

Extended distribution of *Kuepferia chateri* (Gentianaceae) from India

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Abstract: *Kuepferia chateri* (T.N.Ho) Adr.Favre (≡*Gentiana chateri* T.N.Ho), an endemic species to Nepal, is recorded for the first time from Sikkim, India. A detailed taxonomic account, including description, photo-illustrations of diagnostic features, and habitat details are provided to validate this new addition to the flora of India.

Keywords: *Gentiana*, *G.* sect. *Otophora*, Himalaya, New record, North Sikkim.

Introduction

Kuepferia Adr.Favre was established as a separate genus by removing *Gentiana* sect. *Otophora* Kusn. from the genus *Gentiana* L. (Favre *et al.*, 2014). This taxonomic change was based mainly on the morphology of plicae, *i.e.* occurrence of highly reduced asymmetrical plicae in the form of a small tooth or an auricle on the side of the corolla lobes in *Kuepferia*, whereas *Gentiana* has well-developed, elaborate and symmetrical plicae. This change was supported by molecular phylogenetic analysis with the major objective to maintain monophyly of the genus *Gentiana* (Favre *et al.* 2014). Globally, the genus *Kuepferia* comprise 14 species and two infraspecific taxa (Ho & Liu, 2001; Maity & Saha, 2024). Among these, four species are narrow endemics: *K. kanchii* D.Maity, S.K.Dey & Adr.Favre and *K. pringlei* D.Maity & S.K.Dey are endemic to Sikkim, while *K. chateri* (T.N.Ho) Adr.Favre and *K. masonii* (T.N.Ho) Adr.Favre are endemic to Nepal and Myanmar, respectively.

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During the course of revisionary study on the genus *Gentiana* in the Indian Eastern Himalaya, interesting specimens of *Kuepferia* bearing large white flowers were collected in a field trip in July, 2024 from alpine meadows of Panchpokhri area of Sikkim. Based on critical study of the specimens and perusal of literature (Clarke, 1883; Garg, 1987; Ho & Pringle, 1995; Aitken, 1999; Ho & Liu, 2001; Favre *et al.*, 2014; Dey & Maity, 2015; Maity *et al.*, 2016; Gupta *et al.*, 2022; Maity & Saha, 2024), the specimens were identified as *Kuepferia chateri* (T.N.Ho) Adr.Favre (≡*Gentiana chateri* T.N.Ho). The identity of the specimens was also confirmed through consultation of the protologue (Ho, 1993) and comparison with the holotype (BM000521559!) and paratype (*L.W. Beer, C.R. Lancaster & D. Morris* 9545!) specimens deposited at BM.

To date, *K. chateri* has been considered endemic to Nepal and the present report of this species now from Sikkim, extends its distribution to India (Fig. 1). Therefore, the present study provides a detailed description, illustrations and habitat details of *K. chateri* to aid species identification and validate this new addition to the flora of India.

Materials and Methods

The plant specimens were collected in July, 2024 from Panchpokhri area, falling under the Kanchenjunga Biosphere Reserve in North Sikkim district. The collected specimens were processed and preserved in the Calcutta University Herbarium (CUH). The digital camera

(Canon powershot SX430 IS) was used for taking photographs of habit, habitat, close-up of flowers of the specimens. Under a Leica EZ4HD stereo microscope, detail measurements of vegetative and reproductive parts were taken. The protologue (Ho, 1993), holotype (BM000521559) and paratype (*L.W. Beer, C.R. Lancaster & D. Morris* 9545, BM) of *K. chateri* were consulted for its identification.

Taxonomic treatment

Kueferia chateri (T.N.Ho) Adr.Favre, *Taxon* 63: 351. 2014. *Gentiana chateri* T.N.Ho, *Bull. Nat. Hist. Mus. (London)*, Bot. 23: 55. 1993. *Type*: NEPAL, Kasuwa Khola, 4000 m, 23.08.1975, *L.W. Beer* 25363 (holo, BM, [BM000521559!]); Iswa Khola, 4000 m, 08.08.1971, *L.W. Beer, C.R. Lancaster & D. Morris* 9545 (Paratype BM!).

