

Lomatogonium chilaiensis (Gentianaceae), a newly recorded genus and new species in Taiwan

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Abstract. A newly recorded genus *Lomatogonium* A. Braun (Gentianaceae) from Taiwan, and a new species *L. chilaiensis* C. H. Chen & J. C. Wang are described and illustrated. *Lomatogonium chilaiensis*, thus far known only from one population, was found on the high-altitudinal (ca. 3,100-3,300 m) moist gravelly slopes and cliff faces of Mt. Chilaishan of Taroko National Park. The new species is most similar to *L. carinthiacum* (Wulfen) Reichenbach, a widely distributed species, but differs from the latter by its nearly white corolla, calyx lobes almost equal in length to the corolla lobes, with the apex acute to acuminate, and appendages on nectaries few or absent.

Keywords: Gentianaceae; *Lomatogonium*; *Lomatogonium chilaiensis*; New species; Newly recorded genus; Taiwan; Taxonomy.

Introduction

In recent years members of Taiwanese Gentianaceae have been studied by Murata (1988, *Pterygocalyx*), Murata (1989, *Tripterospermum*), Ying (1989, Gentianaceae), Wang and Lu (1998, *Swertia*), and Chen and Wang (1999, *Gentiana*). The results were compiled into the Flora of Taiwan, 2nd Edition by Wang and Chen (1998).

Recently, in our botanical exploration near the summit of Chilaishan in Taroko National Park, Taiwan, a new species of *Lomatogonium*, a genus heretofore unknown in Taiwan, was found. The genus *Lomatogonium* A. Braun (Gentianaceae) consists of about 20 species mainly in temperate Asia, with only few species occurring in North America and Europe (Liu and Ho, 1992; Ho and Pringle, 1995). *Lomatogonium* is distinguished from other genera of the Gentianaceae by having nectaries on the corolla tube near the base of the lobes and stigma decurrent on ovary (Ho, 1988). On the basis of data on chromosome numbers and morphology, *Lomatogonium* appears to be most closely related to *Comastoma* (Yuan and Küpfer, 1993); studies of seed-coat morphology are compatible with this conclusion (Yuan, 1993). According to Ho (1988), this new species belongs to *Lomatogonium* sect. *Lomatogonium* because of its blue anthers and tubal nectaries.

Systematic Treatment

Lomatogonium is a newly recorded genus for the flora of Taiwan. In Gentianaceae, five genera were recorded

from Taiwan (not including *Nymphoides*, which should be placed in Menyanthaceae). In order to distinguish it from other genera of Taiwan, a key is provided here:

Key to Genera of Gentianaceae in Taiwan

1. Corolla with plicae between lobes.
 2. Stems ascending to erect; stamens equal, straight ..
..... *Gentiana*
 2. Stems twining or trailing; stamens unequal, recurved
..... *Tripterospermum*
1. Corolla without plicae between lobes.
 3. Stems twining; calyx tube with wings
..... *Pterygocalyx*
 3. Stems ascending to erect; calyx tube without wings.
 4. Corolla lobes without nectary on inner surface ..
..... *Centaurium*
 4. Corolla lobes with 1 or 2 nectaries on inner surface.
 5. Stigma elevated above ovary, not decurrent; nectaries on corolla lobes *Swertia*
 5. Stigma decurrent on ovary; nectaries on corolla tube near base of lobes .. *Lomatogonium*

Lomatogonium A. Braun, Flora (Regensburg) 13: 221. 1830; Fernald, Rhodora 21: 194. 1919. 肋柱花屬

Pleurogyne Eschscholtz ex Chamisso et Schlechtendal, Linnaea 1: 187. 1826; Bentham et Hooker f., Gen. Pl. 2: 816. 1876.

Swertia subgen. *Lomatogonium* (A. Braun) Satake, J. Jap. Bot. 20(7): 338. 1944.

