a. Stem leaves petiolate; leaf blades widest above middle; calyx lobes oblong-spatulate to narrowly elliptic 8. *C. henryi*
8b. Stem leaves sessile; leaf blades oblong or widest at or below middle; calyx lobes lanceolate to ovate.
9a. Corolla dark blue to blue-purple with dark blue veins and pale yellow base 11. *C. pedunculatum*
9b. Corolla uniformly blue or pale blue.
10a. Calyx lobes acuminate, margin undulate rugose and revolute 9. *C. polycladum*
10b. Calyx lobes apiculate, margin flat and smooth 10. *C. tenellum*

1. *Comastoma disepalum* H. W. Li in T. N. Ho, *Acta Biol. Plateau Sin.* 1: 37. 1982.

二萼喉毛花 er e hou mao hua

Annuals 2–7 cm tall. Stems erect, subquadrangular.

Basal leaves withered at anthesis. Lower stem leaf petioles slender, to 3 cm; leaf blade spatulate to obovate, 3–6 × 2–3.5 mm, base cuneate, margin usually purple, apex rounded, reticulate veins slender. Middle to upper stem leaves sessile, oblong to ovate-orbicular, 3–9 × to 5 mm, base and apex subrounded, reticulate veins slender. Flowers terminal, solitary. Calyx lobes 2, foliose, broadly oblong to ovate-orbicular, 5–10 × 4–6 mm, margin purple, apex rounded, reticulate veins purple. Corolla pale blue, 5-merous, tubular, 7–12 mm; lobes broadly oblong to obovate-oblong, 2–3 mm, scale 1, apex rounded. Nectaries 10, brown. Stamens inserted at middle of corolla tube; filaments ca. 2 mm; anthers blue, ellipsoid, 0.5–0.7 mm. Ovary ellipsoid, 5–6.5 mm. Style indistinct; stigma lobes suborbicular. Fl. Sep.

- Meadows around lakes, alpine slopes; 4200 m. NW Yunnan.

2. *Comastoma cyananthiflorum* (Franchet) Holub, *Folia Geobot. Phytotax.* 2: 120. 1967.

藍钟喉毛花 lan zhong hou mao hua

Perennials 5–15 cm tall. Stems ascending, subquadrangular; stem sheathed by blackish remains of old petioles. Basal leaf petiole flattened, to 1.5 cm; leaf blade 1.5–2.8 cm × 3–7 mm. Stem leaves short petiolate; leaf blade 5–10 × 3–6 mm, base obtuse, apex obtuse to rounded. Flowers terminal, solitary. Pedicel ascending, to 4.5 cm, subquadrangular. Calyx lobes slightly unequal, lanceolate to ovate-lanceolate, 6–10 mm, apex acute, midvein distinct. Corolla blue, salverform, 1.4–2.5 cm; lobes oblong to obovate-oblong, 0.8–1.5 cm, scales 2, fimbriae 2.5–3 mm, apex obtuse to rounded. Nectaries 10. Stamens inserted at middle of corolla tube; filaments white, 2–2.5 mm; anthers yellow, ellipsoid, ca. 1.2 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid. Seeds brown, globose, 0.5–0.7 mm in diam.; seed coat smooth. Fl. Jun–Oct.

- 3000–4900 m. SE Qinghai, Sichuan, SE Xizang, NW Yunnan.

- 1a. Leaf blade spatulate to obovate, apex rounded 2a. var. *cyananthiflorum*
1b. Leaf blade ovate-elliptic to ovate, apex acute 2b. var. *acutifolium*

2a. *Comastoma cyananthiflorum* var. *cyananthiflorum*

藍钟喉毛花 (原变种) lan zhong hou mao hua (yuan bian zhong)

Gentiana cyananthiflora Franchet in F. B. Forbes & Hemsley, *J. Linn. Soc.*, Bot. 26: 126. 1890; *Gentianella maclarenii* Harry Smith.

Leaf blade spatulate to obovate, base abruptly contracted to obtuse, apex rounded.

- Meadow slopes, alpine meadows, scrub meadows, forests; 3000–4900 m. SE Qinghai, Sichuan, SE Xizang, NW Yunnan.

2b. *Comastoma cyananthiflorum* var. *acutifolium* Ma & H. W. Li in T. N. Ho, *Acta Biol. Plateau Sin.* 1: 37. 1982.

件叶喉毛花 jian ye hou mao hua

Leaf blade ovate-elliptic to ovate, apex acute.

- Grasslands, slopes; 3500–3700 m. NW Yunnan.

3. *Comastoma stellariifolium* (Franchet) Holub, *Folia Geobot. Phytotax.* 3: 217. 1968.

纤细喉毛花 xian xi hou mao hua

Gentiana stellariifolia Franchet in F. B. Forbes & Hemsley, *J. Linn. Soc.*, Bot. 26: 135. 1890; *Gentianella stellariifolia* (Franchet) Harry Smith.

