Gentiana zhenxiongensis (Gentianaceae), a new species from Yunnan, China

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Gentiana zhenxiongensis L.H. Wu & Z.T. Wang, sp. nova (Figs. 1 and 2)

Haec species G. praticolae affinis, sed ab caudicibus stolonibus, floribus parvioribus (8–11 mm non 12–15 mm), calycis lorum costis carinatis, corollis campanulatis, testis tuberculatis bene distincta.

Gentianaceae is a large and diverse family widely distributed throughout the tropical, temperate and arctic zones. Recent taxonomic reviews estimate the family to contain 80 genera and 700 species (Ho & Pringle 1995), or 87 genera and over 1600 species (Struwe et al. 2002). Ho and Pringle (1995) estimate some 20 genera and 419 species to be native to China.

Gentiana is the largest genus in the family. After Linnaeus formally established the genus, other scientists subsequently delimited Gentiana with different viewpoints both s. lato and s. stricto (Ho & Liu 2001, Struwe et al. 2002). Gentiana in its current eclectic circumscription comprises about 361 species, with 249 recognized in China (Ho & Pringle 1995, Ho & Liu 2010).

Many Gentiana species have economic value especially in the Traditional Chinese Medicine (TCM) in China. Their medicinal use, which spans over a 1000 years, includes the treatment of jaundice, hepatitis, constipation and rheumatoid arthralgia among Chinese Han and minority nationalities (State Administration of TCM 1999). Whilst undertaking recent fieldwork in NE, W and SW China as part of a wider research project about the authentication of Gentiana species used in TCM, in August 2008 and August 2010 we collected a previously unknown Gentiana species from Zhenxiong county, NE Yunnan province, which we describe here as a new species.

Gentiana zhenxiongensis L.H. Wu & Z.T. Wang, sp. nova (Gentianaceae) from Yunnan province, China, is described and illustrated. It resembles G. praticola, but differs in having stolons and/or rhizomes, small flowers, calyx lobes with keeled midribs, a campanulate corolla and a tuberculate testa.
Fig. 1. *Gentiana zhenxiongensis*. — **A**: Holotype. — **B**: Calyx (opened, dorsal view). — **C**: Corolla (opened) and pistil. — **D**: Opposite leaves with bases connate-sheathing. (**B–D** from the holotype, drawn by Li-Hong Wu)

Fig. 2. *Gentiana zhenxiongensis*, *in situ*, its habitat and showing parts (photographs by Li-Hong Wu). — **A**: Habitat (24 Aug. 2010). — **B**: Flowers (15 Aug. 2008). — **C**: Buds (24 Aug. 2010). — **D**: Fruits (24 Aug. 2010). — **E**: Seed. Scale bars: **A** = 5 cm, **B–D** = 3 mm, **E** = 0.3 mm.

**Etymology**. The epithet is derived from the type locality, Zhenxiong county, in NE Yunnan province, China.

Perennial, 5–10 cm tall; stolons short to 2.5 cm, sometimes producing fleshy adventitious roots. Rhizomes short to 2 cm, producing a few slender, rather fleshy adventitious roots. Stems decumbent to erect, purple, densely papillate, dichotomously branched from base. Basal leaves usually developed, sessile, bases connate-sheathing 1–2 mm, obovate-elliptic to lanceolate, 15–30 × 3–5 mm, abaxially glabrous, adaxially densely and minutely papillate, margin indistinctly cartilaginous and densely ciliolate, apex acute and mucronulate, midrib distinct and sparsely ciliolate. Stems leaves sub-leathery, widely spaced, sessile, bases connate-sheathing ca. 1 mm or less, obovate-elliptic to obovate, 5–12 × 2–4 mm, shorter than internodes, abaxially glabrous, adaxially densely and minutely papillate, margin indistinctly cartilaginous and densely ciliolate, apex acute and mucronulate, midrib slender and sparsely ciliolate. Bracts 1 pair each flower, sessile, bases connate-sheathing ca. 1 mm or less, obovate-lanceolate, 8–9 × 2.5 mm, margin indistinctly cartilaginous and densely ciliolate, apex acute and mucronulate, midrib densely ciliolate. Flowers 1 to 4 crowded into uppermost leaf axils, sessile. Calyx campanulate, 6–8 mm, tube membranous; calyx lobes recurved, green, elliptic-lanceolate, 2.5–3 × 1 mm, leathery, margin indistinctly cartilaginous and densely ciliolate, apex acute and mucronulate, midrib keeled and dentate into a wing of calyx tube. Corolla campanulate, 8–11 mm, outside purple red, inside blue, usually with brownish stripes and spots in throat; lobes ovate-triangular, ca. 2 mm, margin entire, apex obtuse; plicae ovate-triangular, 1 × 1–1.5 mm, margin entire, apex obtuse. Stamens inserted at middle of corolla tube, equal; filaments 3–3.5 mm; anthers narrowly ellipsoid, 1–1.5 mm. Ovary obovoid, 3–3.5 × 2 mm, gynophore to 1.5 mm at anthesis; style ca. 1 mm; stigma lobes recurved. Capsules obovate-triangular, 4–5 mm, usually inserted inside or slightly exserted from corolla, margin and apex winged along sutures, apex denticulate; gynophore to 7 mm. Seeds 0.6–0.7 mm, ellipsoid or spindle-shaped, brown; testa tuberculate and minutely reticulate. Flowering and fruiting in August.

