
Two New Species of Gentianaceae from Northwestern Yunnan, China

Ho Ting Nong and Liu Shang Wu

Key Laboratory of Adaptation and Evolution of Plateau Biota, Northwest Institute of Plateau Biology, Chinese Academy of Sciences, Xining 810001, People's Republic of China

ABSTRACT. Two narrowly endemic species of Gentianaceae from northwestern Yunnan Province in China, *Gentiana spathulisepala* T. N. Ho & S. W. Liu and *Swertia lihengiana* T. N. Ho & S. W. Liu, are described, illustrated, and compared with their closest relatives. Keys are also provided for the allied species of *G. spathulisepala* and *S. lihengiana*, respectively.

Key words: China, *Gentiana*, Gentianaceae, IUCN Red List, *Swertia*.

The Gentianaceae, with about 1600 species (Struwe & Albert, 2002), have a cosmopolitan distribution. They are represented in China by 419 species (Ho & Pringle, 1995). During the study of recent collections of the Gentianaceae from northwestern Yunnan Province in China, two new species were identified and are described here.

Gentiana spathulisepala T. N. Ho & S. W. Liu, sp. nov. TYPE: China. Yunnan: Zhongdian, Xianren-dong, in alpine meadows, 3200 m, Oct. 1982, Lü Zheng-wei 82-130 (holotype, KUN; isotype, KUN). Figure 1.

Haec species *Gentianae suborbisepalae* C. Marquand et *G. tongolensis* Franch. affinis, sed ab ambabus corolla azureo-purpurea late atropurpureo-vittata plerumque infundibuliformi ad faucem (9–)10–12 mm lata, staminibus inclusis tubi corollae basin versus sed infra medium insertis atque filamentis 13–15 mm longis, a hac corollae plicis symmetricis atque folioribus 2 vel 3 in fasciculos terminales dispositis, ab illa staminibus aequalibus atque stylo ovario fere aequilongo differt; etiam *G. delavayi* Franch. aliquanto similis, sed ab ea foliis spathulatis usque obovatis atque lobis calycis aequalibus orbiculato-spathulatis vel suborbiculatis bene distincta.

Biennials, 5–7 cm tall; roots slender, yellow, woody; stems ascending, purple, densely purple papillate, much branched from base, with laxly prostrate branches. Basal leaves in a rosette, sometimes withered at anthesis; petioles 1.5–2.5 mm; leaf blade spatulate to obovate, 4–10 × 2–4 mm, apex obtuse to rounded, base narrowed, midvein distinct; stem leaves in 2 to 4 pairs, mostly crowded and surrounding base of flowers, spatulate, 10–22 × 2.5–7 mm, including petiole, apex rounded, margin cartilaginous and scabrous, veins 3, abaxially distinct, base contracted. Flowers 2 or 3 at the stem apex,

crowded in clusters, sessile or subsessile, 5-merous. Calyx 12–17 mm; calyx tube membranous, narrowly obconic; lobes equal, orbiculate-spatulate, 5–7 mm, apex rounded and cuspidate, margin cartilaginous and scabrous, base contracted into a broad tongue, midvein prominent; corolla funnellform, rarely tubular, 22–28 × (9–)10–12 mm (width at throat), blue-purple, outside with broad dark purple stripes; lobes ovate, 4–5 × 1.5–2 mm, apex acute; plicae ovate, 1.5–2 mm, entire; stamens inserted at basal part of corolla tube; filaments 13–15 mm, linear; anthers 2–2.2 mm, ellipsoid; style 8–10 mm, ca. as long as ovary, linear; stigma lobes oblong. Capsules included, 12–14 mm, narrowly ellipsoid; gynophore to 8 mm; seeds 0.6–0.8 mm, ellipsoid, dark brown; seed coat alveolate, with simple shallow hexagonal pits.

Distribution and habitat. *Gentiana spathulisepala* is known only from the type collection. It is endemic to northwestern Yunnan Province in China, where it occurs in alpine meadows at an altitude of 3200 m.