Perennials 8–20 cm tall. Stems ascending, subquadrangular. Basal leaves poorly developed, sessile, elliptic to ovate, 2.5–4.5 × 1.2–1.7 mm, base slightly contracted, apex acute. Flowers terminal, solitary. Pedicel ascending, to 6.5 cm, slender, subquadrangular. Calyx 2.5–6 mm; lobes spreading, slightly unequal, lanceolate to narrowly elliptic, apex acuminate to acute, midvein indistinct. Corolla blue, tubular-funnelform to salverform, 6–10(–13) mm; lobes narrowly oblong to obovate-oblong, 3.5–4.5(–6) mm, scale 1, fimbriae ca. 1.5 mm, apex obtuse to rounded. Nectaries 10. Stamens inserted just above middle of corolla tube; filaments 1.2–1.3 mm, base decurrent into pubescent wings of corolla tube; anthers yellow, ellipsoid, ca. 1.2 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 8–9 mm. Seeds brown, subglobose, ca. 0.5 mm; seed coat smooth. Fl. and fr. Sep–Nov.

- River banks, swamp margins, slopes, alpine meadows, scrub, forests; 2800–4100 m. NW Yunnan [Bhutan, Myanmar, Nepal, Sikkim].

4. *Comastoma traillianum* (Forrest) Holub, *Folia Geobot. Phytotax.* 2: 120. 1967.

高杯喉毛花 gao bei hou mao hua

Gentiana trailliana Forrest, *Notes Roy. Bot. Gard. Edinburgh* 4: 69. 1905; *G. beesiana* W. W. Smith; *G. trailliana* var. *minima* C. Marquand.

Annuals 5–30 cm tall. Stems erect, terete, striate. Basal leaves withered at anthesis. Stem leaves sessile, oblong to broadly ovate, 0.6–3.8 × 0.5–1(–1.3) cm, base obtuse to rounded and subamplexicaul, apex acute to obtuse; veins 1–3, abaxially distinct. Inflorescences racemelike, rarely 1-flowered. Pedicel erect, to 5 cm, striate. Calyx 5–7 mm; lobes slightly unequal, ovate-lanceolate to ovate, to 5 mm wide, margin sometimes ciliate, apex obtuse, veins 1–3 and sometimes ciliate. Corolla blue, salverform, 1.5–2.6 cm × to 6 mm; lobes oblong to elliptic, 8–11 × to 6 mm, scales 2, fimbriae ca. 4 mm, apex obtuse to rounded. Nectaries 10. Stamens inserted just below middle of corolla tube; filaments 4.5–5.5 mm, base decurrent into pubescent wings of corolla tube; anthers yellow, ellipsoid, ca. 2 mm. Ovary ovoid-ellipsoid, 1.2–1.5 cm. Style indistinct; stigma lobes suborbicular. Fl. Aug–Oct.

• Grassland slopes, alpine meadows, forests; 3000–4200 m. S Sichuan, NW Yunnan.

5. *Comastoma muliense* (C. Marquand) T. N. Ho, Acta Biol. Plateau Sin. 1: 38. 1982.

木里喉毛花 mu li hou mao hua

Gentiana muliensis C. Marquand, Bull. Misc. Inform. Kew 1928: 53. 1928.

Annuals 5–10 cm tall. Stems ascending to erect, subquadrangular. Leaves sessile, lanceolate to elliptic, 1–2.5 cm × to 6 mm, base obtuse, apex acute to obtuse, midvein distinct. Flowers terminal, solitary. Pedicel tinged purple, erect, 4–8 cm, subquadrangular. Calyx 5–6 mm; lobes slightly unequal, linear-lanceolate, apex acute to obtuse, midvein distinct. Corolla blue-purple, salverform, 1.8–2.8 cm; lobes oblong to obovate-oblong, 8–10 mm, scales 2, apex rounded. Nectaries 10. Stamens inserted just above middle of corolla tube; filaments 1.2–1.3 mm, base decurrent into wings of corolla tube; anthers yellow, ellipsoid, ca. 1.2 mm. Style indistinct; stigma lobes suborbicular. Capsules narrowly ellipsoid. Seeds brown, subglobose, 0.5–0.6 mm; seed coat smooth. Fl. and fr. Sep.

• *Pinus* forests; ca. 3100 m. Sichuan (Muli Zangzu Zhixian).

6. *Comastoma falcatum* (Turczaninow ex Karelin & Kirilov) Toyokuni, Bot. Mag. (Tokyo) 74: 198. 1961.

镰萼喉毛花 lian e hou mao hua

Gentiana falcata Turczaninow ex Karelin & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 15: 404. 1842; *G. cordisepala* Murbeck; *G. hedinii* Murbeck.

