

Gentiana laotica, a new species of Gentianaceae from Laos

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ABSTRACT

A new species of *Gentiana* (Gentianaceae), *G. laotica* Soulad., Tagane & Yahara, from Phou Khao Khouay National Protected Area, Vientiane Province, central Laos, is described. Photographs, vernacular name, DNA barcodes of *rbcL*, *matK* and ITS, and preliminary conservation status are provided for the new species.

KEYWORDS: flora, Gentianaceae, Laos, Phou Khao Khouay NPA, taxonomy.

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INTRODUCTION

The genus *Gentiana* L., with 360 to 400 species, is the largest genus in the family Gentianaceae distributed mainly in temperate regions of Europe, Asia and America, with the centre of diversity in southwestern China and northeastern Myanmar (Ho & Liu, 2001; Anilkumar *et al.*, 2015). In Indochina, 12 species of *Gentiana* have been recognized (Hul, 2003 & 2007), among which four species and one subspecies are known from Laos (Hul, 2007; Newman *et al.*, 2007): *G. khammouanensis* Hul, *G. langbianensis* A.Chev. ex Hul, *G. langbianensis* subsp. *kerriana* Hul, *G. leroiyana* Hul, and *G. loureiroi* (G.Don) Griseb.

While carrying out a series of botanical surveys in Laos in 2017 (Souladeth *et al.*, 2017; Tagane *et al.*, 2017 & 2018; Yang *et al.*, 2018), we collected one *Gentiana* species from Phou Khao Khouay National Protected Area, central Laos characterized by a single erect stem and white corolla. After a careful examination using taxonomic literature (Ubolcholaket, 1987; Ho & Pringle, 1995; Ho & Liu, 2001; Ho, 2003; Hul, 2003 & 2007), dried specimens deposited in herbaria (BKF, FOF, FU, HNL and KYO) and online digital specimen images (e.g. JSTOR Global Plants,

<https://plants.jstor.org/>), we are convinced that it is a new species. Here, we describe *Gentiana laotica* Soulad., Tagane & Yahara as the fifth *Gentiana* species for Laos. We also provide DNA barcodes of *rbcL*, *matK* and ITS regions (CBOL Plant Working Group, 2009; Kress & Erickson, 2012). DNA barcoding methods followed published protocols (Kress *et al.*, 2009; Rohwer *et al.*, 2009; Dunning & Savolainen, 2010).

TAXONOMIC TREATMENT

Gentiana laotica Soulad., Tagane & Yahara, **sp. nov.**
— Fig. 1.

Gentiana laotica is similar to *G. bokorensis* Hul of Cambodia and *G. arenicola* Kerr of northeastern Thailand in having single erect stem, number of stem leaves increasing toward stem apex and 5-merous flowers, but differs from the formers in having obovate to obovate-oblong leaves (vs narrowly ovate-triangular in *G. bokorensis*), whitish corolla (blue-purplish) and 5 equal sepals (vs often unequal, 2 small and 3 large) and from the latter in having smaller calyx lobes (4–5 mm long in *G. laotica* vs 5–7 mm long in *G. arenicola*), white flowers (vs pale blue), longer

