

Anaphalis hookeri (Asteraceae: Gnaphalieae) a narrow-endemic species from Sikkim, India: notes on its identity and typification

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Abstract: Taxonomic reassessment of *Anaphalis hookeri* C.B. Clarke ex Hook.f., a lesser-known narrow-endemic species from Eastern Himalayas (Sikkim), India, is presented here to resolve the long-standing confusion on its identity. The current study represents the first elucidative documentation of *A. hookeri*. Macro- and micromorphological features are thoroughly documented through descriptions and detailed photoplates, along with taxonomic differentiation of *A. hookeri* from the morphologically allied *A. margaritacea* (L.) Benth. & Hook.f. and from *A. subumbellata* C.B. Clarke, a species previously considered to be closely allied. A lectotype is also designated from the syntypes to ensure nomenclatural stability.

Keywords: *Anaphalis margaritacea*, *Anaphalis subumbellata*, Compositae, Lectotype, Sikkim, Subdioecy.

Introduction

The genus *Anaphalis* DC., with representation of c. 110 species worldwide (Mabberley, 2018; POWO, 2026), belongs to the tribe Gnaphalieae, Asteraceae. Most of the *Anaphalis* species are distributed in subtropical and temperate Asia. However, two species, *A. margaritacea* (L.) Benth. & Hook.f. and *A. chilensis* Reiche exhibits distinct distribution patterns. The former is found to have disjunct distribution in Asia and North America, and the latter is endemic to the Chilean Andes in South America (Nie *et al.*, 2013). Characters like subdioecy (plants differing in the ratio of female to bisexual florets in the capitula), mostly white

papery and vernicose phyllaries, sometimes yellowish and pinkish, female sterility of bisexual florets, dimorphic pappus and short papillate-clavate hairs on cypsela (Bentham & Hooker, 1873; Beauverd, 1913; Drury, 1970; Anderberg, 1991; Bremer, 1994; Glenney, 1997; Abid & Qaiser, 2007; Xu *et al.*, 2021; Xu *et al.*, 2024) make it distinguishable from other genera of the Gnaphalioid Compositae.

In India, the genus comprises 45 taxa, including 39 species and six varieties, with doubtful occurrence of *A. saxatilis* Boerl., *A. tenella* DC., and *A. corymbosa* (Bureau & Franch.) Diels. The genus is predominantly distributed across the Indian Himalayan regions and Western Ghats with 16 species being endemic to the country (Singh *et al.*, 2015; Karthikeyan *et al.*, 2020; Narasimhan & Irwin, 2021; Remya *et al.*, 2024; Kushwaha & Bhattacharjee, 2025; Remya *et al.*, 2026).

Anaphalis hookeri C.B. Clarke ex Hook.f. is a little-known endemic species of the Eastern Himalayas in India, which has been reported only from a very few locations of North Sikkim (Fig. 1), including type localities (Hooker, 1881; Pant, 1995; Grierson & Long, 2001; Singh *et al.*, 2015; Kushwaha & Bhattacharjee, 2025). Hence, this species has long been overlooked and misidentified by taxonomists, often confused with the morphologically similar *A. margaritacea* and has also been regarded as closely allied to *A. subumbellata* C.B. Clarke in previous taxonomic treatment. This study aims to clarify the

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taxonomic identity and distinctiveness of *A. hookeri* with a detailed and comprehensive morphological description, supplemented by photographic plates emphasizing macro and micro-morphological characters, including Scanning Electron Microscope (SEM) images of cypsela which have not been previously documented for this species. Further, taxonomic differentiation of *A. hookeri*, *A. margaritacea*, and *A. subumbellata* has also been provided to distinguish these taxa. This study has also addressed the typification of the binomial *A. hookeri*, thereby offering nomenclatural clarity for future taxonomic references.

Materials and Methods

The comparative morphological study was carried out based on authentically identified freshly collected plant samples. Herbarium consultation (ARUN, BM, BSHC, CAL, DD, E, K, MANCH) and critical examination of relevant literature (Clarke, 1876; Hooker, 1881; Pant, 1995; Grierson & Long, 2001; Chen *et al.*, 2011) was also undertaken. The herbarium acronyms mentioned here follow Thiers (2026, continuously updated). Additionally, digital resources were consulted, including Global Plants (<https://plants.jstor.org/>), Kew Data Portal (<https://data.kew.org/>), and Global Biodiversity Information Facility (<https://www.gbif.org/>). The live samples of *A. hookeri* were collected from different locations of North Sikkim, *i.e.* Lachung (one of the type localities), Shingba Rhododendron Sanctuary, and Yumthang valley. The collected plant samples were studied under an Olympus SZ61, Nikon SMZ 1500 Stereo Microscope, and Olympus CX41 Compound Microscope at CAL. The micromorphological studies of cypsela were carried out under Zeiss Evo 18 (Special Edition) SEM at the Zoological Survey of India, Kolkata. Cypsela samples were dehydrated in gradient alcohol and fixed on stubs with double-sided adhesive tape and coated with gold. Morphological terms used to describe the characters in the study followed Anderberg (1991), Abid and Qaiser (2007), Beentje (2010)

and Xu *et al.* (2021). Protologue and types were scrutinised for lectotypification in accordance with the Madrid Code (Turland *et al.*, 2025). For providing the geographical location of the taxon, a distribution map was prepared using ArcGIS (<https://www.esri.com/en-us/arcgis/geospatial-platform/overview>).

Taxonomic Treatment

Anaphalis hookeri C.B. Clarke ex Hook.f., Fl. Brit. India 3(8): 282. 1881; P.C. Pant in Hajra *et al.* (eds.), Fl. India 13: 63. 1995; Grierson & Long in Spring. (ed.), Fl. Bhutan 2(3): 1518. 2001. *Lectotype* (designated here): INDIA, **Sikkim**, Lachen, 10–11000 ft, 03.08.1849, *J.D. Hooker s.n.* (K [K000262564] digital image!). *Residual syntypes*: INDIA, **Sikkim**, Lachen, 9000 ft, 31.07.1849, *J.D. Hooker s.n.* (K [K000262565] digital image!); Lachong [Lachung], 9–10,000 ft, 01.10.1849, *J.D. Hooker s.n.* (K [K000262563] digital image!); Lachong [Lachung], 9000 ft, 16.08.1849, *J.D. Hooker s.n.* (K [K000262566] digital image!); Lachen, 10–11,000 ft, 1849, *J.D. Hooker s.n.* (K [K000262567] digital image!).