Annuals 4–25 cm tall. Stems ascending to erect, subquadrangular, branched from base. Leaves mostly basal; petiole to 2 cm; leaf blade oblong to oblong-spatulate, 0.5–1.5 cm × 3–6 mm, base cuneate, apex obtuse to rounded, midvein distinct. Stem leaves sessile, oblong, rarely ovate-oblong to ovate, 0.8–1.5 cm × 3–4(–6) mm, apex obtuse. Flowers terminal, solitary. Pedicel tinged purple, erect, 4–6(–12) cm, subquadrangular. Calyx 6–12 mm, tube saccate at base; lobes falcate-curved, unequal, usually ovate-lanceolate, rarely oblong, lanceolate, or broadly ovate, margin slightly undulate, apex acuminate, midvein distinct. Corolla blue, dark blue, or blue-purple, with blackish veins, salverform, (0.9–)1.2–2.5 cm × ca. 9 mm; lobes spatulate-oblong to oblong, 5–13 × to 7 mm, scales 2, fimbriae to 4 mm, apex rounded. Nectaries 10. Stamens inserted at middle of corolla tube; filaments 5–6 mm, base decurrent into wings of corolla tube; anthers yellow, ellipsoid, 1.5–2 mm. Style indistinct; stigma lobes suborbicular. Capsules narrowly ellipsoid to ovoid-ellipsoid, 8–11 mm. Seeds brown, subglobose, ca. 0.7 mm in diam.; seed coat smooth. Fl. and fr. Jul-Sep.

River banks, grassland slopes, scrub, alpine meadows, forests; 2100–5300 m. Gansu, Hebei, Nei Mongol, Qinghai, Shanxi, NW Sichuan, Xinjiang, Xizang [India, Kashmir, Kyrgyzstan, Mongolia, Nepal, Russia (Siberia), Tajikistan].

7. *Comastoma pulmonarium* (Turczaninow) Toyokuni, Bot. Mag. (Tokyo) 74: 198. 1961.

喉毛花 hou mao hua

Gentiana pulmonaria Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 22(4): 317. 1849; *G. arrecta* Franchet; *G. holdereriana* Diels & Gilg.

Annuals 5–30 cm tall. Stems erect, subquadrangular, branched from base. Basal leaves few; leaf blade oblong to oblong-spatulate, 1.5–2.2 × 0.5–0.7 cm, base cuneate, apex rounded, midvein distinct. Stem leaves sessile, ovate-lanceolate, 0.6–2.8 cm × 3–10 mm, base obtuse to rounded and subamplexicaul, apex acute to obtuse, veins 1–3. Flowers in terminal and axillary cymes or solitary. Pedicel erect, to 4 cm, subquadrangular. Calyx spreading, slightly unequal, 6–8 mm; lobes narrowly elliptic, lanceolate, or ovate-triangular, margin scabrous to ciliolate, apex acute, veins 1–3. Corolla pale blue, with dark blue veins, tubular to broadly tubular, (0.9–)1.5–2(–2.3) cm; lobes erect, ovate-elliptic, elliptic-triangular, or ovate-triangular, 5–6 mm, scale 1, apex acute. Nectaries 10. Stamens inserted just above middle of corolla tube; filaments ca. 3 mm, base decurrent into wings of corolla tube; anthers yellow, ellipsoid, ca. 1 mm. Style indistinct; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 2–2.7 cm. Seeds light brown, subglobose, 0.8–1 mm in diam.; seed coat smooth. Fl. and fr. Jul-Nov.

River banks, meadow slopes, scrub, alpine meadows, forests; 3000–4800 m. Gansu, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [Japan, Russia (E Siberia)].

8. *Comastoma henryi* (Hemsley) Holub, Folia Geobot. Phytotax. 2: 120. 1967.

鄂西喉毛花 e xi hou mao hua

Gentiana henryi Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 128. 1890.

Annuals 4–6 cm tall. Stems prostrate to ascending, slender, terete, striate, branched from base. Basal leaves withered at anthesis. Stem leaf petiole slender, to 5 mm; leaf blade spatulate to obovate, ca. 11 × to 4 mm including petiole, base rounded and abruptly contracted into a petiole, apex rounded, veins 1–3. Flowers terminal, solitary. Pedicel erect, to 3 cm, terete, striate. Calyx spreading, 3–3.5 mm; lobes slightly unequal, oblong-spatulate to narrowly elliptic, base narrowed, apex acute, veins 1–3 and indistinct. Corolla blue, narrowly tubular, 5.5–6.5 mm, to 10 mm in fruit; lobes erect, lanceolate, 2–3 mm, scale 1, apex acute to obtuse. Nectaries 10. Stamens inserted at middle of corolla tube; filaments 1.5–2 mm; anthers yellow, ellipsoid, ca. 1.5 mm. Style indistinct; stigma lobes suborbicular. Capsules narrowly ellipsoid, 6.5–7.5 mm. Seeds light brown, subglobose, 0.4–0.5 mm in diam.; seed coat smooth. Fl. and fr. Aug-Sep.

• Grassland slopes. W Hubei, E Sichuan.

9. *Comastoma polycladum* (Diels & Gilg) T. N. Ho, Acta Biol. Plateau Sin. 1: 39. 1982.

皱边喉毛花 zhou bian hou mao hua

Gentiana polyclada Diels & Gilg in Futterer, *Durch Asien*, Bot. Repr. 3: 16. 1903; *G. limprichtii* Grüning.