IUCN Red List category. Due to the rarity and limited distribution of *Gentiana spathulisepala*, this species is assessed here as Endangered (EN) according to the IUCN Red List criteria Blab(i,ii,iii) (IUCN, 2001).

Etymology. The specific epithet is from the Latin, in reference to the orbiculate to spatulate calyx lobes.

Relationships. *Gentiana spathulisepala* is similar to *G. suborbisepala* C. Marquand and *G. tongolensis* Franch., but differs from both taxa by its blue-purple corolla with broad, dark purple stripes. The corolla is funnellform, (9–)10–12 mm wide at the throat; the stamens are inserted at the basal part of the corolla tube and are included; and the stamen filaments are 13–15 mm long. The new species also differs from *G. suborbisepala* by the stamens being equal and by the style that is approximately as long as the ovary. *Gentiana spathulisepala* differs from *G. tongolensis* by the symmetrical and entire plicae and the inflorescences in 2- to 3-flowered clusters. *Gentiana spathulisepala* is somewhat similar to *G. delavayi* Franch. in the corolla color and shape, but is easily distinguished by its spatulate to obovate leaves and orbiculate-spatulate calyx lobes. *Gentiana spathulisepala* may be

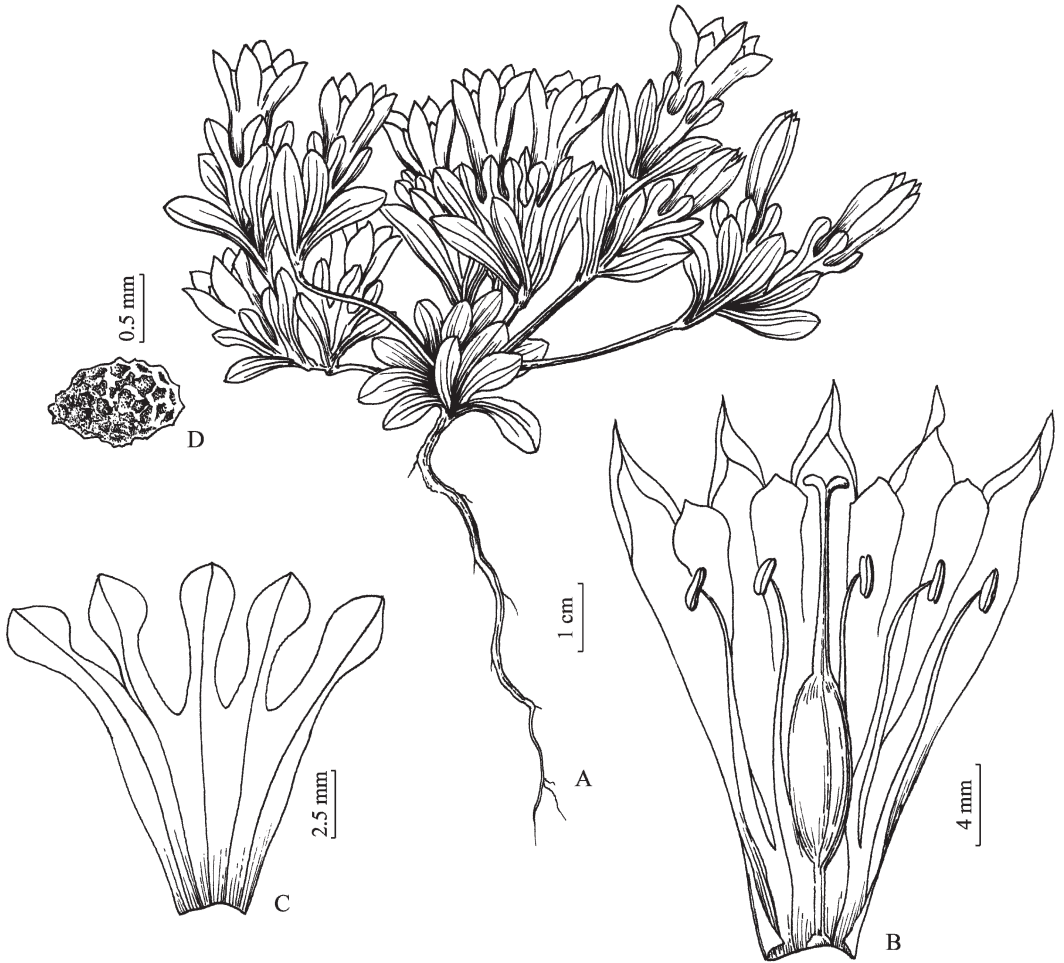


Figure 1. *Gentiana spathulisepala* T. N. Ho & S. W. Liu. —A. Plant. —B. Opened corolla. —C. Opened calyx. —D. Seed. Drawn from the holotype *Lü Zheng-wei 82-130* (KUN).

distinguished from its allied species by the following key.