Figs. 1–4

Perennial herbs, sub-dioecious, 40(30)–60(100) cm tall, aromatic due to the presence of glandular trichomes throughout. Stems erect, slender, glabrescent, highly lanate distally (especially pedicel and peduncles) glandular, ridged (prominent when dried), uniformly leafy. Leaves alternate, spirally arranged, sessile, spreading, narrowly lanceolate, 5–10 × 0.5–1.3 cm, base semi-amplexicaul, margins slightly revolute, acuminate-mucronulate at apex, often hooked, green (appear to be burnt when dried), both surfaces sparsely cobwebby, covered with short biseriate glandular trichomes hidden under woolly long 4–5-celled eglandular trichomes; abaxial surface comparatively light green, less hairy, prominently 3-veined from base to apex, 2 faint lateral veins arise from base merging with lamina-margins near lower half (inconspicuous in dried specimens), mid-rib prominent, nerves prominently pubescent abaxially. Peduncles 7–15

mm long, lanate. Capitula 80–150, arranged in terminal corymb, heterogamous, disciform to obovoid, dimorphic (due to subdioecy); capitula with predominantly pistillate florets: $3\text{--}5 \times 3.5\text{--}4$ mm, pistillate florets multiseriate, 100–150 in number, bisexual florets 5–7 in number; capitula with predominantly bisexual florets: $3\text{--}4 \times 4\text{--}5$ mm, pistillate florets uniseriate, 2–4 in number, bisexual florets multiseriate, 25–30 in number. Phyllaries 6–7 seriate, imbricate, lamina opaque, papery, white to ceraceous, vernicose, basally brownish-maroon, stereome divided, thickened, light yellowish-brown; outermost (1 series) oblong, $2.5\text{--}3 \times 0.6\text{--}0.8$ mm, obtuse and slightly praemorse at apex, margins entire to repand, lamina 1–1.5 mm long, ceraceous, basally yellowish-brown, stereome 0.4–0.5 mm long, divided, outer surface highly arachnoid, inner surface glabrous and lustrous; middle ones (up

to 3 series after the outermost series) lanceolate to ovate, $3\text{--}3.5 \times 1\text{--}1.5$ mm, acute to obtuse at apex, margins entire to slightly crenate, lamina 2–3 mm long, white, basally brownish-maroon, stereome short, 0.5–0.7 mm long, divided, both surfaces glabrous and nitid; inner-ones (up to 2 series inside middle ones) unguiculate, $3.2\text{--}3.5 \times 0.5\text{--}0.8$ mm, acute at apex, slightly incised, margins entire, lamina 0.8–1 mm long, white, basally maroon, stereome c. 1.5 mm long, divided, yellowish-green, outer surface slightly villous, inner surface glabrous and lustrous; innermost (1 series) linear, $2.5\text{--}3 \times 0.3\text{--}0.5$ mm, highly incised at apex, margins entire, lamina under-developed and inconspicuous, stereome highly elongated 2 mm long, divided, greenish-brown, outer surface villous, inner surface glabrous and lustrous. Receptacle plano-convex, scrobiculate, 1–1.7 mm in diam., brown, paleate. Pistillate florets outer,

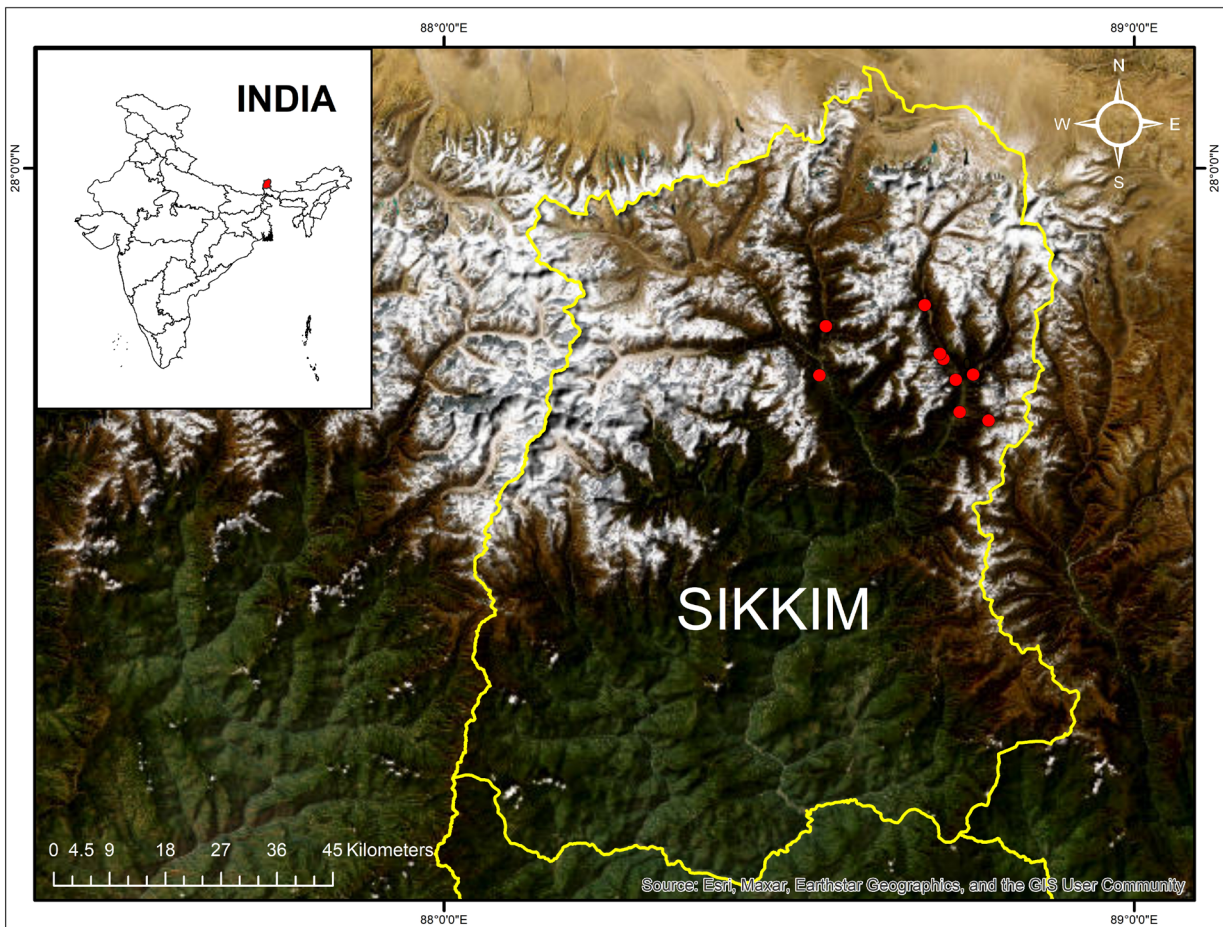


Fig. 1. Map showing the distribution of *Anaphalis hookeri* C.B. Clarke ex Hook.f. in India (Prepared using ArcGIS).