Herbs annual or perennial. Roots fibrous or woody. Stems prostrate, ascending, erect, striated or angled,

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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 dextrorse in flower bud. Nectaries 2, at base of corolla lobes. Stamens inserted at summit of corolla tube; filaments somewhat flattened; anthers usually blue, shorter than or rarely as long as filaments. Ovary ensiform, cylindrical, or ovoid-ellipsoid; style absent; stigma lobes decurrent along carpel sutures. Capsule 2-valved, seeds many. Seed coat almost smooth.

About twenty species: North America, temperate Asia, Europe; only one species in Taiwan.

Lomatogonium chilaiensis C. H. Chen & J. C. Wang, sp. nov.—TYPE: Taiwan, Hualien Hsien, Hsiulin Hsiang, Taroko National Park, Chilaishan, elev. ca. 3,100-3,300 m, 23 Oct 1999, *Chen 2922* (holotype: TNU; isotype: HAST, TAI, TAIF, TNU). 奇萊助柱花

Figures 1, 2A

Species *L. carinthiacum* (Wulfen) Reichenbach affinis, sed corolla fere albi, calyx lobis cum corolla lobis circa aequilongae et acutatus vel acumintus apice, paucus vel nullus appendix ad nectario, differt.

Annual herbs. Stem erect, purplish, glabrous, angular, 3-12 cm tall. Basal leaves short-petiolate, spatulate, 3-8 mm long, 2-4 mm wide, apex obtuse. Stem leaves sessile, ovate to lanceolate, 5-10 mm long, 2-5 mm wide, base

