

## ***KUEPFERIA PRINGLEI* (GENTIANACEAE), A NEW SPECIES FROM THE EASTERN HIMALAYA**

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A new species of *Kuepferia* (Gentianaceae), *K. pringlei* D.Maity & Sentu K.Dey from north Sikkim, Eastern Himalaya, is described and illustrated. Details of habitat, phenology and conservation status are given, and it is compared to related species. This previously undescribed species is most similar to, but distinct from, *Kuepferia leucantha* (Harry Sm. ex T.N.Ho & S.W.Liu) Adr.Favre, known from Bhutan and China.

*Keywords.* Eastern Himalaya, Gentianaceae, *Kuepferia pringlei* D.Maity & Sentu K.Dey *sp. nov.*

### INTRODUCTION

The genus *Kuepferia* Adr.Favre (Gentianaceae) was recently established to include the species formerly in *Gentiana* section *Otophora* Kusn. (Favre *et al.*, 2014). The species of *Kuepferia* have reduced plicae, resembling small teeth or auricles on the sides of the corolla lobes, while other genera of subtribe Gentianinae have well-developed plicae. This major morphological difference is largely supported by the available molecular data (Favre *et al.*, 2010, 2014). The same authors also suggested that the species of *Kuepferia* appear to be more closely related to *Metagentiana* T.N.Ho & S.W.Liu, *Crawfordia* Wall. and *Tripterospermum* Blume, than to any of the remaining sections of *Gentiana* (Favre *et al.*, 2010, 2014).

*Kuepferia*, with 13 species, is distributed in India, Nepal, Bhutan, China and Myanmar (Clarke, 1883; Garg, 1987; Ho & Pringle, 1995; Aitken, 1999; Favre *et al.*, 2014). *Kuepferia infelix* (C.B.Clarke) Adr.Favre [= *Gentiana infelix* C.B.Clarke] was, until now, the only species recorded in India, being originally described from Sikkim by C. B. Clarke (1883).

On a visit to the Lhonak valley of North Sikkim District in the course of a floristic study of the region, the authors collected a *Kuepferia* specimen that resembled *K. leucantha* (Harry Sm. ex T.N.Ho & S.W.Liu) Adr.Favre mainly by its bifid (rarely trifid), auriculate plicae, but which differed markedly in having triangular calyx lobes instead of distinctly ovate to broadly elliptic calyx lobes, as in *K. leucantha* (Fig. 1C, D & J). Moreover, the ovary and capsule were significantly smaller (ovary 2–2.5 × 1–1.5 mm

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vs.  $7\text{--}10 \times 1\text{--}1.5$  mm; capsule  $3.5\text{--}4$  mm long vs.  $11\text{--}12$  mm long). Detailed literature studies (Clarke, 1883; Garg, 1987; Ubolcholaket, 1987; Ho & Pringle, 1995; Aitken, 1999; Ho & Liu, 1993, 2001; Hul, 2003; Favre *et al.*, 2014) and critical analysis of specimens revealed that the Lhonak valley specimen was a new species of *Kuepferia*. A detailed description, illustration and images of the new species are provided to facilitate its identification. A comparison of this new taxon with *Kuepferia leucantha* is also provided (Table 1).

#### SPECIES DESCRIPTION

##### ***Kuepferia pringlei* D.Maity & Sentu K.Dey, sp. nov.**

Closely related to *Kuepferia leucantha* (Harry Sm. ex T.N.Ho & S.W.Liu) Adr. Favre but calyx lobes distinctly triangular with acute to acuminate apex; corolla, corolla lobes, corolla tube, plicae, filaments, anthers, ovary, and style smaller; capsules distinctly stalked; capsules and seeds much smaller; seed surface verrucose with longitudinal lines. – Type: Sikkim, above Kalapathar, near lake, 4400 m, 23 vii 2014, Dey & Maity 21355 (holo CUH; iso CAL). **Figs 1, 2.**