**Distribution and Habitat**. Gentiana zhenxiongensis is known only from the type locality, Si-gong-li, Zhenxiong county, NE Yunnan province. It grows at 1890 m in yellow soils on a hilltop clearing; associated species include Cunninghamhamia lanceolata, Cryptomeria japonica var. sinensis, Quercus serrata var. brevipetiulata, Cotoneaster horizontalis, Gentiana rigescens, Swertia macrosempra and Hypericum erectum.

As the largest genus within the Gentianaceae, Gentiana in its current global circumscription includes 15 sections, excluding sect. Stenogyne (Ho & Liu 2001), with 12 sections including sect. Stenogyne in China (Ho & Pringle 1995). Sect. Chondrophyllae is the largest one on a global scale, with 156 species, 117 of which are endemic to China (Ho & Pringle 1995). Based on the perennial plants with stolons and/or fleshy roots together with small flowers, Ho (1985) described a new series within sect. Chondrophyllae, viz. ser. Napuliferae, comprising four species, G. napulifera, G. sarcorrhiza, G. praticola and G. louirei (Ho et al. 1988). Gentiana sarcorrhiza was later recognized to be a synonym of G. napulifera (Ho & Pringle 1995, Ho & Liu 2001). In gross morphology G. zhenxiongensis most closely resembles G. pratitcola, which occurs in Guizhou, Sichuan and NW Yunnan provinces, the former is distinguished in having stolons and/or rhizomes, smaller flowers, calyx lobes with keeled midribs, campanulate corolla and tuberculate seed coat. The morphological characters of the two species are compared in Table 1. The taxon described here is a fourth species in Gentiana sect. Chondrophyllae ser. Napuliferae and it may be identified from its allied species by following key.

**Key to the species of Gentiana sect. Chondrophyllae ser. Napuliferae in China**

1. Roots stout, fusiform; basal leaves linear to linear-lanceolate .......................... G. napulifera

1. Roots slender, cylindric; basal leaves elliptic to ovate-lanceolate .......................... 2
Table 1. Morphological comparison of *Gentiana zhenxiongensis* and *G. praticola*. Data on the latter based on the descriptions in Frachet (1896), Ho *et al.* (1988), Ho and Pringle (1995), and Ho and Liu (2001).

<table>
<thead>
<tr>
<th>Characters</th>
<th><em>G. zhenxiongensis</em></th>
<th><em>G. praticola</em></th>
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<tbody>
<tr>
<td>Stolon</td>
<td>to 2.5 cm</td>
<td>usually absent</td>
</tr>
<tr>
<td>Rhizome</td>
<td>short to 2 cm</td>
<td>usually absent</td>
</tr>
<tr>
<td>Flower</td>
<td>8–11 mm</td>
<td>12–15 mm</td>
</tr>
<tr>
<td>Corolla shape</td>
<td>campanulate</td>
<td>broadly tubular</td>
</tr>
<tr>
<td>Plicae</td>
<td>ovate-triangular, 1 × 1–1.5 mm, margin entire, apex obtuse</td>
<td>semi-orbicular, 1–1.2 mm, margin denticulate, apex rounded</td>
</tr>
<tr>
<td>Calyx lobe midrib</td>
<td>keeled and decurrent into a wing of calyx tube tuberculate and minutely reticulate</td>
<td>distinct but not keeled minute reticulate</td>
</tr>
<tr>
<td>Testa</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Flowers solitary on short to long branches, subsessile to pedicellate; anthers 1.8–2.5 mm .......................... *G. loureiroi*
2. Flowers usually clustered, sessile; anthers 1–1.5 mm .. 3
3. Stolons to 2.5 cm; rhizomes usually short to 2 cm; flowers 8–11 mm; calyx lobe midribs keeled; corolla campanulate; testa tuberculate and minutely reticulate ........ .......................................................... *G. zhenxiongensis*
3. Stolons and rhizomes usually absent; flowers 12–15 mm; corolla broadly tubular; testa minutely reticulate ........................ .......................................................... *G. praticola*

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