KEY TO SPECIES ALLIED TO *GENTIANA SPATHULISEPALA* IN CENTRAL CHINA

- 1a. Leaf blades narrowly elliptic to lanceolate; calyx lobes slightly unequal, oblanceolate, obtuse at both ends; corolla (15–)28–40 mm long; northwestern and northeastern Yunnan, southwestern Sichuan *G. delavayi*
- 1b. Leaf blades spatulate to obovate; calyx lobes equal, orbiculate-spatulate or suborbiculate, apex rounded, base contracted; corolla 20–30 mm long.
 - 2a. Corolla blue-purple, with broad, dark purple stripes, usually funnellform, (9–)10–12 mm wide at throat; stamens equal, inserted at basal part of corolla tube, included, filaments 13–15 mm long; northwestern Yunnan *G. spathulisepala*
 - 2b. Corolla pale yellow or to pale blue, usually with blackish streaks and spots, not funnel-

- form, 5–8 mm wide at throat; stamens equal or unequal, inserted at middle of corolla tube, usually exserted, filaments 5–9 mm long.
- 3a. Stamens unequal; plicae symmetrical, broadly ovate, slightly 2-cleft or denticulate; style shorter than ovary; flowers in terminal and axillary clusters; northeastern Yunnan, southwestern and western Sichuan, western Guizhou *G. suborbisepala*
- 3b. Stamens equal; plicae extremely oblique, auriculate to triangular, entire; style as long as to longer than ovary; flowers solitary at ends of branches; eastern Xizang, northwestern Yunnan, western Sichuan *G. tongolensis*

Swertia lihengiana T. N. Ho & S. W. Liu, sp. nov.
TYPE: China. Yunnan: Gongshan, Dulongjiang, Lenben pass, 1300 m, on sandy places of riverbanks, 19 Nov. 1990 (fl.), *Dulongjiang*