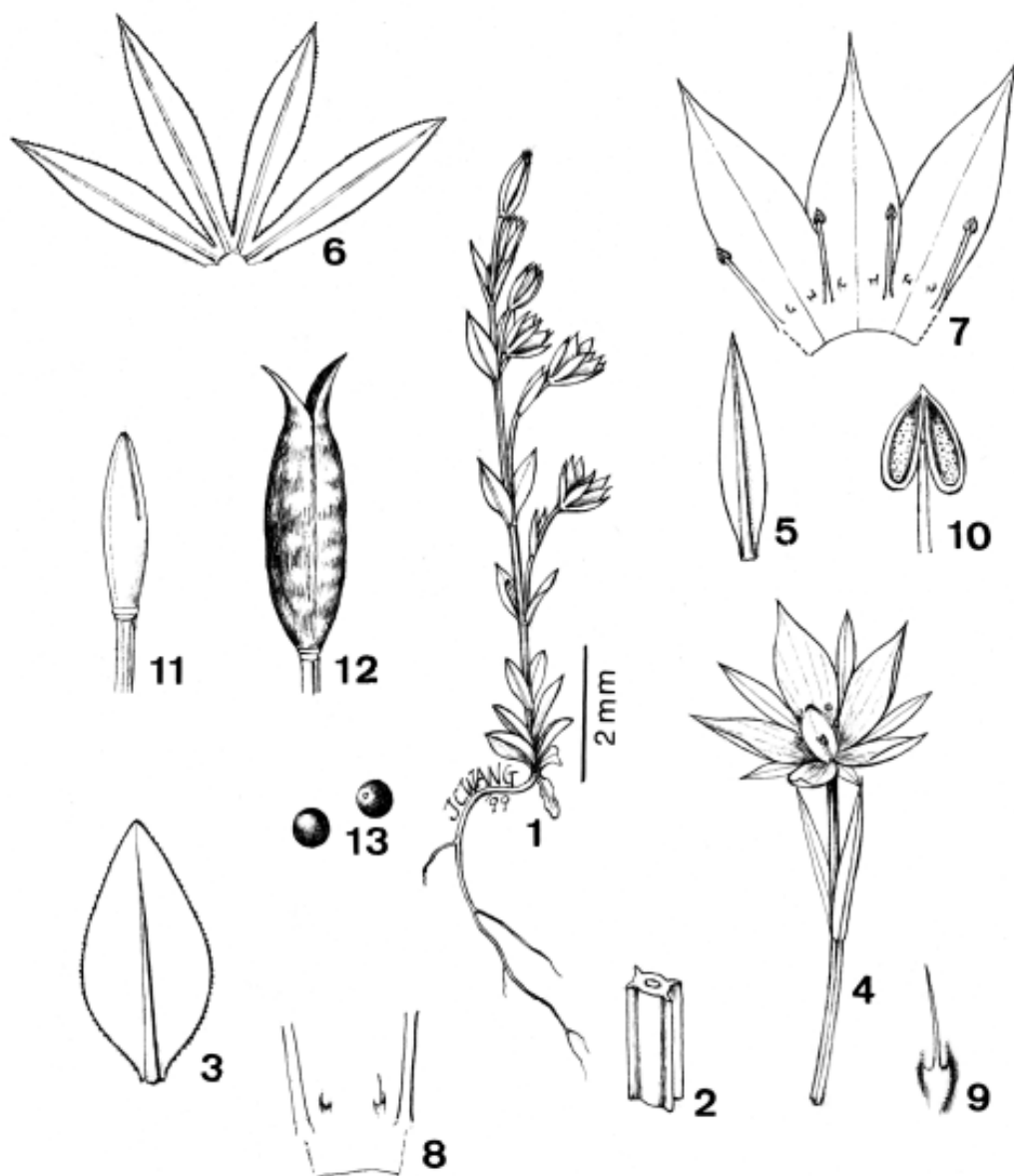


Figure 1. *Lomatogonium chilaiensis* C. H. Chen & J. C. Wang. 1, Habit; 2, Cross section of stem; 3, Leaf; 4, Flower; 5, Bract; 6, Outside view of calyx; 7, Corolla; 8, Nectaries on base of corolla lobes; 9, Enlarged appendage on nectary; 10, Stamen; 11, Pistil; 12, Capsule; 13, Seeds. (*Wang et al. 11177*)