Annuals 8–20 cm tall. Stems erect, much branched from base, subquadrangular, scabrous along striae. Basal leaves withered at anthesis, short petiole; leaf blade spatulate, 6–11 × 2.5–5 mm including petiole, base cuneate, apex rounded, midvein distinct. Stem leaves sessile, elliptic-lanceolate to elliptic, to 2 × 0.5 cm, margin usually undulate and revolute, apex obtuse, midvein indistinct. Flowers in terminal and axillary cymes or solitary. Pedicel to 11 cm, spreading to erect, subquadrangular. Calyx 6.5–9 mm; lobes slightly unequal, lanceolate to ovate-lanceolate, margin revolute and dark purple, apex acuminate, midvein distinct. Corolla blue, tubular, 1–1.5 cm × 3–4 mm; lobes erect, narrowly elliptic, 5–7 mm, scales 2, fimbriae ca. 2.5 mm, apex obtuse. Nectaries 10. Stamens inserted at middle of corolla tube; filaments ca. 3.5 mm, base decurrent into wings of corolla tube; anthers yellow, ellipsoid, ca. 1 mm. Style indistinct; stigma lobes suborbicular. Capsules narrowly ellipsoid to ellipsoid, 1.2–1.5 cm. Seeds light brown, ellipsoid, 0.5–0.7 mm; seed coat smooth. Fl. and fr. Aug-Sep.

• River banks, meadow slopes, wet places; 2100–4500 m. Gansu, Qinghai, Nei Mongol, Shanxi.

10. *Comastoma tenellum* (Rottbøll) Toyokuni, Bot. Mag. (Tokyo) 74: 198. 1961.

长梗喉毛花 chang geng hou mao hua

Gentiana tenella Rottbøll, Skr. Naturhist.-Selsk. 10: 436. 1770.

Annuals 5–12 cm tall. Stems ascending to erect, subquadrangular, branched from base. Basal leaves few, short petiole; leaf blade spatulate to oblong-spatulate, 5–8 × 2–3 mm including petiole, base cuneate, apex rounded, midvein distinct. Stem leaves sessile, oblong to ovate-oblong, 4–11 × 2–4 mm, apex acute, with reticulate veins. Flowers terminal, solitary, often 4-merous. Pedicel spreading to erect, to 8 cm. Calyx lobes slightly unequal, lanceolate to ovate, 6–7 × 2.5–3 mm, apex acute. Corolla pale blue to blue, tubular, 7–11 × to 3 mm; lobes spreading, oblong, 2–3 mm, scales 2,

fimbriae ca. 1.5 mm, apex obtuse. Nectaries 8. Stamens inserted just below middle of corolla tube; filaments subulate, ca. 2 mm, base decurrent into wings of corolla tube; anthers yellow, ovate. 0.5–0.7 mm. Ovary ovoid-ellipsoid, ca. 7 mm. Style indistinct; stigma lobes oblong. Capsules exerted from persistent corolla. Seeds (immature) ovoid; seed coat smooth. Fl. and fr. Jun.

Hillsides, wet places; ca. 2600 m. Xinjiang [Mongolia].

11. *Comastoma pedunculatum* (Royle ex D. Don) Holub, Folia Geobot. Phytotax. 3: 218. 1968.

柔弱喉毛花 rou ruo hou mao hua

Eurythalia pedunculata Royle ex D. Don, London Edinburgh Philos. Mag. & J. Sci. 8: 76. 1836; *Gentianella pedunculata* (Royle ex D. Don) Harry Smith.

Annuals 5–15 cm tall. Stems ascending, subquadrangular, branched from base. Basal leaves few, short petiole; leaf blade oblong-spatulate, 0.5–1.6 cm × to 3 mm including petiole, base narrowed, apex obtuse to rounded, midvein distinct. Stem leaves sessile, elliptic to ovate-oblong, 2–12 × 2–5 mm, base obtuse, apex acute, midvein indistinct. Flowers terminal, solitary, often 5-merous on main stem but 4-merous on lateral branches. Pedicel spreading, to 20 cm, subquadrangular. Calyx 1.5–4 mm, tube shallowly saccate at base; lobes slightly unequal, lanceolate to ovate-lanceolate, margin sometimes blackish, apex acuminate to acute. Corolla dark blue to blue-purple, with pale yellow base and dark blue veins, tubular, 6–10 × ca. 4 mm, to 1.8 cm in fruit; lobes suberect, ovate-oblong, 3–11 mm, scale 1, fimbriae 2–2.5 mm, apex obtuse. Nectaries 10. Stamens inserted at middle of corolla tube; filaments ca. 3 mm, base decurrent into wings of corolla tube; anthers yellow, ellipsoid, ca. 1 mm. Style indistinct; stigma lobes oblong. Capsules exerted from persistent corolla. Seeds dark brown, subglobose; seed coat smooth. Fl. and fr. Jul-Oct.

River banks, alpine meadows; 3200–4800 m. Gansu, Qinghai, W Sichuan, Xizang, NW Yunnan [Bhutan, India, Kashmir, Nepal, Sikkim].

19. GENTIANELLA Moench, Methodus 482. 1794.

假龙胆属 jia long dan shu

Aliopsis Omer & Qaiser; *Aloitis* Rafinesque.