Figs. 2 & 3

Perennial herb, 4–10 cm tall (including flower); taproot stout, vertical, fusiform-cylindric, 3–7 mm diam with few wiry secondary rootlets; vegetative stems often prolonged, few-branched, both ascending and erect, basally covered with dense brown remnants of old petioles, each with many-leaved apical rosette; lamina 0.4–5 × 0.2–1.1 cm, narrowly oblanceolate, base narrowed, margin narrowly thickened, minutely and densely papillate, apex obtuse, midvein prominent; petioles up to 2 cm long; flowering stems annual, arising from beside rosettes of basal leaves, ascending, simple (often appear branched terminally when with more than one flower), slender, often purple. Leaves 2–5 pairs, distantly spaced; lamina 6.5–12.5 × 3.5–8 mm, elliptic-ovate, broadly elliptic, ovate-lanceolate or oblanceolate, base narrowed, margin

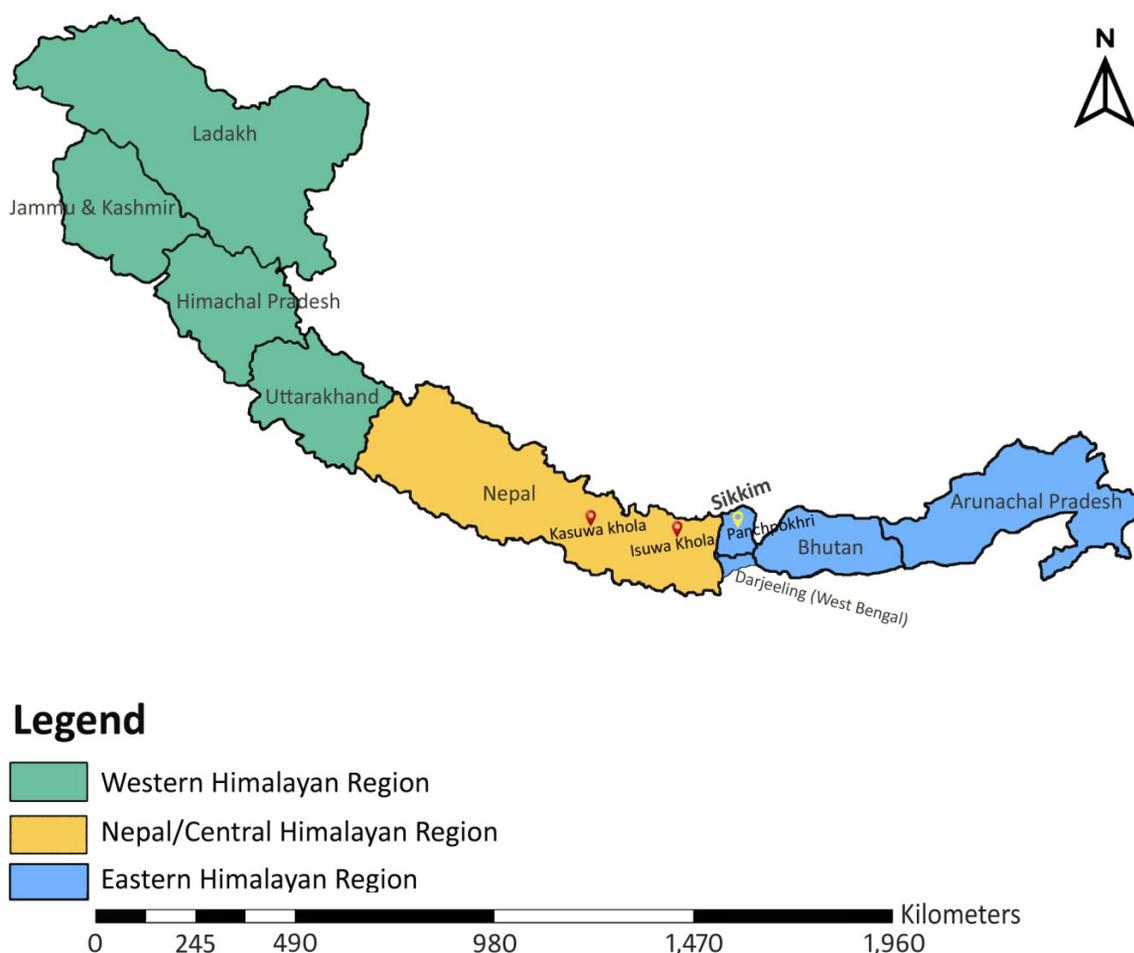


Fig. 1. Geographical distribution map of *K. chateri* showing both the previously known two locations in Nepal (red) and the newly recorded location in Sikkim (yellow). (Map prepared by Somnath Chakroborty).