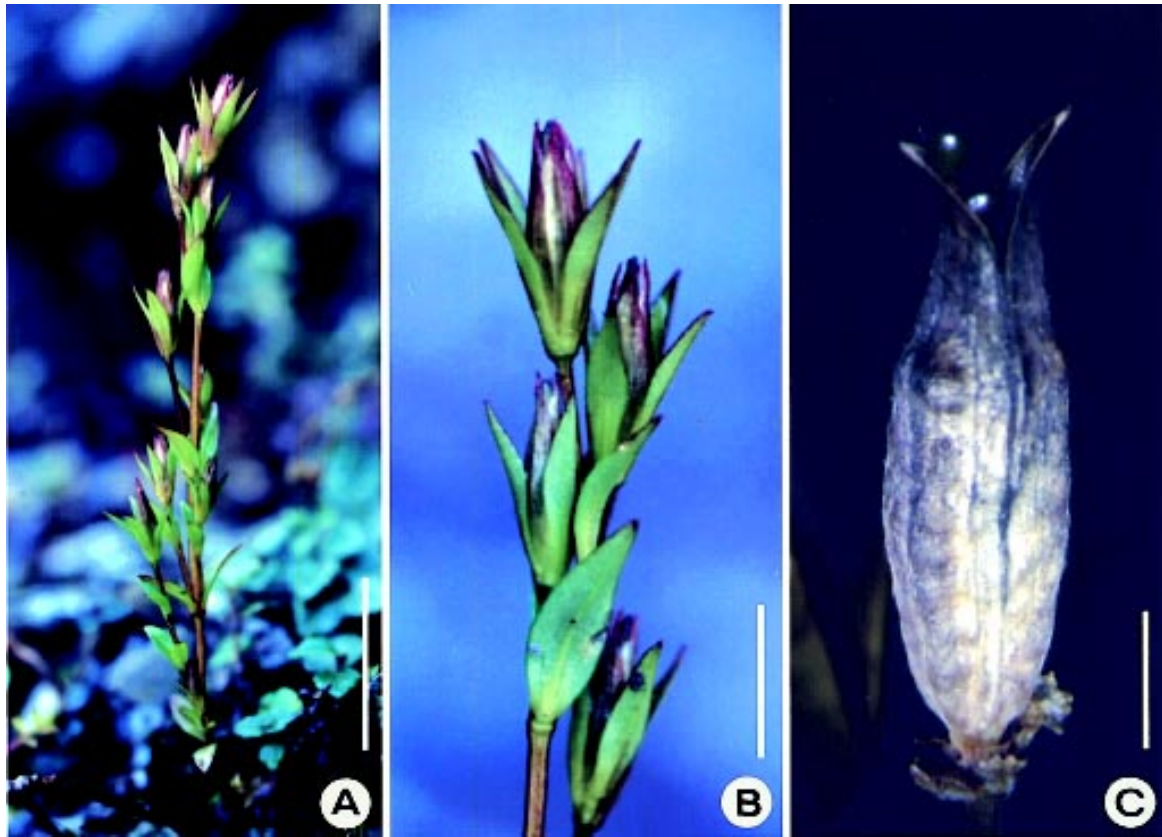


Figure 2. *Lomatogonium chilaiensis* C. H. Chen & J. C. Wang. A, Habit. Bar = 2 cm; B, Upper portion of a stem, showing calyx lobes almost equal in length to corolla lobes and with an acute apex. Bar = 5 mm; C, Capsule dehiscent by two valves at apex, with perianth removed. Bar = 2 mm.

cuneate, apex acute, margin finely denticulate, midvein distinct beneath. Cymes lax, terminal and axillary. Flowers 4 or 5-merous. Pedicel spreading to erect, 5-30 mm long, angular, glabrous. Calyx tube 0.6-1 mm long; lobes lanceolate to narrow-lanceolate, 6-9 mm long, 1.5-2.5 mm wide, apex acute or acuminate. Corolla slightly bluish white, tube 0.8-1.2 mm long; lobes ovate, 7-9 mm long, apex acuminate. Nectaries 2, at base of each corolla lobe, the rim prolonged into a tube, with filamentous appendages usually absent, few when present; appendages ca 0.5 mm long. Stamens inserted at summit of corolla tube; filaments curved outward in fresh flowers, 3-4 mm long; anthers blue, ellipsoid, ca. 1 mm long. Ovary elliptic-oblong, 5-6 mm long, ca. 1.5 mm wide, apex triangular acute; stigma lobes triangular, decurrent on apical part of ovary. Capsules cylindrical, as long as persistent corolla, 8-10 mm long, 2.5-3.5 mm wide, dehiscent by two valves at apex. Seeds dark brown, smooth, subglobose, 0.6-0.8 mm in diam.

Additional specimen examined. **TAIWAN.** HUALIEN HSIEN: Hsiulin Hsiang, Taroko National Park, on the way from Cheng-kung-pao No. 2 to peak of Chilaishan, 3,150-3,350 m alt., 3 Oct 1998, *Chen 2609* (TNU); Taroko National Park, the saddle between Chilaishan and Chilaifeifeng, ca. 2 km SW of Chilaifeifeng, 3,200-3,300 m alt., 2 Sep 1999, *Wang et al. 11177* (TNU).

Distribution and Note. Endemic to Taiwan, so far known only from one population on moist gravelly slopes and cliff faces of Mt. Chilaishan of Taroko National Park, ca. 3,100-3,300 m alt. Very rare. Flowering Aug-Oct, fruiting Sep-Nov.

In Asia, with the discovery of the Taiwanese *Lomatogonium*, the known distribution of the genus extends southeastward to Taiwan. Most members of the genus are on high mountains (more than 3,000 m alt.), as is *L. chilaiensis*. In Taiwan, this species was only found in an exposed and moist area, usually mixed with other heliophytic herbs, including *Clinopodium laxiflorum* (Hayata) Mori, *Adenophora uehatae* Yamamoto, *Scabiosa lacerifolia* Hayata, *Anaphalis nepalensis* (Spreng.) Hand.-Mazz., *Gentiana scabrida* Hayata, etc.

