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Addition of *Melanoseris qinghaica* (Asteraceae: Cichorieae) to the flora of India

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Abstract: *Melanoseris qinghaica* (S.W.Liu & T.N.Ho) N.Kilian & Ze H.Wang (Asteraceae: Cichorieae) is reported as a new record for the flora of India. A description, line drawings, field photographs of live plants, data on ecology and phenology are given. Its IUCN conservation status in India is also assessed. A dichotomous key to the species of *Melanoseris* Decne. found in Sikkim Himalaya is provided to facilitate their correct identification.

Keywords: Asteraceae, Eastern Himalaya, IUCN, New record, Sikkim.

Introduction

The genus *Melanoseris* Decne. (Asteraceae: Cichorieae) includes about 34 species published under this name (Kilian *et al*., 2009+), and a good number of further species mainly distributed in Africa and Asia are associated with the *Melanoseris* lineage (Kilian *et al*., 2009+; 2017). Molecular phylogenetic analyses indicate that reticulation between the *Melanoseris* and *Lactuca* lineages have occurred and consequently morphologically both lineages are difficult to distinguish (Kilian *et al*., 2017). It has been questioned recently whether the *Melanoseris* lineage should be recognized as a separate genus besides *Lactuca* (Kilian *et al*., 2017; Güzel *et al*., 2021). Nevertheless, for the time being, the author here maintains the generic distinction between *Lactuca* L. and *Melanoseris*. *Melanoseris* represents around 15 species in India and the majority of species are found in the Himalaya and Northeastern states, though *Melanoseris cyanea* (D.Don) Edgew. extends its occurrence to Punjab, Kerala and Tamil Nadu (Rao *et al*., 1989; Hajra *et al*., 1995). Sikkim shelters seven species of *Melanoseris* in its temperate and alpine forests (Hooker, 1881; Hajra *et al*., 1995; Maity *et al*., 2018; Singh *et al*., 2019; Gogoi *et al*., 2021).

While working on the flora of North Sikkim, the author came across unusual specimens of Cichorieae of the family Compositae. They were growing in open alpine pasture and under a *Dasiphora fruticosa* (L.) Rydb. (≡*Potentilla fruticosa* L.) thicket and appeared inimitable with bright purplish red to bluish-purple large flower heads. The plants were short stemmed and with milky latex. The leaves were mostly arranged in basal rosette with sinuate margins that make them unique among all other associated species. After consultation of the relevant literature (Hajra *et al*., 1995; Grierson & Springate, 2001; Liu & Ho, 2001; Shi & Kilian, 2011; Shih *et al*., 2011; Wang *et al*., 2015) and expert scrutiny of specimens both in the field and laboratory, the specimens were identified as *Melanoseris qinghaica* (S.W.Liu & T.N.Ho) N.Kilian & Ze H.Wang, hitherto unknown from India. The species was previously recorded only from Bhutan and China, and never reported in Indian literature (Hooker, 1881; Rao *et al*., 1989; Hajra *et al*., 1995; Maity *et al*., 2018; Gogoi *et al*., 2021), and thus *M. qinghaica* is a new record for the flora of India from the Sikkim Himalaya. A detailed taxonomic description, supplemented with illustrations and key to the species of *Melanoseris* growing in the Sikkim Himalaya is also incorporated. Moreover, habitat information and an IUCN conservation assessment of the species in India are included.

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Materials and Methods

Plant specimens were collected from open alpine pastures of Lhonak valley of North Sikkim. Photographs of the habit and habitat of the plants were captured. Voucher specimens were deposited at CUH (Thiers, updated continuously). Flowers were dissected under a stereo binocular microscope for morphological characterization. Specimens of related species deposited at different herbaria, viz. CUH, CAL, K, E, PE were examined either directly or through high resolution digital images. The relevant literature on the species was examined to circumscribe the taxon properly (Liu & Ho, 2001; Shi & Kilian, 2011; Shih *et al*., 2011; Wang *et al*., 2015). Both qualitative and quantitative traits as observed in the Sikkimese (Indian) plants have been given below in the taxonomic description of the species, whereas the range of characters as noted in the literature for species in China and Bhutan (and Nepal?) are given below in brackets.