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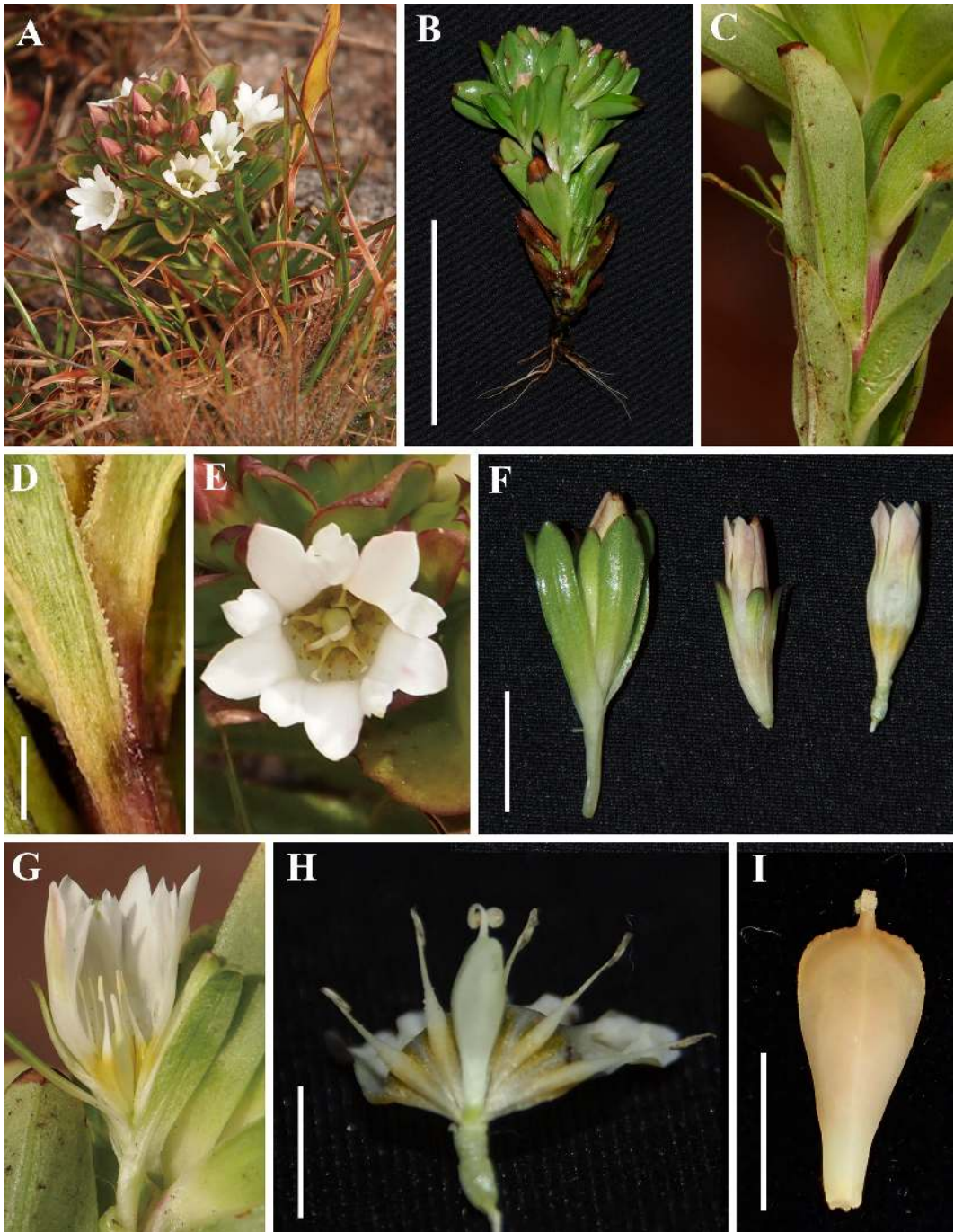


Figure 1. *Gentiana laotica* Soulad., Tagane & Yahara: A. habit; B. whole plant; C. abaxial leaf surface; D. base of leaf blade showing ciliolate margin; E. flower, top view; F. flowers (flower with leaves and calyx, flower with calyx, corolla); G. young flower corolla opened; H. stamens and pistil; I. ovary, style and stigma. Scale bars: B = 5 cm, D = 1 mm, F = 1 cm, H & I = 5 mm.

corolla lobes (ca 3 mm long vs 1.5 mm long) and smaller anthers (1.2 mm long vs 2 mm long). Type: Laos, Phou Khao Khouay National Protected Area, Vientiane Province, Thoulakhom District, Ban Pa Paek, 18°22'35.28"N, 102°51'29.46"E, 905 m elev., 26 Dec. 2017, with flowers, *Yahara T.*, *Tagane S.*, *Souladeth P.*, *Nagamasu H.*, *Naiki A.*, *Chayer S.* & *Kongxaisavath D.* L1863 (holotype **FOF!**, isotypes **BKF**, **KYO!**-fl. in a spirit collection, **NHL**, **P**).