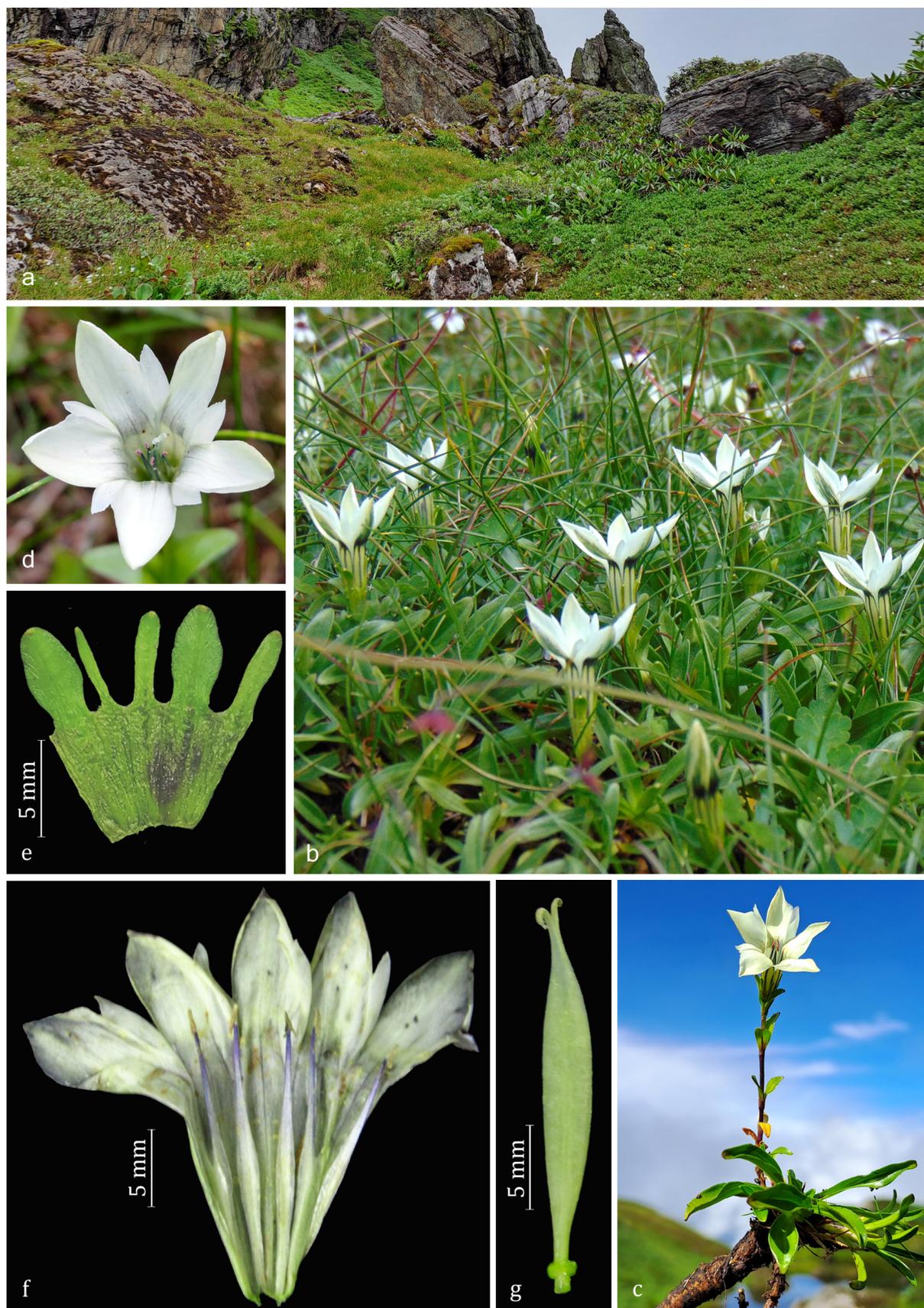


Fig. 2. *Kuepferia chateri* (T.N.Ho) Adr.Favre: **a.** Habitat; **b-c.** Habit; **d.** Flower; **e.** Calyx (ventral face); **f.** Corolla (ventral face); **G.** Gynoeceum (Photos a, c-g by Arup Kumar Halder and b by Somnath Chakrabortty).