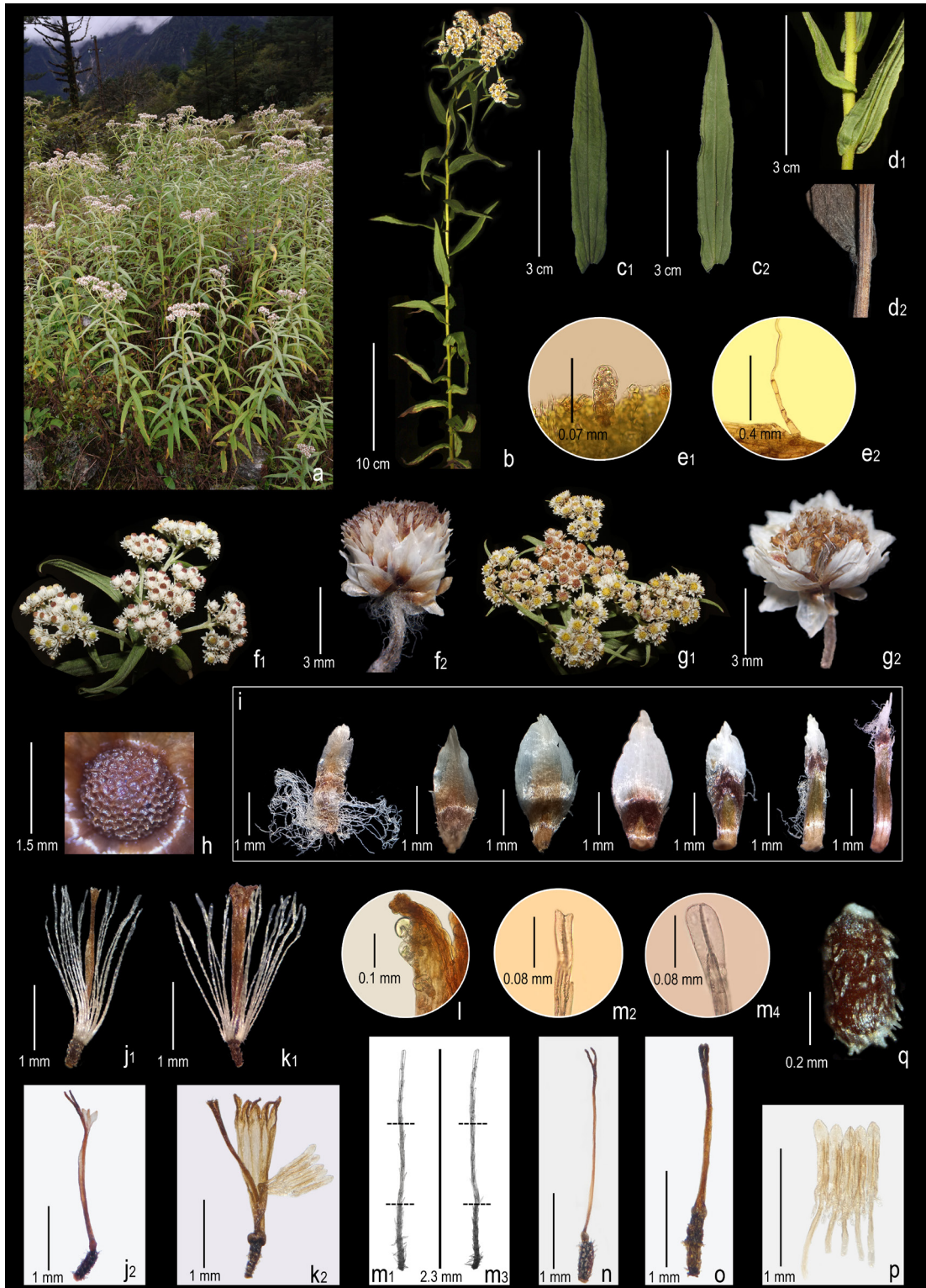


Fig. 2. *Anaphalis hookeri* C.B.Clarke ex Hook.f.: **a & b.** Habit; **c.** Leaf (c1–adaxial surface; c2–abaxial surface); **d.** Stem showing leaf base; **e.** Types of foliar trichomes (e1–glandular; e2–eglandular); **f. & g.** Inflorescence and capitula showing subdioecy (f1–inflorescence of pistillate floret predominant capitula; f2–pistillate-floret predominant capitulum; g1–inflorescence of bisexual-floret predominant capitula; g2–bisexual-floret predominant capitulum); **h.** Receptacle; **i.** Phyllaries from outermost to innermost (left to right); **j.** Pistillate-floret (j1–entire; j2, dissected); **k.** Bisexual floret (k1–entire k2–dissected); **l.** Glands on corolla lobes; **m.** Dimorphic pappus (m1–entire pappus of pistillate-floret; m2–pappus tip of pistillate-floret; m3–entire pappus of bisexual-floret; m4–pappus tip of bisexual-floret); **n.** Pistil of pistillate-floret; **o.** Pistil of bisexual floret; **p.** Stamens in bisexual floret; **q.** Cypsela (Photos by P.S. Kushwaha; g1 & g2 from P.S. Kushwaha 96866; others from P.S. Kushwaha 96879).