Perennial herb, 2–4 cm tall; taproot slender, cylindrical, 3–5 cm long. *Stems* few to many, prostrate to ascending, slender, simple. *Leaves*: basal rosette leaves few, larger than stem leaves; leaf blades ovate-elliptic or oblong-lanceolate,  $4\text{--}7 \times 2\text{--}4$  mm, apex acuminate, margin thick-cartilaginous; stem leaves many,  $\pm$  crowded, withering towards stem base; petioles fused to tubular sheath to 2 mm long; leaf blade elliptic-ovate to oblong-oblancheolate,  $3.5\text{--}6 \times 1\text{--}2$  mm, apex acute and mucronate, margin entire, thickened, slightly cartilaginous, lower half often papillose, upper half entire and epapillose; upper leaves epapillose. *Flowers* terminal, solitary, 5–8.5 mm long; pedicels 1–7 mm long, glabrous. *Calyx* narrowly campanulate,  $5\text{--}6 \times 2.5$  mm, glabrous; tube 3–4.5 mm; lobes slightly spreading, narrowly triangular,  $2\text{--}2.5 \times 0.5\text{--}0.75$  mm, subequal, apex acute to acuminate. *Corolla* bluish-white, tubular-campanulate, 6–8.2 mm; tube 6–7 mm long; lobes ovate to triangular,  $1.5\text{--}2 \times 1\text{--}1.5$  mm, apex acute; plicae auriculate, attached to one side of corolla lobe, ovate-triangular,  $1\text{--}1.7 \times 1$  mm, 2-cleft; lobes unequal; larger one rarely with emarginate apex; acute to acuminate. *Stamens* inserted near middle of corolla tube, one rarely larger; filaments 2–3 mm, much dilated at base; anthers c.0.5 mm; ovarian stipe 1–2.5 mm long. *Ovary* narrowly ellipsoid,  $2\text{--}2.5 \times 1\text{--}1.5$  mm; style 0.5–1 mm; stigma lobes oblong, c.1 mm, recurved; capsules clavate, c. $3.5\text{--}4 \times 2$  mm, slightly compressed, on 2–3 mm long stipe, included; dorsal suture keeled at base; ventral suture narrowly winged. *Seeds* many, angular, oblong-ellipsoid, c. $0.7\text{--}0.8 \times 0.3\text{--}0.4$  mm, base truncate, slightly tapered to the top, surface with verrucose, longitudinal lines, brownish.

*Distribution.* Endemic in the type locality, Sikkim.

*Habitat.* On grassy slopes, moss-covered rocks, in moist places, in open alpine meadow, 4300–4500 m.

TABLE 1. Comparison of selected morphological characters of *Kuepferia pringlei* D.Maity & Sentu K.Dey and *K. leucantha* (Harry Sm. ex T.N.Ho & S.W.Liu) Adr.Favre

Character	<i>K. pringlei</i> D.Maity & Sentu K.Dey	<i>K. leucantha</i> (Harry Sm. ex T.N.Ho & S.W.Liu) Adr.Favre
Basal rosette leaves		
– Occurrence	Always present	Often absent
– Shape	Ovate-elliptic or oblong-lanceolate	Triangular
– Size	4–7 × 2–4 mm	2–5 × 1–3 mm
Pedicel	1–7 mm long	Absent
Calyx		
– Tube	3–4.5 mm long	(4–)5–6 mm long
– Lobe, shape	Narrowly triangular, subequal	Ovate, broadly elliptic or spatulate, unequal
– Lobe, size	2–2.5 × 0.5–0.75 mm	3–4 × (1–)2–2.5 mm
– Lobe, apex	Acute to acuminate	Acute, obtuse or acuminate and mucronate
Corolla		
– Colour	Bluish-white	White or pale yellow-white
– Size	6–8.2 mm long	13–15 mm long
– Tube	6–7 mm long	9–10(–14) mm long
– Lobe, shape	Ovate to triangular	Ovate to elliptic-ovate
– Lobe, size	1.5–2 × 1–1.5 mm	(2–)4–5 × 3–4 mm
– Lobe, apex	Acute	Obtuse
Plicae		
– Shape and nature	Ovate-triangular, 2-cleft, unequal; larger rarely with emarginated and acute or acuminate apex; acuminate	Triangular, 2-cleft
– Size	1–1.7 mm long	(1–)2–2.5 mm long
Filaments	2–3 mm	6–8 mm
Anthers	c.0.5 mm	1.5–2 mm
Stipe (flowering)	1–2.5 mm long	0–2 mm long

TABLE 1. (Cont'd)

Character	<i>K. pringlei</i> D.Maity & Sentu K.Dey	<i>K. leucantha</i> (Harry Sm. ex T.N.Ho & S.W.Liu) ADr.Favre
Ovary		
– Shape	Narrowly ellipsoid	Ellipsoid
– Size	2–2.5 × 1–1.5 mm	7–10 × 1–1.5 mm
Style	0.5–1 mm long	1–2.5 mm long
Capsule		
– Stalked/sessile	Stalked	Sessile
– Shape	Clavate, slightly compressed	Ellipsoid
– Size	3.5–4 × 2 mm	11–12 × 1.5–2 mm
Seed		
– Shape	Angular, ellipsoid-oblongoid, slightly tapered towards top	Ellipsoid or oblongoid
– Size	0.7–0.8 × 0.3–0.4 mm	1–1.2 × 0.4 mm
– Seed coat	Verrucose with longitudinal lines	Thinly reticulate