Taxonomic Treatment

Melanoseris qinghaica (S.W.Liu & T.N.Ho) N.Kilian & Ze H.Wang, PLoS One 8(12): e82692 (18). 2013. *Mulgedium qinghaicum* S.W.Liu & T.N. Ho, *Acta Phytotax. Sinica* 39: 556. 2001. *Type*: CHINA, **Qinghai**, Hualong, in poplar forests, 2600 m, 18.09.1988, *S.W. Liu* 3536b (holotype lost, HNWP). *Lectotype*: [icon] *Acta Phytotax. Sinica* 39: 556, fig. 2. 2001 (designated by Wang *et al*., 2015).

Figs. 1 & 2

Perennial herbs with milky latex, 4–16(-40) cm tall. Root fleshy, 6–8 mm diam. Stems branched from base or often simple at base and branched above 1/3 of length; branches often sub-equal, ±corymbose, ±erect, gray or purple-hairy. Basal leaves in rosette, petiolate; petioles flattened, winged, 1–3.5 cm long (petioles of lower leaves longer, 2–3.5 cm), broadened at the base, ±semiamplexicaul; lamina elliptic-oblong or oblanceolate, (1–)3.5–6(–9) × (0.4–)1–2.2(–3.5)cm, apex acute, margin shallowly lobed or sometimes lyrate-pinnatisect (lateral lobes 2–4 pairs, ovate, triangular-ovate), entire or denticulate, sparsely and distinctly ciliolate, base cuneate, gradually narrowed and winged on petiole, glabrous on both the surfaces or with scattered hairs on veins adaxially, older often pale purple blotched, midvein thick, usually red-purple; cauline leaves few to several, ovate-lanceolate, elliptic-oblong or oblanceolate, (1.8–) 4–6 × (0.3–)0.8–1.5 cm, often subulate towards stem apex, margin sometimes lyrate-pinnatisect (lateral lobes 2–4 pairs, ovate, triangular-ovate), upper ones bract-like, 0.5–3 cm long, apex acute or acuminate, margin entire, sparsely and distinctly ciliolate, purple, base cuneate, gradually narrowed and winged on petiole, glabrous on both surfaces or with scattered hairs on veins adaxially, older often pale and purple blotched, midvein thick, purple; petioles ±semiamplexicaul. Synflorescence racemiform (overall often corymbose), with (5–)9–15 capitula, mostly solitary and terminal on lateral branches, 4–5 in central main stem, racemiform. Capitulum with (12–)20–25 florets; peduncles mostly (1–)2–3 cm

Fig. 1. *Melanoseris qinghaica* (S.W.Liu & T.N.Ho) N.Kilian & Ze H.Wang: **a.** Habit; **b.** Synflorescences enlarged; **c.** Achene (photos by Debabrata Maity).