2.5–2.8 mm long; pappus uniseriate, 16–20 per floret, 2–2.3 mm long, white, free, barbellate, bristles capillary, apex acute, base with patent cilia; corolla filiform, yellow (golden-brown when dried), obscurely 3–4-lobed, glandular hairs dorsally; ovary oblong, c. 0.3 mm long, yellowish-green, moderately clavate papillate; style slender, 1.8–2 mm long, yellow (brownish-maroon after cypsela formation), glabrous, swollen at base, bifid, stylar branches with rounded apex; stigma

0.2–0.35 mm, surface smooth. Bisexual florets (functionally staminate), central, 2.5–2.8 mm long; pappus uniseriate, 13–26 per floret, 2–2.3 mm long, white, free, barbellate, bristles capillary, patent cilia at base, apical cells incrassate; corolla tubular, yellow (yellowish-brown when dried) 5-lobed, with glandular hairs; stamens 5, syngenesious, 1.5–1.8 mm long; filaments 0.8–1 mm long; anther collar c. 0.1 mm long, having thick-walled cells; anther ecalcarate, 0.5–0.7 mm

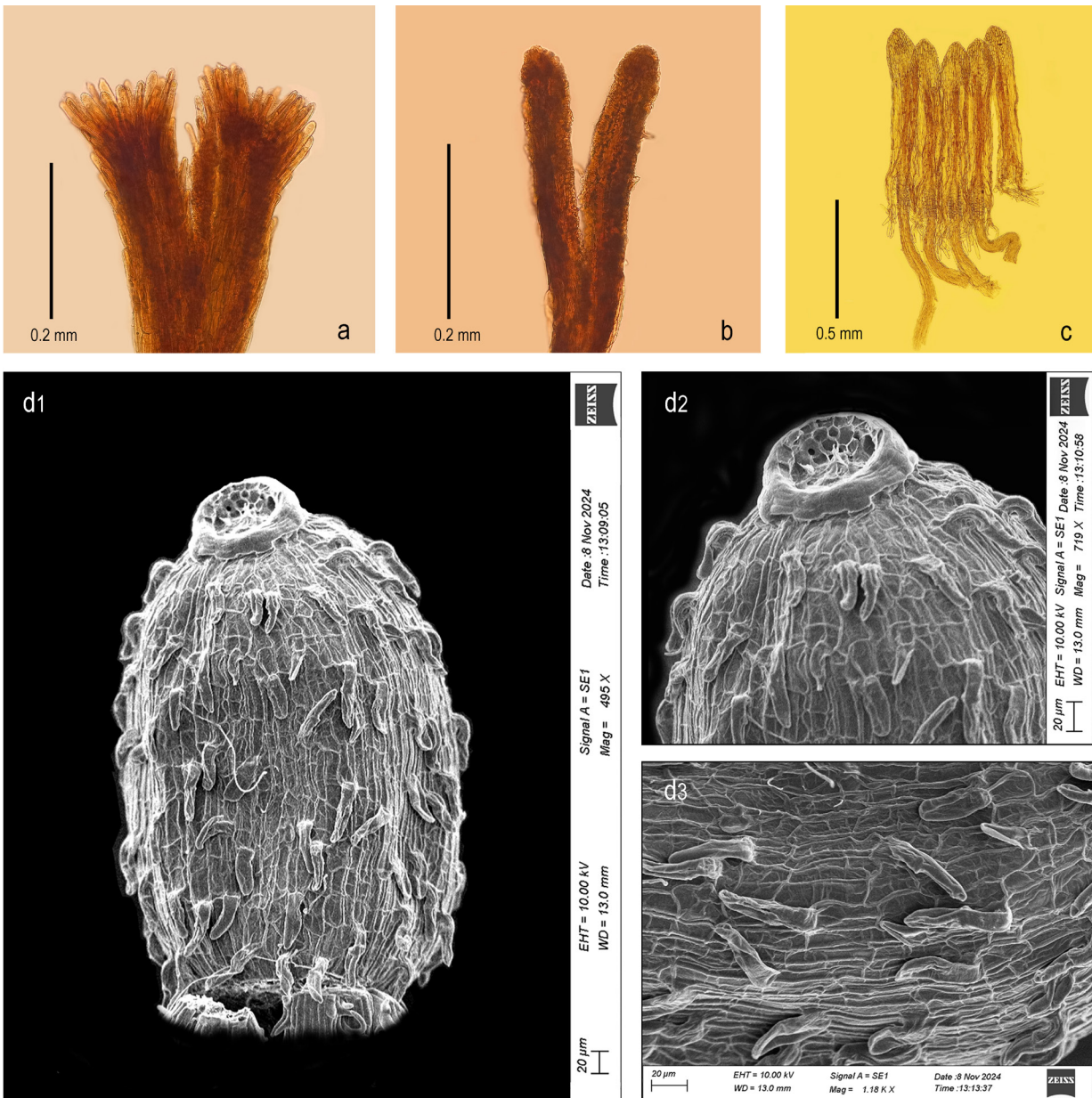


Fig. 3. Micromorphological characters in *Anaphalis hookeri* C.B. Clarke ex Hook.f.: **a.** Stylar branch in bisexual-floret; **b.** Stylar branch in pistillate-floret; **c.** Syngenesious anthers showing anther collar and tails; **d.** SEM images of cypsela (d1—entire cypsela; d2—enlarged view of cypsela showing Carpopodium; d3—enlarged view of cypsela surface).



Fig. 4. Lectotype of *Anaphalis hookeri* C.B. Clarke ex Hook.f. (K000262564, left side) © The Board of Trustees of the Royal Botanic Garden, Kew.

long, basal appendage tailed c. 0.25 mm long, obtuse at apex, apical appendage flat; ovary sub-cylindric, c. 0.2 mm, yellowish-green, densely clavate papillate, style thick, 1.5–1.8 mm long, yellow, glabrous, swollen at base, bifid, stylar branches truncate; stigma 0.2–0.3 mm, with oblong sweeping hairs apically and dorsally reaching the furcation. Cypsela ellipsoid, slightly angular 0.3–0.5 × 0.1–0.2 mm, reddish brown, surface reticulate-claviform, moderately papillate-clavate twin hairs; carpopodium 0.07–0.08 mm in diam., asymmetric, complete ring, slightly angular, foramen narrow, inner surface alveolate.

Flowering and fruiting: Flowering from July to August; fruiting from September to October (–November).