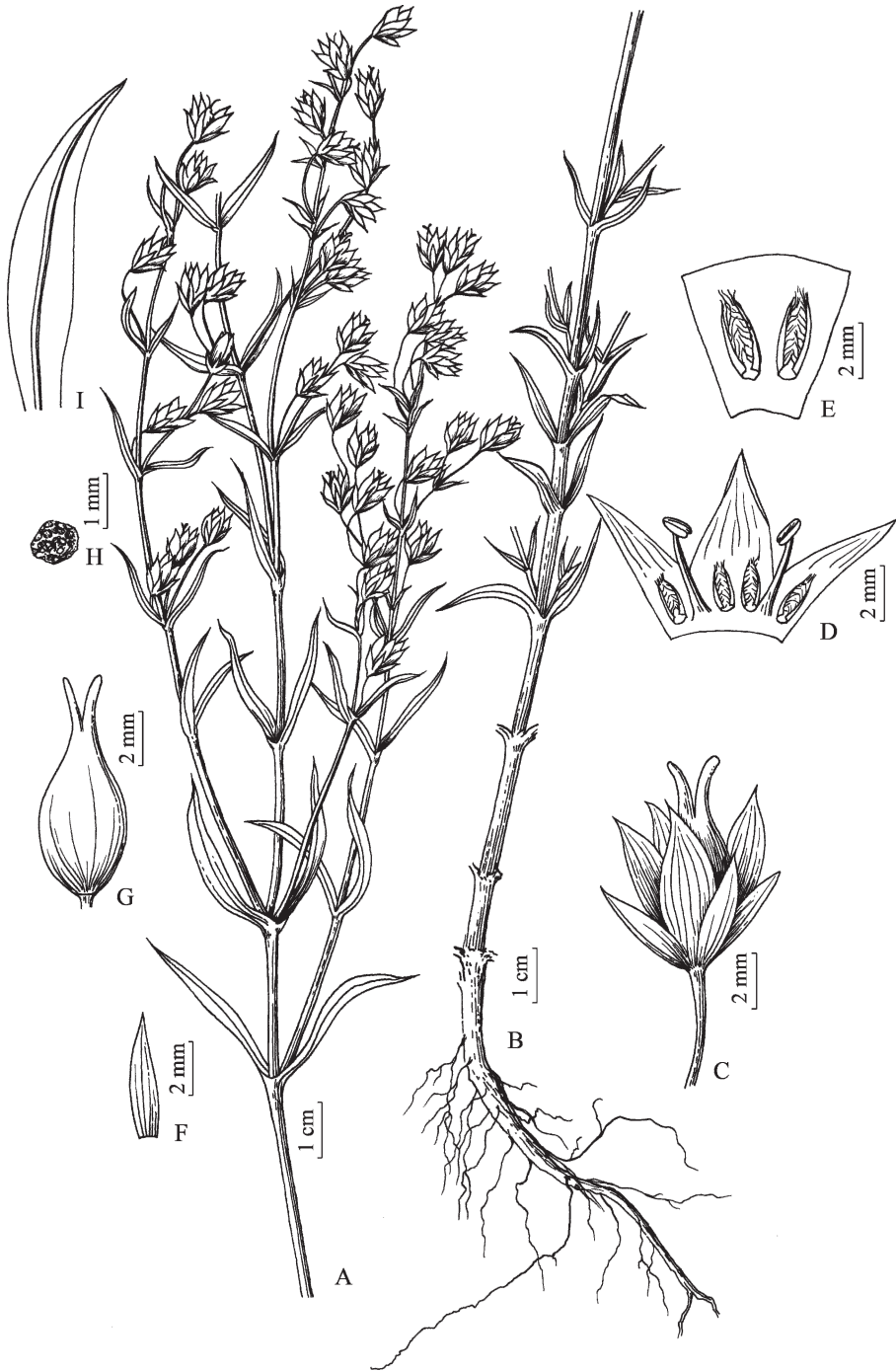


Figure 2. *Swertia lihengiana* T. N. Ho & S. W. Liu. —A. Flowering branch. —B. Basal portion of plant. —C. Flower. —D. Opened corolla. —E. Nectaries. —F. Calyx lobe. —G. Capsule. —H. Seed. —I. Leaf. Drawn from the holotype *Dulongjiang Expedition 545* (KUN).

Expedition 545 (holotype, KUN; isotype, CAS).
Figure 2.

Hac species *Swertia chirayitae* (Roxb. ex Fleming) H. Karst. et *S. luridae* (D. Don) C. B. Clarke similis, sed ab ambabus foliis caulinis lineari-lanceolatis usque linearibus base attenuatis, lobis calycis lineari-lanceolatis atque lobis corollae apice acuminatis caudatisque, a hac corolla purpurea 5–7 mm longa bene distincta.

Annuals, 60–70 cm tall, glabrous; stems erect, distinctly edged, branched from middle. Basal leaves in 2 or 3 pairs, withered at anthesis; petioles 2–3 cm; leaf blades narrowly elliptic, 2–4 × 0.2–0.3 cm, apex obtuse, base narrowed, midvein distinct; stem leaves in 7 to 10 pairs, sessile, 2.5–6.5 × 0.2–0.5 cm, smaller toward stem apex, linear-lanceolate to linear, apex acute, margin revolute, veins 3, abaxially distinct, base narrowed and narrowly decurrent along stem. Inflorescences as panicles of cymes, lax, many-flowered, spreading branched; pedicels 4–18 mm. Flowers 4-merous; calyx and corolla rotate, lobed to near base; calyx 3.5–5 mm; lobes linear-lanceolate, slightly unequal, apex subacute, margin entire, midvein prominent; corolla 5–7 mm, pale purple; lobes elliptic, apex acuminate and shortly caudate; nectaries on corolla lobes, 2 per lobe, oblong, radially elongated, with a narrow marginal scale, raised with many long fimbriae; stamens with the filaments linear, 3.2–3.5 mm; anthers ellipsoid, 1–1.2 mm; style 1–1.2 mm, linear; stigma lobes oblong. Capsules sessile, ovoid to ovoid-ellipsoid, 5–6 mm; seeds subglobose, 0.5–0.6 mm diam., brown; seed coat finely reticulate.