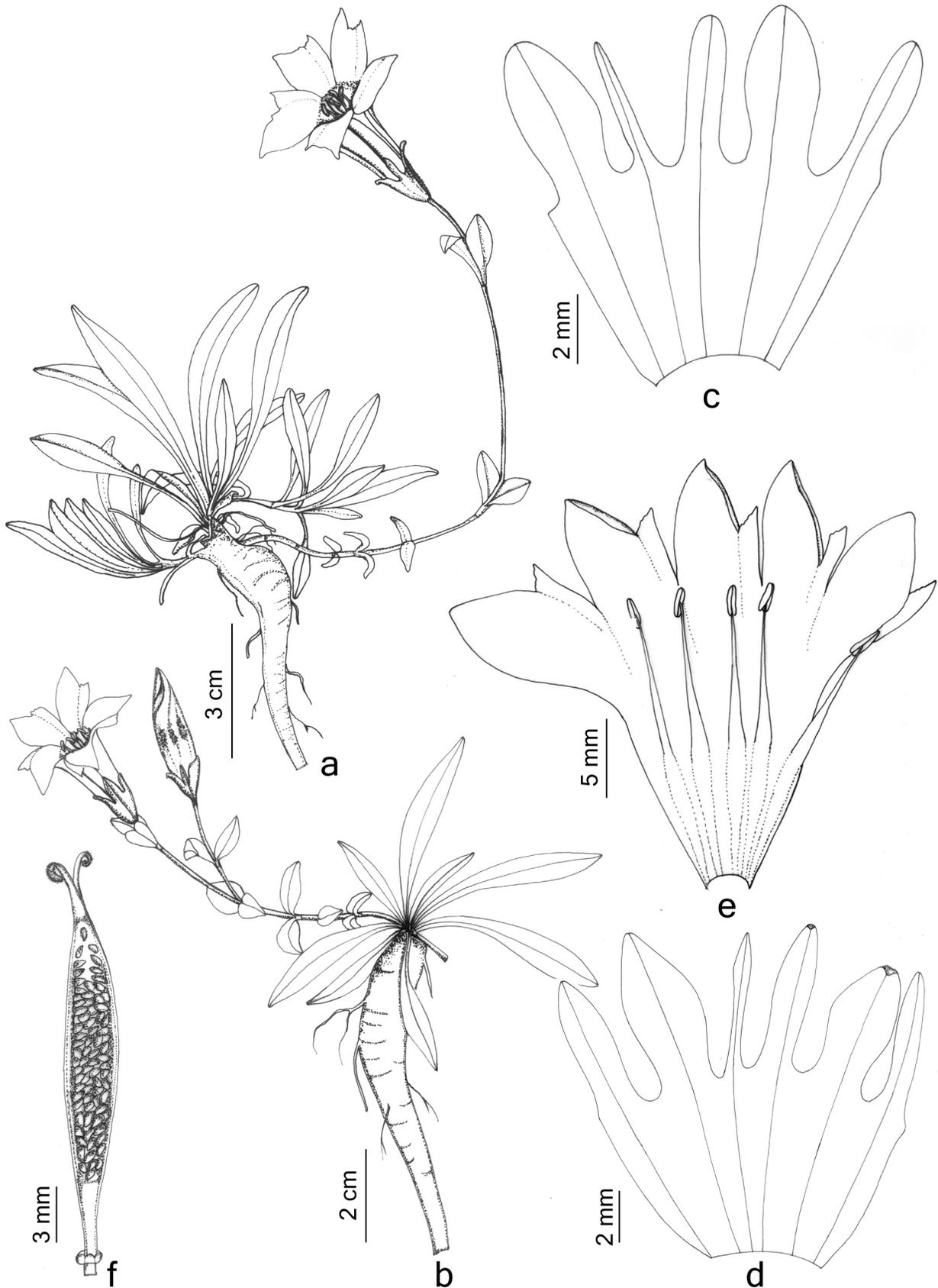


Fig. 3. *Kuepferia chateri* (T.N.Ho) Adr.Favre: **a-b.** Habit; **c-d.** Calyx (ventral face, note six lobes in d); **e.** Corolla (ventral face); **f.** Gynoecium (Drawing by Arup Kumar Halder).