Habitat: Plants found growing at elevations ranging between 2743–3670 m. Occurs in sub-alpine to alpine regions and valleys, typically thriving in

open, sunlit environments and absent from areas with dense forest canopy.

Distribution: Endemic to India (North Sikkim region, currently Mangan district).

Etymology: Candolle (1838) derived the generic name *Anaphalis* from the classical ancient Greek name of a plant '*Gnaphalio*' which shows close resemblance with *Anaphalis*. Additionally, he remarked that it may be regarded as an anagram of *Gnaphalii*. However, the two names do not constitute an exact anagram in the modern sense, suggesting that the latter remark was intended as historical etymological observation rather than literal statement. The specific epithet '*hookeri*' was designated by C.B. Clarke in honour of Sir Joseph Dalton Hooker, who first collected this species in 1849 during his Himalayan expedition encompassing Bengal, Sikkim, Nepal, and Khasi Hills.

Specimens examined: *Anaphalis hookeri* C.B. Clarke ex Hook.f.: INDIA, **Sikkim**, s.loc., 1892, G.A. Gammie 748 (CAL [CAL0000211383, CAL0000211384]); Mangan district, Yumthangchu bridge to Dombeyang, 14.07.1987, D.C.S. Raju & S. Singh 7605 (BSHC [BSHC00021083, BSHC00021084]); Mangan district, Dombeyang [Dombang], 14.09.1988, S. Kumar & S. Singh 9767 (BSHC [BSHC00021077, BSHC00021082]), Shingba Rhododendron Wildlife Sanctuary, 22.07.2013, C.S. Purohit 37474 (BSHC [BSHC00021078, BSHC00021079]); Shingba Rhododendron Wildlife Sanctuary entry gate, 27°43'42.78" N, 88°44'28.32" E, 3205 m, 03.09.2023, P.S. Kushwaha 96866; Yumthang, Shingba Rhododendron Sanctuary, 27°43'50.02" N, 88°44'22.42" E, 3094 m, 20.09.2024, P. S. Kushwaha & Avishek Bhattacharjee 90493 (CAL); Katao, 3500 m, 13.08.2019, R. Gogoi & N. Sherpa 40813 (BSHC [BSHC00026599, BSHC00026600]); Zema, 16.08.2012, Mohan Gangopadhyay 37514 (BSHC, BSHC00021080, BSHC00021081); on the way to Yumthang Valley, 27°45'44.76" N, 88°43'5.04" E, 3425 m, 04.09.2023, P.S. Kushwaha 96879 (CAL), near Phuni lake, on the way to Yumthang Valley, 27°

45°20.92"N, 88°43'22.55"E, 3271 m, 19.09.2024; *P.S. Kushwaha, Avishek Bhattacharjee & M.R. Ranjith Layola* 90489 (CAL [CAL0000310687]), Lachung, 27°41'15.36"N, 88°44'48.70"E, 2923 m, 20.09.2024, *P.S. Kushwaha, Avishek Bhattacharjee & M.R. Ranjith Layola* 96625 (CAL).

Anaphalis margaritacea (L.) Benth. & Hook.f.: INDIA, **Arunachal Pradesh**, Upper Subansiri district, Taksing, 3000 ±50 m, 18.10.2005, *Kumar Ambrish* 20094 (ARUN [ARUN000038427]). **Sikkim**, Mangan district, Dombeyang, 14.09.1988, *S. Kumar & S. Singh* 9762 (BSHC), Yumthang, Shingba Rhododendron Sanctuary, 27°43'41.63"N, 88°44'35.99"E, 3247 m, 04.09.2023, *P.S. Kushwaha* 96875 (CAL); Pakyong district, Zuluk army base camp, 2717 m, 27°14'55.61"N, 88°46'23.05"E, 12.09.2023, *P.S. Kushwaha* 90437 (CAL). **West Bengal**, Darjeeling district, 2134 m, 00.10.1872, *J.S. Gamble* 2492A (DD); Darjeeling district, Kurseong [Kurseong], 2134 m, 28.09.1884, *C.B. Clarke* 36012B (DD), Senchal Wildlife Sanctuary, Lake area, 13.10.2008, *A.K. Ghosh* 43477 (CAL [CAL0000234602]).

Anaphalis subumbellata C.B. Clarke: INDIA, **Sikkim**, Mangan district, Lachong [Lachung], 3658 m, 05.09.1849, *J.D. Hooker s.n.* (K [K000250053]); *s.loc.*, 3353–3658 m, *J.D. Hooker s.n.* (BM [BM00006516], K [K000910527], P [P02677115, P02677116]); Pakyong district, Gnathang [Gnathang]; 3658 m, 16.08.1910, *W. W. Smith* 4340D (E [E00527571]), Gnathang Valley, 3756 m, 27°17'20.69"N, 88°48'49.36"E, 23.09.2024, *P.S. Kushwaha, Avishek Bhattacharjee & M.R. Ranjith Layola* 96622 (CAL [CAL0000310688]), Gnathang, Ramkrishna Paramhansa Meditation Cave, 3886 m, 27°17'43.73"N, 88°49'51.20"E, 24.09.2024, *P.S. Kushwaha, Avishek Bhattacharjee & M.R. Ranjith Layola* 96623 (CAL [CAL0000310686]).

Notes: Morphological characterisation of *Anaphalis hookeri* demonstrates that the entire aerial surface, including stem, foliage, and peduncle, is uniformly covered with two distinct types of trichomes *i.e.* short biseriate glandular

and elongated uniseriate (4–5-celled) eglandular (Fig. 2e1 & 2e2). The subdioecious nature of the capitula revealed cypselae dimorphism. Mature cypselae is confined to the pistillate-florets; in contrast, bisexual florets either produce abortive or narrowly linear underdeveloped cypselae. Mature cypselae are rarely seen in the latter, supporting the notion of their functionally staminate role (Candolle, 1838; Beauverd, 1913; Anderberg, 1991). In bisexual-floret predominant capitula, cypselae development is nearly absent or rudimentary in both floret types. Furthermore, a notable disparity in style morphology is observed, *i.e.* pistillate-florets possess slender styles with smooth and obtuse stylar branches, whereas bisexual-florets exhibit thick styles with truncated branches bearing dense sweeping hairs (Fig. 2n, o & Fig. 3a, b). These observed differences in stylar morphology in Asteraceae suggest a close relationship between stylar configuration and the functional role of florets in pollen presentation (Bremer, 1994; Torres & Galetto, 2007).