Herbs annual, biennial [or perennial]. Leaves opposite [or whorled]. Flowers terminal, solitary or in cymes, 4- or 5-merous. Calyx without intracalycular membrane. Corolla tubular or funnellform, either without appendages or with a vascularized fringed scale across base of each lobe, plicae absent. Nectaries at base of corolla tube. Stamens inserted on corolla tube. Capsules 2-valved, many seeded. Seeds smooth to warty.

About 125 species: N and S temperate zones; nine species in China.

- 1a. Corolla lobes fimbriate at base; calyx lobes keeled; stem branched apically 9. *G. acuta*
1b. Corolla lobes glabrous at base; calyx lobes not keeled; stem branched from base.
2a. Flowers 5-merous.
3a. Anthers blue; calyx lobe margins and midveins blackish; sinus between lobes cuneate 8. *G. azurea*
3b. Anthers yellow; calyx lobe margins and midveins not blackish; sinus between lobes acute or rounded.

- 4a. Stem leaf blades linear; corolla lobes apically obtuse 6. *G. moorcroftiana*
 4b. Stem leaf blades ovate-lanceolate to ovate; corolla lobes apically mucronate.
 5a. Plants 5–8 cm tall; stem densely purple pilose; leaves petiolate; calyx herbaceous, sinus between lobes acute 1. *G. gentianoides*
 5b. Plants 10–45 cm tall; stem glabrous; leaves sessile; calyx membranous, sinus between lobes rounded 2. *G. turkestanorum*
- 2b. Flowers 4-merous.
 6a. Leaves sessile, blade base and apex attenuate 7. *G. angustiflora*
 6b. Leaves petiolate, blade base narrowed to abruptly contracted, apex obtuse to rounded.
 7a. Calyx lobes unequal in width; corolla lobes densely papillate outside 3. *G. anomala*
 7b. Calyx lobes all similar in width; corolla lobes glabrous outside.
 8a. Calyx lobes spatulate, apically recurved; corolla purple 4. *G. arenaria*
 8b. Calyx lobes elliptic to rhomboid, erect; corolla pale yellow 5. *G. pygmaea*

1. *Gentianella gentianoides* (Franchet) Harry Smith in Handel-Mazzetti, Symb. Sin. 7: 981. 1936.

密花假龙胆 mi hua jia long dan

Swertia gentianoides Franchet, Bull. Soc. Bot. France 46: 314. 1899; *Gentiana scabratoipes* W. W. Smith.

Annuals 5–8 cm tall. Stems erect, branched from base, purple pilose. Basal leaves few, withered at anthesis. Stem leaf petiole flattened, to 6 mm, ciliolate; leaf blade usually tinged purple, ovate, ca. 1.2 × 1.2 cm, base contracted, margin scabrous, apex obtuse, veins 3. Cymes axillary and terminal, many flowered, crowded. Flower 5-merous. Pedicel slender, 0.2–2 cm. Calyx 5–8 mm; lobes usually tinged purple, narrowly elliptic, 3.5–7 mm, sinus between lobes acute, margin scabrous, apex acuminate and caudate, veins 1–3. Corolla pale blue, with white toward base, funnelform, 0.6–1.4 cm × 3.5–6 mm; lobes narrowly oblong, 3–7 mm, apex obtuse and mucronate. Nectaries 10, green. Stamens inserted at middle of corolla tube; filaments white, 3–6 mm, base decurrent into wings of corolla tube; anthers yellow, ellipsoid, 0.8–1.8 mm. Style linear, 3–6 mm; stigma lobes suborbicular. Capsules ovoid. Seeds light brown, subglobose, 0.3–0.4 mm in diam.; seed coat reticulate. Fl. and fr. Oct–Nov.

• Grassland slopes, scrub, forests; 2700–4200 m. S Sichuan, NE and W Yunnan.

2. *Gentianella turkestanorum* (Gandoger) Holub, Folia Geobot. Phytotax. 2: 118. 1967.

新疆假龙胆 xin jiang jia long dan

Gentiana turkestanorum Gandoger, Bull. Soc. Bot. France 65: 60. 1918.

Annuals or biennials 10–45 cm tall. Stems erect, subquadrangular, branched from base. Leaves sessile, ovate-lanceolate to ovate, to 4.5 × 2 cm, base obtuse to rounded, margin usually revolute, apex acute, veins distinct. Cymes many flowered, crowded, each cyme subtended by 2 large ovate-lanceolate bracts. Flowers 5-merous, variable in size, terminal ones 2–3 × larger than others. Calyx tube 1.5–7(–9) mm, membranous; lobes linear to linear-elliptic, 2–10 × ca. 1 mm, unequal, sinus between lobes rounded, margin scabrous, apex acute and long apiculate, midvein distinct. Corolla pale blue, with dark blue veins, tubular to campanulate-tubular, 0.7–2 cm; lobes elliptic-triangular to

elliptic, 3–7 mm, apex obtuse and mucronate. Nectaries 10, green, oblong. Stamens inserted at basal part of corolla tube; filaments white, ca. 7 mm, base decurrent into narrow wings of corolla tube; anthers yellow, ellipsoid, ca. 1.2 mm. Style linear; stigma lobes suborbicular. Gynophore 1.8–2.2 cm. Seeds light brown, subglobose, ca. 0.8 mm in diam.; seed coat reticulate. Fl. and fr. Jun–Jul.