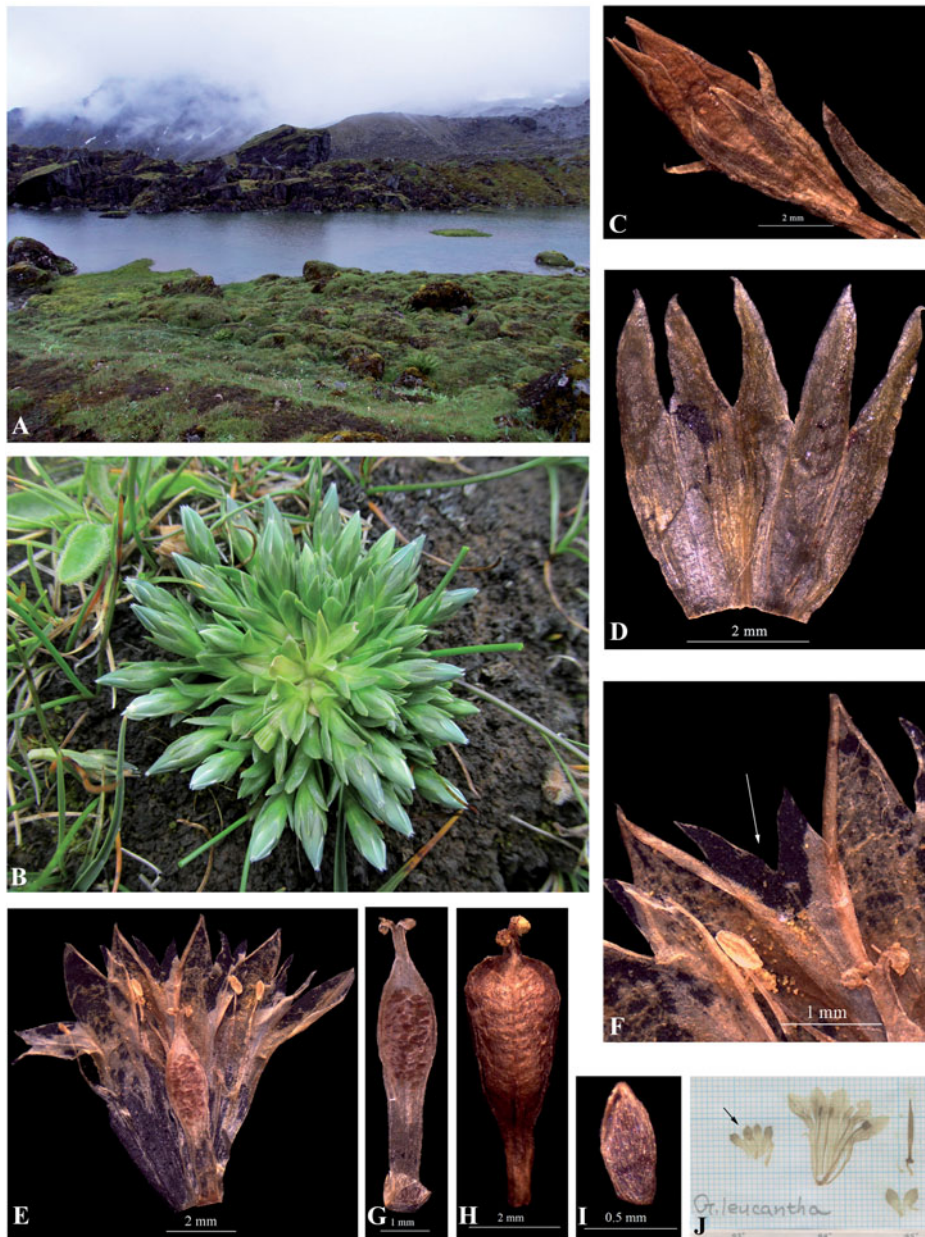


FIG. 1. A–I. *Kuefferia pringlei* D.Maity & Sentu K.Dey: A, habitat; B, habit [Dey & Maity 21386 – CUH]; C, flower (after anthesis); D, calyx split open (ventral face); E, opened corolla with stamens and gynoecium (ventral face); F, two-cleft plicae (marked with arrow); G, gynoecium; H, capsule; I, seed [Dey & Maity 21355 – CUH]. J, *Kuefferia leucantha* (Harry Sm. ex T.N.Ho & S.W.Liu) Adr.Favre: floral parts (note ovate to broadly elliptic calyx lobes marked with arrow) [from Ludlow, Sherriff & Taylor 5934 (BM), accessed via Global Plants on JSTOR, <http://plants.jstor.org/specimen/bm000947152>].