Taxonomists have long overlooked the identity of *A. hookeri*, often confusing it with the morphologically similar *A. margaritacea*. Hooker (1881) identified the types of *A. hookeri* as *Antennaria margaritacea* (= *Anaphalis margaritacea*), which was later correctly identified by Clarke as a new species. Being a widely distributed species, *A. margaritacea* shows a high degree of morphological variations leading to the ongoing confusion.

We encountered two additional records of *Anaphalis hookeri* outside its typical distribution in Sikkim, *i.e.* from Arunachal Pradesh (Kumar, 2010) and West Bengal (Ghosh & Paul, 2019). The critical assessment of the cited herbarium specimens (ARUN000038427 and CAL0000234602) revealed that both exhibit morphological traits inconsistent with *A. hookeri* and similar to *A. margaritacea*. Notably, the specimens exhibit glabrous to sparsely tomentose adaxial leaf surface that is dark green, shiny when fresh, and reddish to brownish-black upon drying.

The abaxial surface is greyish-pale yellow, densely covered with glandular and eglandular (woolly) hairs, yielding the typical contrast between the leaf surfaces. Furthermore, the presence of an attenuate to weakly auriculate leaf base and prominently recurved leaf margins substantiates their identity as *A. margaritacea* (Fig. 5).

Willam W. Smith, during his tenure (1907–1911) as herbarium keeper at the Royal Botanic Garden, Calcutta (Stafleu & Cowan, 1985), expressed uncertainty on the identity of *A. hookeri* while examining a specimen collected by G.A. Gammie from Sikkim (CAL0000211384). In his annotation, Smith stated, “Is this one a form of *A. cinnamomea* Clarke (syn. of *Anaphalis margaritacea*) or does it come near *A. hookeri* Clarke, of which we have no type?” After re-examination, this specimen is found to be *A. hookeri* only.

Hooker (1881), in the protologue, indicated the close resemblance of *A. hookeri* to *A. subumbellata* in its glandular pubescence and growth habit. Similarly, Pant (1995) perceived a close affinity between these two but indicated a significant difference in leaf morphology. However, the glandular nature of the leaf and the growth habit of *A. subumbellata* differ markedly from that of *A. hookeri* in the present study suggesting that the previously proposed close relationship between these two species is misleading (Fig. 5, 6; Table 1).

The present study demonstrates that *A. hookeri* can be readily distinguishable from *A. margaritacea* and *A. subumbellata* based on a combination of diagnostic vegetative and cypselar characters (Fig. 5, 6; Table 1). All these instances indicate the significance of vegetative characters like leaf base, shape and indumentum on surfaces in distinguishing *A. hookeri* from *A. margaritacea* and *A. subumbellata*. Similarly, Anderberg (1991) while dealing with the taxonomy of *Anaphalis* stated that “Many of the species are strikingly similar and often differ only in minor vegetative details such as the shape of the leaves, the density of the indumentum, and the number of florets, etc”.

Nie *et al.* (2013) based on ITS-ETS phylogenetic analysis within *Anaphalis* suggested that the genetic data corresponded to the shape of the leaf base rather than the morphology of capitula and phyllaries, which has been earlier used for species delimitation and infrageneric classification. The recent plastome phylogeny by Xu *et al.* (2024) suggested that both shape of the leaf base and cypselar characters are less homoplasious while species delimitation.

Typification: Hooker (1881) in the protologue indicated the type of *Anaphalis hookeri* as “Sikkim Himalaya; Lachen and Lachoong valleys, alt. 9–11,000 ft., J.D.H.” While consulting the herbaria in which J.D. Hooker’s type collections are likely to be housed (K, E, MANCH, and P; Stafleu & Cowan, 1979), the authors located five specimens, all preserved at K. The specimens K000262563 and K000262564 are mounted together on a single herbarium sheet, as are K000262565 and K000262566, whereas K000262567 is mounted on a separate sheet. The specimens K000262563 and K000262566 were collected from Lachung, whereas K000262564, K000262565, and K000262567 from Lachen. Since, these specimens were collected from two different localities on different dates in 1849, they represent separate gatherings.

It is clear from these details that Hooker (1881) considered specimens from both Lachen and Lachoong (presently Lachung) valleys while describing the name. However, no date of collection was mentioned in the protologue, even though it was provided in all the type materials. To authenticate these collections, authors have cross-verified the chronology with the Himalayan Journal (Hooker 1854), a detailed expedition diary of Hooker containing information about travels and botanical surveys from May 1849 to January 1851.

Further, based on Hooker’s annotations (Burdet, 1975) on the types, it is apparent that he earlier identified it as *Antennaria margaritacea* R.Br. Later, C.B. Clarke recognized it as a new species and