slightly cartilaginous, minutely and densely papillate, apex obtuse, midvein prominent, purple abaxially towards base; petioles fused to tubular sheath up to 5 mm long. Flowers solitary terminal, or 2–3 in lax cymes; pedicels 0.5–2 cm long, rarely flowers sessile. Calyx tubular, green; tube 5–6 mm long; lobes unequal, reflexed, 4–5 × 1–2 mm, larger lobes oblanceolate-spathulate, smaller lobes linear, linear-oblong or linear-oblanceolate, base contracted, apex obtuse, sinuses wide. Corolla wide campanulate, 2.1–2.4 cm long, white (-pale yellow) inside, yellowish green outside, blue-purple tinge on middle of outer surface of lobes and along veins; lobes 5–7 × 3.5–4 mm, ovate-elliptic, margin entire, apex obtuse; plicae auricular, *c.* 2 × 0.9–1.1 mm, margin often denticulate, apex acute. Stamens inserted at basal part of corolla tube; filaments (4–) 8–9 mm long, widen towards base, bluish at upper part, yellowish white at lower part; anthers (0.8–) 1.5–2 mm long, purplish at anthesis. Ovary 0.9–1.3 cm long, narrowly ellipsoid, green; style 2–3 mm; stigma lobes *c.* 1 mm, linear; stipe 3–4 mm long. Capsules (immature) *c.* 1.2 × 1.9 cm, ellipsoid; seeds (immature) 0.7–0.8 × 0.35–0.45 mm, ± ellipsoid, light brown, minutely reticulate.

Flowering & fruiting: July–September.

Habitat: The species grows in alpine meadows between 3900–4000 m elevations. Altogether three populations of the species were observed. The largest population comprised of about 15 mature individuals, whereas in other two small populations about 11 and 7 individuals were recorded. The associated species included: *Argentina peduncularis* (D. Don) Soják (Rosaceae), *Bistorta affinis* (D. Don) Greene (Polygonaceae), *Carex* sp. (Cyperaceae), *Diplarche multiflora* Hook. f. & Thomson (Ericaceae), *Gaultheria pyrolifolia* Hook. f. ex C. B. Clarke (Ericaceae), *Potentilla coriandrifolia* G. Don (Rosaceae), *Salix* sp. (Salicaceae), *Rhododendron* sp. (Ericaceae) and *Viola biflora* L. (Violaceae).

Distribution: INDIA (Sikkim); Nepal (Koshi Province).

Specimens examined: INDIA, **Sikkim**, way to Panchpokhri (North Sikkim), 3900 m, 24.07.2024, A.K. Halder, B.K. Jha & S. Chakraborty 27212; Panchpokhri, 4000 m, 25.07.2024, A.K. Halder, B.K. Jha & S. Chakraborty 27319; Panchpokhri, 4000 m, 26.07.2024, A.K. Halder, B.K. Jha & S. Chakraborty 27374 (CUH).

Discussion

The current report of Nepalese endemic *Kuepferia chateri* from Sikkim, India assumes significance. Till date, the genus *Kuepferia* was represented in India by four species, viz. *K. doxiongshangensis* (T. N. Ho) Adr. Favre, *K. infelix* (C. B. Clarke) Adr. Favre, *K. kanchii* D. Maity, S. K. Dey & Adr. Favre, *K. pringlei* D. Maity & S. K. Dey. With this report of *Kuepferia chateri* (T. N. Ho) Adr. Favre, the number of species in the genus from India now raises to five. *Kuepferia chateri* is close to *K. hicksii* (Harry Sm.) Adr. Favre, the latter is endemic to Nepal and Bhutan (Ho, 1993; Ho & Liu, 2001). Both the species share a number of important characters like corolla lobes distinctly shorter than tube, white (or pale yellow) flowers (corolla) with blue stripes and minutely reticulate seed coat. However, unequal, oblanceolate-spathulate, linear, linear-oblong or linear-oblanceolate calyx lobes with narrowed base, usually 2–3-flowered cymes and comparatively shorter corolla make *K. chateri* much distinct from *K. hicksii*.

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