Moist places around lakes, river banks, shady meadow slopes, forests; 1500–3100 m. N Xinjiang [Kazakhstan, Mongolia, Russia Tajikistan].

3. *Gentianella anomala* (C. Marquand) T. N. Ho, Acta Biol. Plateau Sin. 1: 39. 1982.

异萼假龙胆 yi e jia long dan

Gentiana anomala C. Marquand, Bull. Misc. Inform. Kew 1928: 49. 1928.

Annuals 1–5 cm tall. Stems erect, slender, simple or branched from base. Basal leaves withered at anthesis. Stem leaves with petiole flattened, 2–7 mm; leaf blade elliptic, ovate-oblong, or broadly ovate, 2–7 × 1.5–4 mm, base narrowed to abruptly contracted, apex obtuse to rounded. Inflorescences 1- to many flowered. Pedicel usually arcuate, filiform, to 2.7 cm. Flower 4-merous, variable in size, terminal ones 2–4 × larger than others. Calyx 1.5–6 mm; lobes dimorphic, 1 pair ovate-elliptic and ca. 2 mm wide, another pair narrowly lanceolate and ca. 1 mm wide, base narrowed, apex acuminate and apiculate. Corolla pale purple, tubular, 2.5–10 mm; lobes lanceolate, 1.5–5 mm, apex acute and apiculate, densely papillate outside. Nectaries 8, green, oblong. Stamens inserted at middle of corolla tube; filaments white, ca. 1.5 mm; anthers ellipsoid, ca. 1 mm. Ovary ovoid-ellipsoid, to 6 mm. Style linear; stigma lobes oblong. Fl. Oct.

• Gravel slopes, sheltered limestone cliffs; 3400–4200 m. NW and S Sichuan, NW Yunnan.

4. *Gentianella arenaria* (Maximowicz) T. N. Ho, Acta Biol. Plateau Sin. 1: 39. 1982.

紫红假龙胆 zi hong jia long dan

Gentiana arenaria Maximowicz, Diagn. Pl. Nov. Asiat. 8: 30. 1892.

Annuals 2–4 cm tall; whole plant dark purple. Stems prostrate to ascending, striate, much branched from base.

Leaves short petiolate; leaf blade spatulate to oblong-spatulate, 5–8 × 1–1.3 mm including petiole, base narrowed, apex rounded, veins indistinct. Flowers terminal, solitary, 4-merous. Calyx 3–4.5 mm; lobes recurved, spatulate, base narrowed, apex subrounded, veins indistinct. Corolla purple, tubular, 5–5.5 × 3–4.5 mm; lobes oblong, 1.6–1.8 mm, apex subrounded. Nectaries 8. Stamens inserted at apical to middle part of corolla tube; filaments white, ca. 2 mm; anthers yellow, ovoid to ellipsoid, 0.2–0.3 mm. Style linear; stigma lobes linear. Capsules ovoid-ellipsoid, 6.5–7 mm. Seeds dark brown, subglobose, to 1 mm; seed coat reticulate. Fl. and fr. Jul-Sep.

• Sandy places on river banks, alpine rocky places; 3400–5400 m. Gansu, Qinghai, N Xizang.

5. *Gentianella pygmaea* (Regel & Schmalhausen) Harry Smith in S. Nilsson, Grana Palynol. 7(1): 144. 1967.

矮假龙胆 ai jia long dan

Gentiana pygmaea Regel & Schmalhausen, Izv. Imp. Obshch. Ljubit. Estestv. Moskovsk. Univ. 34(2): 54. 1882; *Aliopsis pygmaea* (Regel & Schmalhausen) Omer & Qaiser; *G. thomsonii* C. B. Clarke.

Annuals 1–3 cm tall. Stems prostrate to ascending, striate, much branched from base. Leaves short petiolate; leaf blade spatulate to obovate, 3–9 × 1–1.2 mm including petiole, base narrowed, apex obtuse to rounded, veins indistinct. Flowers terminal, solitary, 4-merous. Pedicel ascending, to 2 cm. Calyx 3–4 mm; lobes erect, elliptic to rhomboid, base narrowed, apex subrounded, veins 3 and indistinct. Corolla pale yellow, tubular, 4.5–5.5 × 3–4 mm; lobes oblong, 2–2.5 mm, apex subrounded. Nectaries 8. Stamens inserted just above middle of corolla tube; filaments white, 1.5–2 mm; anthers yellow, ellipsoid, ca. 0.5 mm. Style linear; stigma lobes purple, suborbicular. Capsules ovoid-ellipsoid, 5.5–6 mm. Seeds dark brown, subglobose, 0.7–0.8 mm; seed coat reticulate. Fl. and fr. Jul-Aug.

Sandy slopes, alpine rocky places; 3600–5300 m. Qinghai, N Sichuan, Xinjiang, Xizang [India, Kyrgyzstan, Sikkim, Tajikistan].

6. *Gentianella moorcroftiana* (Wallich ex G. Don) Airy Shaw, Hooker's Icon. Pl. 35: t. 3431. 1943.