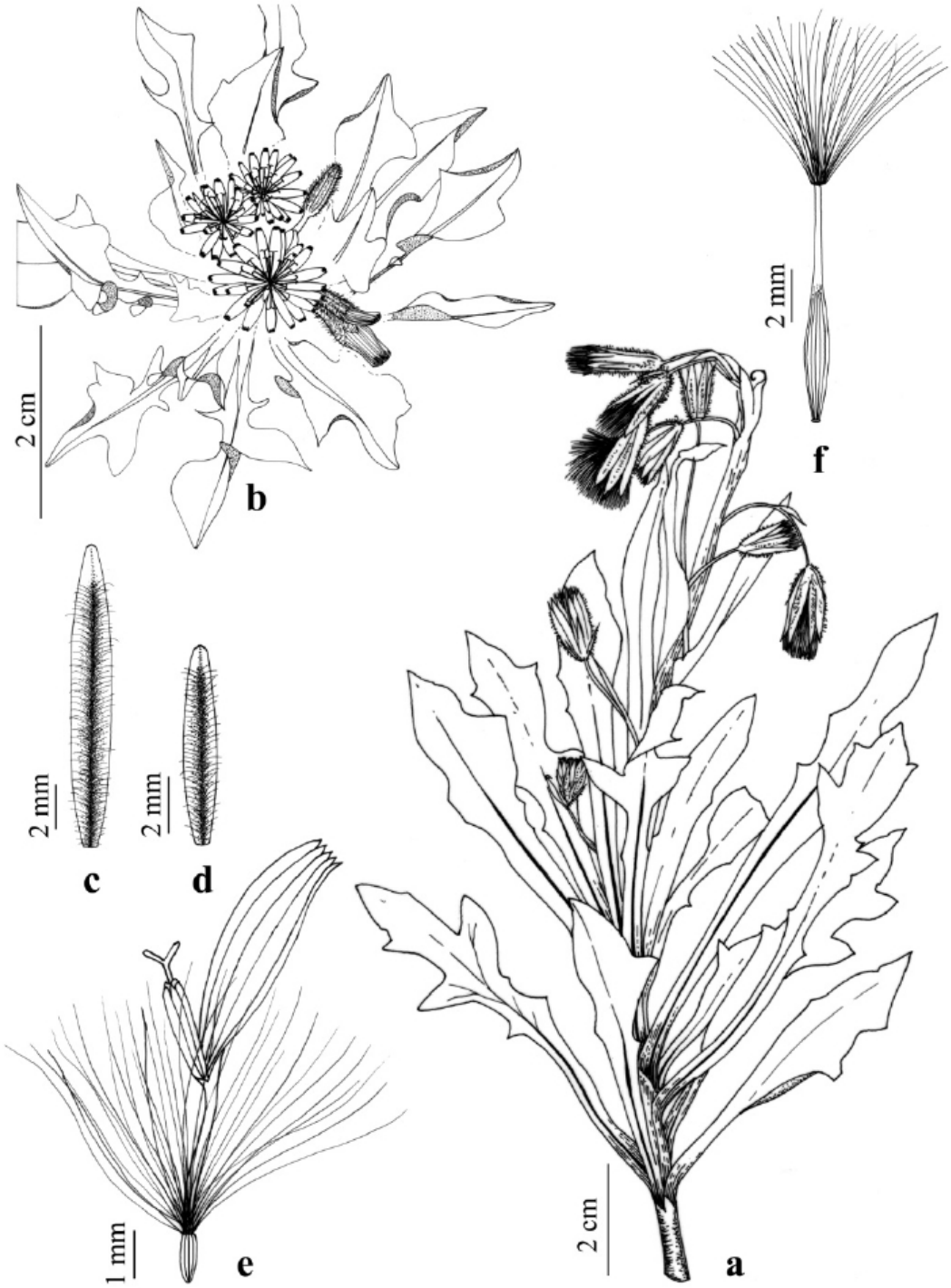

Fig. 2. *Melanoseris qinghaica* (S.W.Liu & T.N.Ho) N.Kilian & Ze H.Wang: **a.** Habit – side view; **b.** Habit – top view; **c.** Inner phyllaries – abaxial face; **d.** Outer phyllaries – abaxial face; **e.** Floret; **f.** Achene (drawn by Mrinmoy Midday from Maity *et al*. 21776 [CUH]).

long, bracteate; involucre campanulate, (0.6–)0.9–1.5(–1.8) × 0.5–0.8(–1) cm; outer phyllaries 2–3-seriate, lanceolate-oblong, (1–)4–12 × 0.9–2 mm, apex obtuse(-rounded) or sub-acute, densely ciliolate, margin narrowly membranous, thickened and hirsute with white or light red purple spreading hairs along midvein. Florets (12–) 20–25, purplish red to bluish purple; ligule oblong or narrowly elliptic, (4–)5–10 × (1–)1.5–1.7 mm, apex 5-denticulate, dark, tube (2–)3–6.5 mm long, glabrous. Anther tube excluding appendages 1.8–2(2.1–2.5) mm long. Style branches 1.36–1.42 mm long; cypsela (slightly immature) fusiform, (6–)8.5–9.5(–10) mm long, brown, ribbed, ±compressed, attenuate to narrow, slender, long beaked; beak pale yellowish, (2–)4.3–5.5 mm long. Pappus 2-seriate, (4–)5.5–9.5 mm long, yellowish, scabrid.

Flowering & fruiting: Flowering from July to September, fruiting from September to October (in Sikkim).

Habitat: Grows in open alpine pastures at 4200 m elevation. Plants of one population growing amongst a thicket of *Dasiphora fruticosa* (L.) Rydb. (Rosaceae) along with *Carex* sp. (Cyperaceae). The other population grows in association with *Aletris pauciflora* (Klotzsch) Hand.-Mazz. (Nartheciaceae), *Allium sikkimense* Baker (Amaryllidaceae), *Bistorta affinis* (D.Don) Greene (Polygonaceae), and others.

Distribution: India (Sikkim), Nepal (based on photo record published by Kilian *et al*., 2009+), Bhutan, and China.