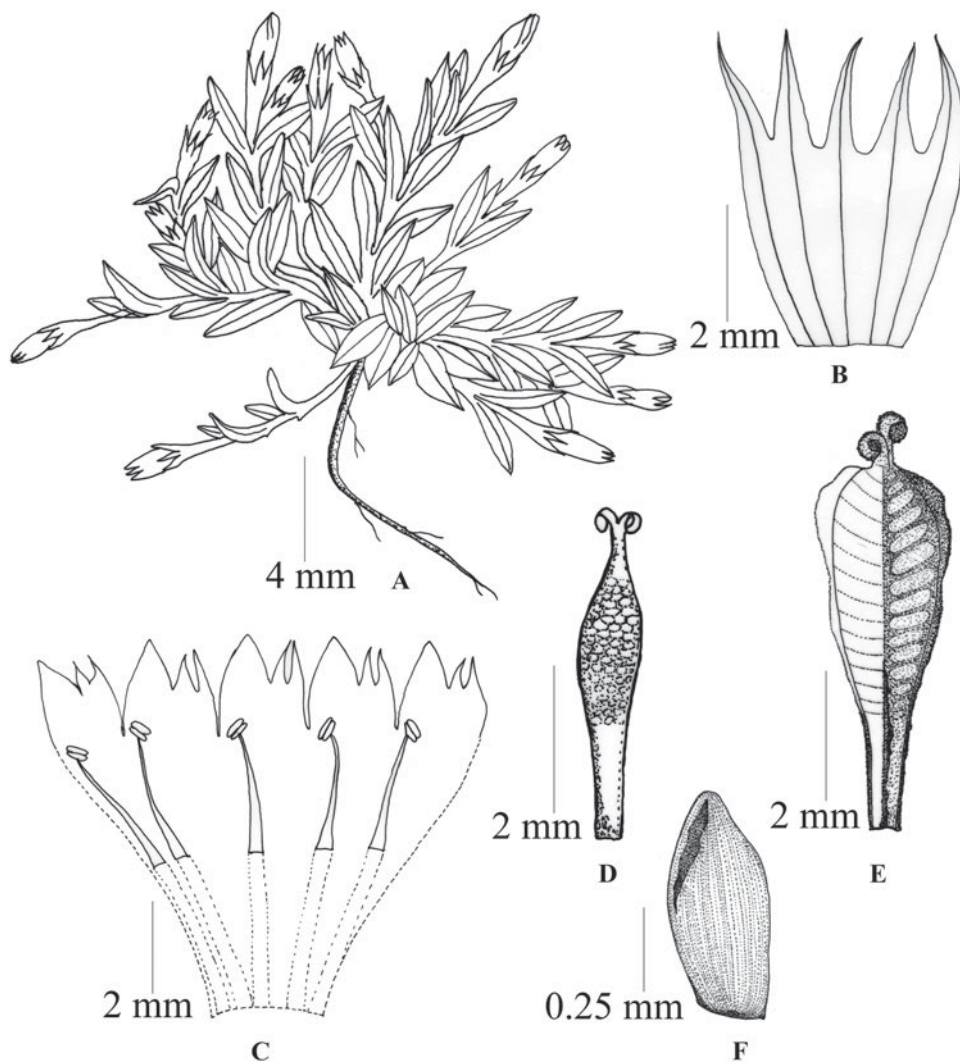


FIG. 2. *Kuepferia pringlei* D.Maity & Sentu K.Dey: A, habit; B, opened calyx (ventral face); C, opened corolla showing stamens (ventral face); D, gynoecium; E, capsule; F, seed (from Dey & Maity 21355 – holotype).

*Phenology.* Flowering: June–August; fruiting: July–September.

*Proposed IUCN conservation status.* Critically Endangered (CR). The species is known from a single mountain range in a very restricted area of the Lhonak valley. The type specimen was collected from a population of some eight mature individuals which covered an area of less than 0.5 sq. km. After a detailed search of the area around the type locality, along the trekking path between Kalapathar and Muguthang, two more populations were discovered. In total 20–22 individuals were observed in these three

populations. In view of the very low number of individuals known, the species should be considered Critically Endangered (CR D) (IUCN Standards and Petitions Subcommittee, 2014). The habitat of the species is along the boundary of the Kanchenjunga Biosphere Reserve, Sikkim. Some threats to the habitat are associated with the army camp at Muguthang. Yaks and army personnel carrying military goods and equipment use the footpath along which the plants are found. Conservation measures should be taken to save this new species.

*Etymology.* The specific epithet honours Dr James S. Pringle, Plant Taxonomist, Royal Botanical Garden, Hamilton, Ontario, the authority on New World *Gentiana*, from whom the second author received the most generous help regarding the new species.

*Additional specimens examined.* INDIA. Sikkim, between Kalapathar and Lhonak La (Shiv Mandir), 4500 m, 23 vii 2014, *Dey & Maity* 21386 (CUH); below Lhonak La, near lake, 4300 m, 26 vii 2014, *Dey & Maity* 21496 (CUH).

*Note.* *Kuepferia pringlei* brings the number of species recognised in the genus to 13, and the number of Indian species to two.

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