Lomatogonium chilaiensis is a member of the section *Lomatogonium* according to Ho (1988). This species is most similar to *L. carinthiacum* (Wulfen) Reichenbach, a widely distributed species in the temperate zone of Asia and Europe (Liu and Ho, 1992), but differs from the latter in having a nearly white corolla, and calyx lobes almost equal in length to the corolla lobes, with the apex acute to acuminate (Figure 2B), and scarce or absent appendages on nectaries.

The flowers of *L. chilaiensis* are 4- or 5-merous, and are variable even if within an individual. The larger plants

usually bear a majority of 5-merous flowers, and the smaller ones bear mostly 4-merous flowers. The capsules are slightly exserted beyond the persistent corolla, and dehisce by two valves only at the apex when mature (Figure 2C). The plants turn yellow and wither after fruiting in winter.

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Literature Cited

- Chen, C.H. and J.C. Wang. 1999. Revision of the genus *Gentiana* L. (Gentianaceae) in Taiwan. Bot. Bull. Acad. Sin. **40**: 9-38.
- Ho, T.N. 1988. *Lomatogonium* (Gentianaceae). In T.N. Ho (ed.), Flora Reipublicae Popularis Sinicae. Tomus 62. Science Press, Beijing, pp. 323-341. (in Chinese)
- Ho, T.N. and J.S. Pringle. 1995. *Lomatogonium* (Gentianaceae). In C.Y. Wu and P.H. Raven (eds.), Flora China, vol. 16. Science Press, Beijing and Missouri Botanical Garden, St. Louis, pp. 124-129.
- Liu, S.W. and T.N. Ho. 1992. Systematic study on *Lomatogonium* A. Br. (Gentianaceae). Acta Phytotax. Sin. **30**(4): 289-319. (in Chinese)
- Murata, J. 1988. *Pterygocalyx* (Gentianaceae), new to Taiwan. J. Jap. Bot. **63**(4): 163-167.
- Murata, J. 1989. A synopsis of *Tripterosperrum* (Gentianaceae). J. Fac. Sci. Univ. Tokyo Sec. III, **16**(4): 273-339.
- Wang, J.C. and C.H. Chen. 1998. Gentianaceae. In T.C. Huang et al. (eds.), Flora of Taiwan, 2nd edn., vol. 4. Editorial Committee of the Flora of Taiwan, Second Edition, Taipei, pp. 154-191.
- Wang, J.C. and C.T. Lu. 1998. Revision of the genus *Swertia* L. (Gentianaceae) in Taiwan. Taiwaniana **43**(4): 273-288.
- Ying, S.S. 1989. Systematic study on Gentianaceae of Taiwan. Quart. J. Exp. Forest Natl. Taiwan Univ. **3**(2): 87-111.
- Yuan, Y.M. 1993. Seedcoat micromorphology and its systematic implications for Gentianaceae of West China. Bot. Helv. **10**: 73-82.
- Yuan, Y.M. and P. Küpfer. 1993. Karyological studies of *Gentianopsis* Ma and some related genera of Gentianaceae from China. Cytologia **58**: 115-123.

台灣產龍膽科的新紀錄屬及新種 — 奇萊肋柱花

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本文發表台灣龍膽科 (Gentianaceae) 的新紀錄屬植物—肋柱花屬 (*Lomatogonium*)，以及一新種—萊肋柱花 (*L. chilaiensis*)，並提供植物描述及繪圖以供辨識；至目前為止，奇萊肋柱花僅發現於太魯閣國家公園內的奇萊山上，生長於高海拔（約 3,100 至 3,300 公尺）的潮溼碎石坡或峭壁上。此新種與另一廣泛分布種—肋柱花 (*L. carinthiacum*) 較為相似，但奇萊肋柱花的花冠近白色，花萼裂片幾乎與花冠裂片等長，且花萼裂片前端銳尖，花冠上腺體的附屬物極缺乏或不存在，上述這些特徵則與後者相異。

關鍵詞：龍膽科；肋柱花屬；奇萊肋柱花；新種；新紀錄屬；台灣；分類。