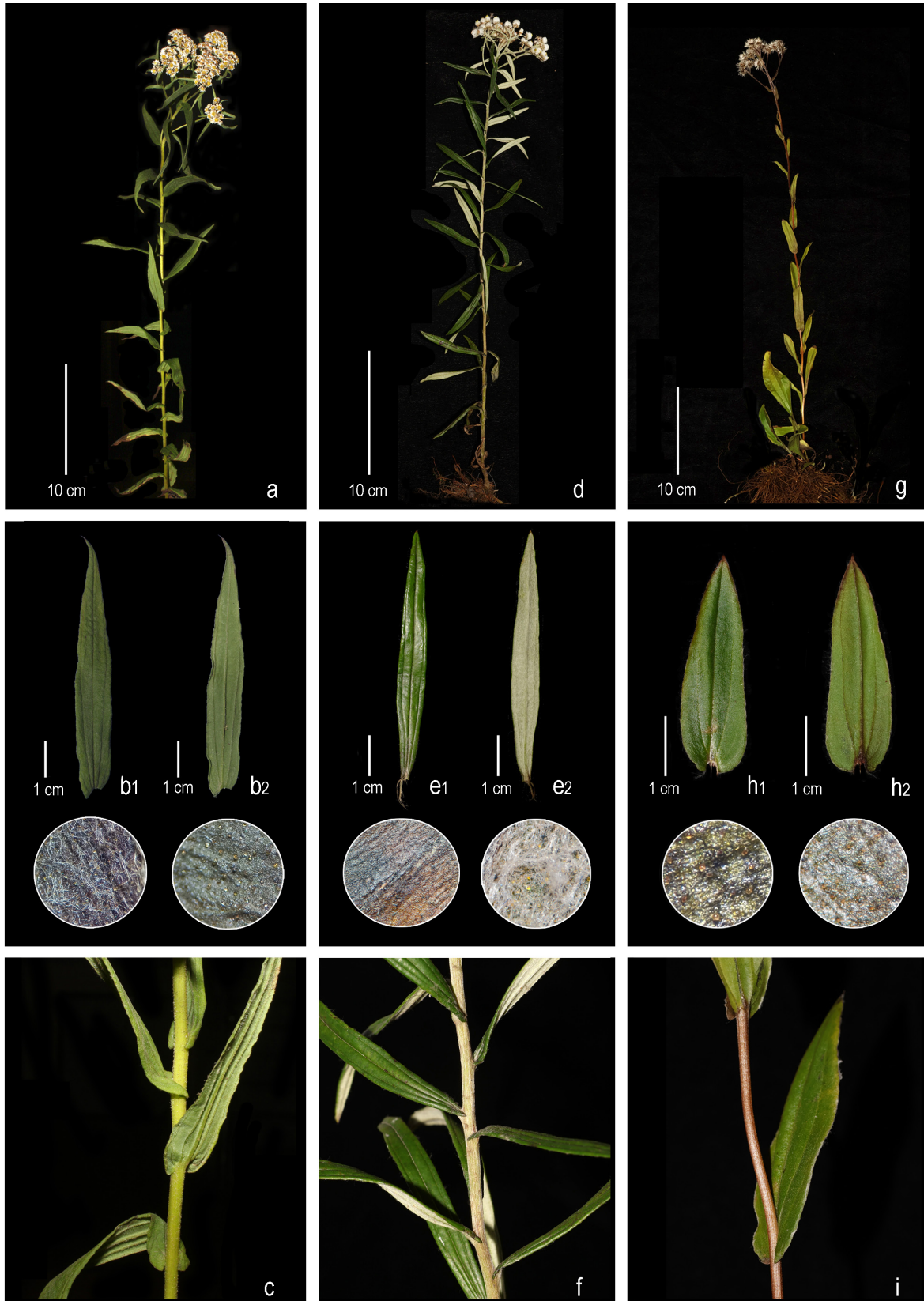


Fig. 5. Diagnostic morphological characters distinguishing (a–c) *Anaphalis hookeri* C.B. Clarke ex Hook.f., (d–f) *Anaphalis margaritacea* (L.) Benth. & Hook.f., and (g–i) *Anaphalis subumbellata* C.B. Clarke: a, d, g. Habit; b, e, h. Leaf surfaces (b1, e1, h1– Leaf showing adaxial surface and close up; b2, e2, h2 – Leaf showing abaxial surface and close up); c, f, i. Leaf base and stem (Photos by P.S. Kushwaha; a, b1, b2, c from P.S. Kushwaha 96879; d, e1, e2, f from P.S. Kushwaha 96875; g, h1, h2, i from P.S. Kushwaha 96622).

named it *Anaphalis hookeri*, as evident by Clarke's handwriting (Burdet, 1974) with pencil on the type sheets. Apart from Clarke's annotation on the types, authors found no additional manuscripts by Clarke pertaining to this species. However, Clarke did not publish this name anywhere. Hooker (1881) validly published the name by citing 'Clarke mss.' after

the species name in the protologue based on the specimens he collected from Lachen and Lachung, which were seen and annotated by Clarke.

Hence, all five specimens are treated as syntypes following Art. 9.6 of ICN, Madrid code (Turland *et al.*, 2025). In the absence of a designated holotype,