Distribution and habitat. *Swertia lihengiana* is endemic to northwestern Yunnan Province in China and is known only from the type localities, with two populations of 30 to 50 plants. It occurs in evergreen forests or on sandy riverbanks at elevations between 1300 and 1400 m.

IUCN Red List category. Due to the rarity and limited distribution of *Swertia lihengiana*, this species is assessed here as Endangered (EN) according to the IUCN Red List criteria Blab(i,ii,iii) (IUCN, 2001).

Etymology. *Swertia lihengiana* is named after Li Heng at the Kunming Institute of Botany, Chinese Academy of Sciences, in appreciation of her great contribution to phytotaxonomy and phytogeography in China and in recognition of the Dulongjiang Expedition where she first collected this new species.

Relationships. *Swertia lihengiana* resembles the Himalayan species *S. chirayita* (Roxb. ex Fleming) H. Karst. and *S. lurida* (D. Don) C. B. Clarke, but differs from both by the linear-lanceolate to linear stem leaves with the base narrowed, the lanceolate calyx lobes, and the acuminate and shortly caudate corolla lobes. It further differs from *S. lurida* by the purple corolla that is 5–7 mm long. *Swertia lihengiana* may be distinguished from these allied species by the following key.

KEY TO SPECIES ALLIED TO *SWERTIA LIHENGIANA* IN CHINA AND ADJACENT HIMALAYAN REGIONS

- 1a. Stem leaves linear-lanceolate to linear, base narrowed; calyx lobes linear-lanceolate; corolla lobes acuminate and shortly caudate; northwestern Yunnan, China. *S. lihengiana*
- 1b. Stem leaves ovate-triangular to ovate-elliptic, base cordate to orbiculate, ± amplexicaul; calyx lobes ovate; corolla lobes acute.
 - 2a. Flowers smaller: calyx lobes 0.5–2 × 0.5–1 mm, corolla lobes 2–3 × 1–1.5 mm; Kashmir, Nepal, India *S. lurida*
 - 2b. Flowers larger: calyx lobes 3–5 × 1–2 mm, corolla lobes 4–7 × 1.5–3 mm; Nepal, eastern India, Sikkim *S. chirayita*

Paratype. CHINA. **Yunnan:** Gongshan, Dulongjiang, Dandangwango, in evergreen forests, 1400 m, 19 Jan. 1991 (fr.), *Dulongjiang Expedition 3323* (KUN).

Acknowledgments. We are much indebted to Sun Han and Zhan Yan at the herbarium of the Kunming Institute of Botany, Chinese Academy of Sciences, for arranging specimen loans. We are grateful to Wang Yin and Li Ai-li for drawing the illustrations. We also thank the reviewer, Bernhard von Hagen, and the scientific editor, Victoria C. Hollowell, for numerous minor corrections and suggestions that improved the paper.

Literature Cited

Ho, T. N. & J. S. Pringle. 1995. Gentianaceae. Pp. 1–140 in Z. Y. Wu & P. H. Raven (editors), *Flora of China*, Vol. 16. Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis.

IUCN. 2001. IUCN Red List Categories and Criteria, Version 3.1. Prepared by the IUCN Species Survival Commission. IUCN, Gland, Switzerland, and Cambridge, United Kingdom.

Struwe, L. & V. A. Albert. 2002. *Gentianaceae: Systematics and Natural History*. Cambridge University Press, Cambridge, United Kingdom.