Annual herbs, 5–8.5 cm tall, glabrous throughout whole plant except near the base of leaf margin. *Root* fibrous, light brown to yellowish brown. *Flowering stem* simple, erect, angled, purple, glabrous. *Leaves* opposite, sessile, 5–12 pairs, blade obovate to obovate-oblong, 0.6–2.5 × 0.1–1 cm, chartaceous, apex rounded, obtuse, rarely acute, base attenuate or obtuse, margin entire, sometimes ciliolate at the base, 1(or 3)-nerved, midrib prominent abaxially. Inflorescences terminal clusters, flowering branches crowded into a capitulum, sometimes also in axillary clusters on peduncle-like branches. *Flowers* (1–)3–12 per plant, 5-merous. *Calyx* tube conical, 4–5 mm long, white, lobes 5, equal, linear, 4–5 mm long, white, greenish toward apex, apex acute to obtuse, apiculate, recurved, purplish at margin. *Corolla* white, outside slightly greenish-purple, inside with greenish yellow spots at around 1/3 from base, yellowish only behind stamens near base, corolla tube urceolate-tubular, ca 1.4 cm long, lobes 5, ovate-triangular, ca 3 mm long, apex acute; plicae ovate-triangular, ca 2 mm long, apex acute, acuminate or obtuse, margin erose with 1–2 teeth. *Stamens* equal, filaments ca 7 mm long, swollen in the lower half, attached slightly above the base of corolla tube, anther narrowly ellipsoid, ca 1.2 mm long, white. *Style* ca 0.75 mm long, stigma bilobed, ca 1.85 mm long, recurved at anthesis; ovary shortly stipitate, ellipsoid-obovoid, flattened, 4.5–8 mm long, 3–3.5 mm wide, 1.2–1.5 mm thick, conspicuously winged near the apex. *Capsule* and seed not seen.

Distribution.— Laos. (So far known only from Phou Khao Khouay National Protected Area, Vientiane Province).

Ecology.— In open grassland, pine forest. Altitude 905 m.

Vernacular.— Wheed Khao (ຫວີດຂາວ) (suggested here).

Phenology.— Flowering in December.

Etymology.— The specific epithet refers to the country where we collected the plant.

DNA barcodes.— LC371683 (*rbcL*), LC371684 (*matK*), LC371685 (ITS); based on *Yahara et al.* L1863.

Preliminary conservation status.— Critically Endangered (CR). *Gentiana laotica* is currently known only from a single population at its type locality in the Phou Khao Khouay National Protected Area. The habitat, an open grassy area, is relatively common in this area and it is possible that this species will be found in other localities. However, the population we found consists of fewer than 15 individuals. Therefore, as a first assessment of the IUCN conservation status for this species the most appropriate is Critically Endangered (CR) under criteria D (IUCN, 2012).

Notes.— According to the system of Ho & Liu (2001), *Gentiana laotica* belongs to *Gentiana* sect. *Chondrophyllae* Bunge ser. *Capitatae* T.N.Ho due to having an annual habit, solitary and angled stems, apically with many leaves and flowering branches crowded into a capitulum, naked corolla throat, and apically winged ovary. Ubolcholaket (1987) recorded 8 taxa including 1 subspecies and 1 variety of *Gentiana* in Thailand. Among them, in addition to *G. arenicola*, *Gentiana laotica* is also similar to *Gentiana* sp. 4 from Doi Chiang Dao, northern Thailand, but easily distinguished by its larger leaves, and more and larger flowers.

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