普兰假龙胆 pu lan jia long dan

Gentiana moorcroftiana Wallich ex G. Don, Gen. Hist. 4: 182. 1837; *Aliopsis moorcroftiana* (Wallich ex G. Don) Omer, Qaiser, & Ali; *G. moorcroftiana* var. *maddenii* C. B. Clarke.

Annuals 5–20 cm tall. Stems erect, striate, branched from base. Leaves sessile, linear, 6–12 × 1–1.5 mm, base and apex obtuse, margin scabrous, veins indistinct. Cymes axillary and terminal, few flowered. Pedicel to 4 mm. Flowers 5-merous. Calyx 7–8 mm; lobes linear, 4–5.5 mm, slightly unequal, sinus between lobes subrounded, margin scabrous, apex obtuse, veins indistinct. Corolla blue, with pale yellow toward base, tubular, 1.2–1.4 cm; lobes oblong, 2.5–3.5 mm, apex obtuse. Nectaries 10. Stamens inserted at middle of corolla tube; filaments white, 4–5 mm; anthers yellow, ellipsoid, ca. 1.2 mm. Style indistinct; stigma lobes

suborbicular. Capsules ovoid-ellipsoid, ca. 7 mm; gynophore ca. 2 mm, stout. Fl. Aug.

Hillsides; ca. 4500 m. Xizang (Burang Xian) [India, Kashmir, Nepal].

7. *Gentianella angustiflora* Harry Smith, J. Jap. Bot. 56: 275. 1981.

窄花假龙胆 zhai hua jia long dan

Annuals 12–15 cm tall. Stems erect, striate, branched from base. Leaves sessile, lanceolate to elliptic, 0.9–1.2 cm × 2–4 mm, base and apex attenuate, veins indistinct. Cymes axillary and terminal, sometimes secund, few flowered. Flower usually nodding, 4-merous. Pedicel to 2 cm, filiform, striate. Calyx 3.5–5 mm; lobes spreading, narrowly elliptic to elliptic-spatulate, base slightly contracted, margin scabrous, apex obtuse, veins indistinct. Corolla blue, tubular, 9–10 × 3–3.5 mm; lobes broadly elliptic, 2.5–3 mm, apex obtuse to rounded. Nectaries 8, oblong. Stamens inserted at middle of corolla tube; filaments pale blue, flattened, 2.5–3 mm, decurrent basally into narrow wings of corolla tube; anthers yellow, ellipsoid, ca. 0.7 mm. Ovary sessile, ovoid-ellipsoid, ca. 5.5 mm. Style indistinct; stigma lobes suborbicular. Fl. Aug-Sep.

Roadsides, hillsides; 3400–3800 m. Xizang (Nyalam Xian) [Kashmir, Nepal].

8. *Gentianella azurea* (Bunge) Holub, Folia Geobot. Phytotax. 2: 116. 1967.

黑边假龙胆 hei bian jia long dan

Gentiana azurea Bunge, Mém. Soc. Imp. Naturalistes Moscou 7: 230. 1829.

Annuals 2–25 cm tall. Stems ascending to erect, striate, branched from base. Basal leaves withered at anthesis. Stem leaves sessile, oblong, elliptic-lanceolate, or elliptic, 0.3–2.2 cm × 1–7 mm, base narrowed, margin scabrous, apex obtuse, midvein distinct. Cymes axillary and terminal, rarely 1-flowered. Flowers 5-merous. Pedicel to 4.5 cm. Calyx 4–9 mm; lobes linear-lanceolate, elliptic, or ovate-oblong, sinus between lobes cuneate, margin and midvein blackish, apex acute to obtuse. Corolla pale blue to blue, funnellform, 5–14 × 4.5–5.5 mm; lobes oblong, 2–6 mm, apex obtuse. Nectaries 10. Stamens inserted at middle of corolla tube; filaments 2–4.5 mm; anthers blue, ovoid to ellipsoid, 0.4–1 mm. Style linear; stigma lobes suborbicular. Capsules ovoid-ellipsoid, 0.6–1.5 cm. Seeds brown, ellipsoid, 1–1.2 mm; seed coat reticulate. Fl. and fr. Jul-Sep.

Grasslands on hillsides, alpine meadows, scrub, forests; 2200–4900 m. Gansu, Qinghai, NW Sichuan, Xinjiang, Xizang, NW Yunnan [Bhutan, Kazakhstan, Kyrgyzstan, Mongolia, Russia (Siberia)].

9. *Gentianella acuta* (Michaux) Hultén, Memoranda Soc. Fauna Fl. Fenn. 25: 76. 1950.

尖叶假龙胆 jian ye jia long dan

Gentiana acuta Michaux, Fl. Bor.-Amer. 1: 177. 1803;

G. amarella Linnaeus var. *fastigiata* Ling.

Annuals 25–35 cm tall. Stems erect, subquadrangular, branched apically. Basal leaves withered at anthesis. Stem leaves sessile, lanceolate to ovate-lanceolate, 1.5–3.5 cm × 3–10 mm, base obtuse to rounded, apex acute, veins abaxially 3–7. Inflorescences axillary and terminal, forming narrow panicles. Flowers 5- rarely 4-merous. Pedicel slender, 2–8 mm, subquadrangular. Calyx 5–9 mm; lobes narrowly lanceolate, keeled, 4–7 mm, apex acuminate. Corolla blue, tubular, 8–11 × ca. 3 mm; lobes oblong-lanceolate, 3–4 × ca.