Specimen examined: INDIA, **Sikkim**, Lhonak valley, 08.08.2015, *Maity*, *Maiti*, *Chakraborty & Dey* 21776 (CUH).

Conservation status: *Melanoseris qinghaica* is currently known from two populations in India with only 5–6 mature individuals altogether, both are in Lhonak valley, North Sikkim. These two populations are *c*. 0.5 km apart. The newly identified populations are found confined only in a small area (*c*. 1 km²) in the Sikkim Himalaya. The locality is exposed to anthropogenic threats like roadway construction, residential house construction and livestock grazing. Considering that and the threats may reduce the number of individuals in the future, and as the AOO and EOO of the species are <10 km² and <100 km², respectively, it is suggested to consider the species as 'Critically Endangered' (CR, B1ab(i,iii)+2ab(ii, iii,v) and D) in India (IUCN, 2022).

Discussion

Initially, *Melanoseris qinghaica* was assigned to genus *Mulgedium* Cass. as *M. qinghaicum* S.W.Liu & T.N.Ho and was described based on a single specimen collected from the Qinghai province of China (Liu & Ho, 2001). Subsequently, through molecular phylogenetic analysis and morphological evidence the species was transferred to *Melanoseris* by Wang *et al*. (2013). The holotype is lost, and subsequent lecto-typification had been carried out with the image from the protologue by Wang *et al*. (2015), who established its morphological distinction from *M. lessertiana* (DC.) Decne. Earlier, Shi and Kilian (2011) had tentatively included *M. qinghaica* in *M. lessertiana* as both share a similar habit, capitulum size and pubescence of the involucres. The present investigation fully corroborates its diagnostic features as detailed by Wang *et al*. (2015). The cypselas of the former have a thin and slender beak which is definitely longer, sometimes equal, than the body and the anther tube is (1.8–)2–2.4 mm long. In *M. lessertiana* the cypsela beak is stout and distinctly shorter than the body and the anther tube is much longer (3.7–4.7 mm). *Melanoseris qinghaica* was reported from China and Bhutan by Wang *et al*. (2015). A photo record by E. Byers from NE Nepal of August 2017, the first and so far single report for that country, has been published by Kilian *et al*. (2009+). The present finding of a new location in Sikkim Himalaya establishes the continuous distribution of *M. qinghaica* and provides the first evidence for its occurrence in India.

Key to the Sikkim Himalayan species of *Melanoseris*

1. Florets 3–6 2
1. Florets 10–40 3

2. Plants up to 2.5 m tall; terminal leaf lobe elliptic-lanceolate with cuneate (-truncate) base; inner involucral bracts 3(-4); achene distinctly beaked ..... *M. graciliflora*

2. Plants 0.75–1 m tall; terminal leaf lobe triangular with hastate, sagittate, cordate or truncate base; inner involucral bracts 5(-6); achenes beakless, truncate ..... *M. violifolia*

3. Florets nearly 40; phyllaries with white dense fimbriate margin ..... *M. macrantha*

3. Florets up to 30; phyllaries never as above, margin usually entire 4

4. Leaves usually pinnatisect with up to six orbicular or broadly elliptic lobes; petioles of at least middle leaves abruptly and largely expanded and auriculate at base ..... *M. macrorhiza*

4. Leaves usually unlobed or sinuately lobed; segments, if present otherwise; petioles never expanded and auriculate as above 5

5. Leaves not sinuate or lobed, usually dentate-serrate; peduncle with conspicuous lanceolate purplish bracts to 1.5 cm gradually reaching the size of the involucral bracts; phyllaries abaxially glabrous ..... *M. bracteata*

5. Leaves usually sinuate-lobed; peduncles not bracteate as above; phyllaries (at least outer one) abaxially variously hairy 6

6. Plants with dominant strong main stem more than 75 cm tall (often to 2 m); most leaves ovate-triangular, larger leaves up to 8.5 cm across .... *M. cyanea*

6. Plants usually with weak stem less than 45 cm tall, or several lower stems; leaves narrowly elliptic-oblanceolate or oblanceolate, less than 3 cm across 7

7. Anther tube (excluding appendage) more than 3.5 mm long; achene beak stout, thick, distinctly shorter than body..... *M. lessertiana*

7. Anther tube (excluding appendage) up to 2.5 mm long; achene beak thin, filiform, slender, longer than (-equal to) body ..... *M. qinghaica*

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