

## 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  $\pm$  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 fastigiate 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 sessile 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 sessile 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 sessile 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 Fütterer, 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 ciliate 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].