1.5 mm, base of each lobe bearing 6 or 7 unequal vascular fimbriae, apex acute. Nectaries 8 or 10. Stamens inserted at middle of corolla tube; filaments ca. 2 mm, decurrent basally into narrow wings of corolla tube; anthers blue, ellipsoid, ca. 1 mm. Style indistinct; stigma lobes suborbicular. Capsules sessile, narrowly ellipsoid, 5–7 mm. Seeds brown, globose, 0.6–0.8 mm in diam.; seed coat warty. Fl. and fr. Aug–Sep.

Hillsides, wet meadows; below 1500 m. Hebei, Heilongjiang, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi [Mongolia, E Russia; North America].

20. JAESCHKEA Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 39(2): 230. 1870.

口药花属 kou yao hua shu

Kurramia Omer & Qaiser.

Herbs annual. Inflorescences terminal and axillary clusters, often forming panicles, sometimes 1-flowered. Flower 4- or rarely 5-merous. Calyx lobed nearly to base. Corolla valvate at base of lobes, apically lobes often folded on 1 side and appearing imbricate, tubular, lobed to middle, plicae absent. Nectaries at base of corolla tube. Stamens inserted at 1 side of base of each corolla lobe, alternating with corolla lobes; filaments very short. Style short. Capsules 2-valved, few seeded. Seeds smooth.

Two species: N India, Kashmir, Pakistan, Sikkim; both species in China.

- 1a. Plants 6–11 cm; stem 1, usually erect; flowers in a umbel-like inflorescence and also in axillary clusters; anthers blue 1. *J. canaliculata*
1b. Plants 1–4 cm; stems many, ascending to erect; flowers solitary; anthers yellow 2. *J. microsperma*

1. *Jaeschkea canaliculata* (Royle ex G. Don) Knoblauch, Bot. Centralbl. 60: 387. 1894.

宽萼口药花 kuan e kou yao hua

Gentiana canaliculata Royle ex G. Don, Gen. Syst. 4: 182. 1837; *Jaeschkea latisejala* C. B. Clarke.

Annuals 6–11 cm tall. Stems purple, erect, striate, simple or few branched. Basal leaves with petiole flattened, 2–2.5 mm; leaf blade spatulate-oblong to obovate, (3–)5–9 × (1.5–) 2–3 mm, base narrowed, apex obtuse to rounded, veins indistinct. Stem leaves sessile; middle leaves oblong, 6–9 × 2–3 mm, base slightly contracted and connate, apex obtuse, midvein abaxially distinct; upper leaves ovate-oblong to ovate, to 12 × 4 mm, base narrowed and free, apex obtuse. Inflorescences umbel-like, terminal, subtended by a whorl of 4 leaves; flowers also in axillary clusters. Flower 5-merous, variable in size. Pedicel 1.5–3 mm. Calyx 5–6 mm when young; lobes spatulate-oblong to oblong, 6–8 mm, base slightly narrowed, apex obtuse, veins 3 and indistinct. Corolla blue, tubular, 8–10 mm; lobes ovate, 4–4.5 mm, apex acute and mucronate. Nectaries 10, oblong. Filaments less than 1 mm; anthers blue, ellipsoid, 1–1.5 mm. Ovary ovoid-ellipsoid, 4–6 mm. Style short; stigma lobes small. Fl. Jul.

Meadows on river banks; ca. 4400 m. SW and W Xizang [Kashmir, Pakistan].

2. *Jaeschkea microsperma* C. B. Clarke in J. D. Hooker, Fl. Brit. India 4: 119. 1883.

小籽口药花 xiao zi kou yao hua

Annuals 1–4 cm tall. Stems ascending to erect, subquadrangular, branched from base. Basal leaves with blade spatulate, 2–4 × ca. 1 mm including petiole, base narrowed, margin scabrous, apex obtuse. Stem leaves sessile, lanceolate to oblong, 2–6 × to 2 mm, base and apex obtuse, veins abaxially indistinct. Flowers terminal, solitary, 5- or rarely 4-merous. Pedicel 0.5–1.5 cm, subquadrangular. Calyx 3–6 mm; lobes oblong to elliptic, 2.5–5 × 1–2 mm, base slightly narrowed, margin scabrous, apex obtuse. Corolla blue-purple, tubular, 4–10 mm; lobes ovate, 1–3 × 1.5–2.5 mm, apex obtuse and mucronate, papillate outside. Nectaries 8 or 10. Filaments less than 1 mm; anthers yellow, ellipsoid, 1–1.2 mm. Style short; stigma lobes small. Capsules ovoid-ellipsoid, to 1.3 cm. Seeds brown, ellipsoid, ca. 1 mm; seed coat smooth. Fl. and fr. Sep.

Meadowland slopes, alpine rocky places; 4300–4600 m. S and W Xizang [N India, Sikkim].