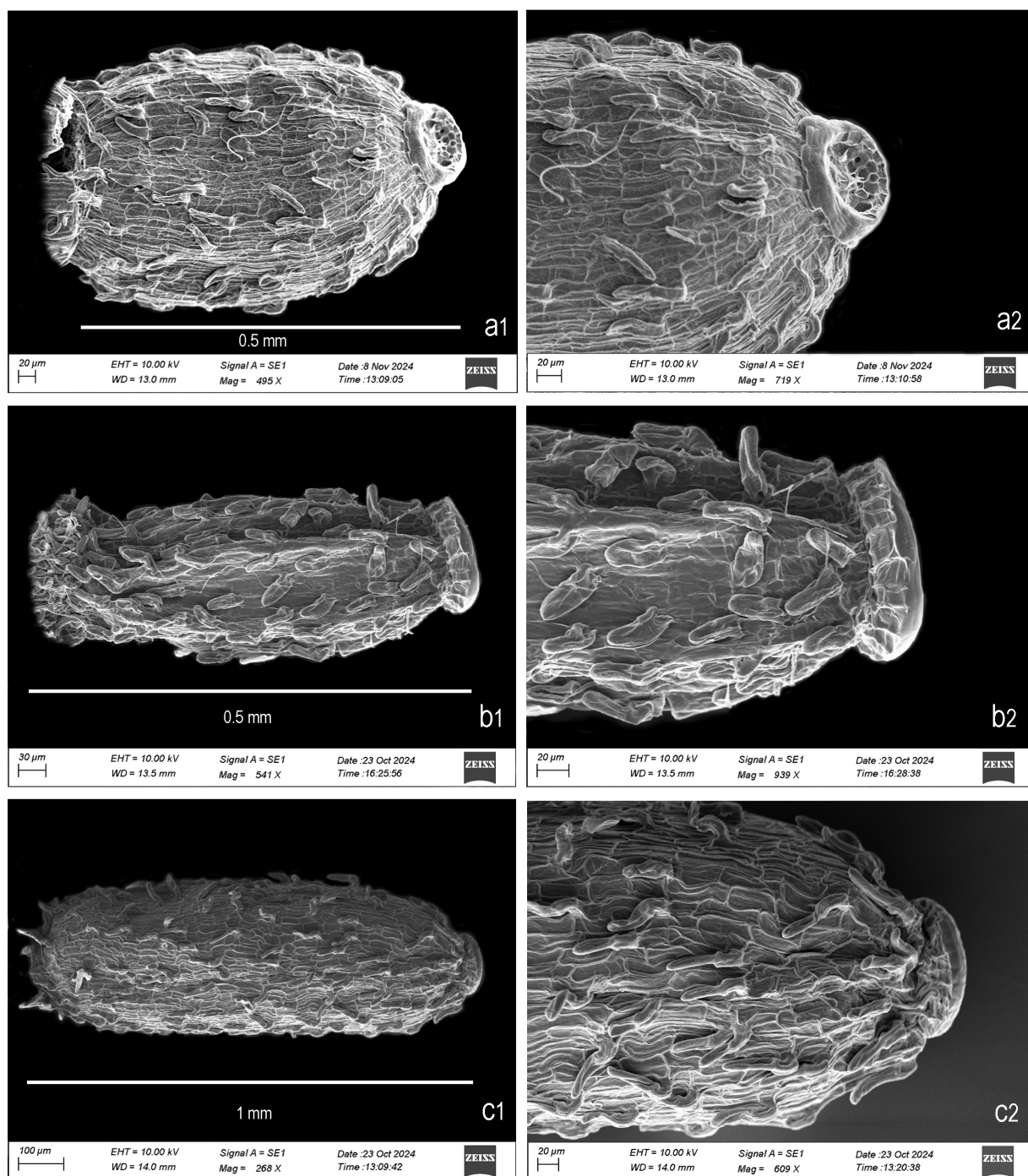


Fig. 6. Comparison of ultrastructure of cypsels under Scanning Electron Microscope: **a.** *Anaphalis hookeri* C.B.Clarke ex Hook.f.; **b.** *A. margaritacea* (L.) Benth. & Hook.f.; **c.** *A. subumbellata* C.B.Clarke: a1–c1. Cypseli; a2–c2. Surface enlarged showing (papillose clavate twin hairs, carpopodium, and epidermal cell surface).

Table 1. Diagnostic morphological features to distinguish *Anaphalis hookeri* from *A. margaritacea*, and *A. subumbellata*.

Character	<i>Anaphalis hookeri</i> C.B. Clarke ex Hook.f.	<i>Anaphalis margaritacea</i> (L.) Benth. & Hook.f.	<i>Anaphalis subumbellata</i> C.B. Clarke
Habit	40 (30)–60 (100) cm high	40–80 (>100) cm high, stoloniferous	30–45 cm high
Stem	Sparsely glandular, pubescent, bright-green	Densely villous (greyish-appearance), greenish-brown	Minutely glandular and tomentose, reddish-brown
Leaf size and shape	Basal and cauline leaves similar; narrowly lanceolate, spreading, margins weekly recurved when dried.	Basal and cauline leaves similar; narrowly elliptic to lanceolate, spreading, margins strongly recurved when fresh and even after drying	Basal leaves spatulate and cauline leaves ovate to lanceolate, adpressed against the stem, margins not recurved
Leaf base	Semi-amplexicaul, wide to subcordate base	Attenuate (sometimes weekly auriculate), narrowed base	Semi-amplexicaul, obtuse to rounded base
Adaxial leaf surface	Sparsely hairy, uniformly glandular, greyish-green	Glabrous (sometimes slightly tomentose), shiny, dark-green, eglandular	Glabrous (tomentose on margins and midrib), lustrous-green, less glandular
Abaxial leaf surface	Sparsely hairy, pubescence mainly on nerves, light green, uniformly glandular	Highly arachnoid, greyish yellow (cinnamomeous when dried), glands hidden beneath the woolly hairs	Glabrous (tomentose only on margins and midrib), pale-green, highly glandular
Capitula	80–150, 3–5 × 3.5–4 mm	50–100, 4–6 × 5–7 mm	7–10, 8–10 × 6–9 mm
Cypsela	Broadly ellipsoid, c. 0.5 mm long; twin hairs long clavate 0.05–0.06 mm long, moderately dense; surface with oblong epidermal cells; carpopodium slightly angular, 0.07–0.08 mm in diam., narrow foramen	Oblong, c. 0.5 mm long; twin hairs short clavate 0.03–0.04 mm long, dense; surface with ovate epidermal cells; carpopodium straight 0.10–0.13 mm in diam., broad foramen	Sub-cylindrical, c. 1 mm long; twin hairs long clavate, 0.07–0.08 mm long, moderately dense; surface with oblong epidermal cells; carpopodium slightly angular, 0.11–0.13 mm in diam., broad foramen

the specimen K000262564 (Fig. 4), an intact specimen that closely matches the protologue, is designated here as the lectotype of *Anaphalis hookeri* in accordance with Art. 9.3 of ICN.

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Literature Cited

- ABID R. & M. QAISER 2007. Cypsel morphology of the genus *Anaphalis* DC. (Gnaphalieae–Asteraceae) from Pakistan. *Pakistan Journal of Botany* 39(6): 1897–1906.
- ANDERBERG A.A. 1991. Taxonomy and phylogeny of the tribe Gnaphalieae (Asteraceae). *Opera Botanica* 104: 1–195.
- BEAUVERD G. 1913. La constante génétique des *Anaphalis* DC. *Bulletin de la Société Botanique, Geneve* 52: 146–147.
- BEENTJE H. 2010. *The Kew plant glossary: An illustrated dictionary of plant terms*. Royal Botanic Gardens, Kew.
- BENTHAM G. & J.D. HOOKER 1873. *Genera plantarum*. Volume 2(1). Lovell Reeve & Co., London.
- BREMER K. 1994. *Asteraceae, cladistics and classification*. Timber Press, Oregon.
- BURDET H.M. 1974. Cartulae ad botanicorum graphicem IV. *Candollea* 29: 225–226.
- BURDET H.M. 1975. Cartulae ad botanicorum graphicem VII. *Candollea* 30: 397–398.
- CHEN Y.S., ZHU S.X. & R.J. BAYER 2011. Gnaphalieae. In: WU Z.Y., RAVEN P.H. & D.Y. HONG (eds.), *Flora of China*. Volumes 20–21. Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis. pp. 774–818.
- CLARKE C.B. 1876. *Compositae Indicae Descriptae et Secus Genera Benthamii Ordinatae*. W. Thacker & Co., London. <https://doi.org/10.5962/bhl.title.49202>
- CANDOLLE A.P. DE 1838. *Prodromus systematis naturalis regni vegetabilis*. Volume 6. Treuttel & Würtz, Paris. <https://doi.org/10.5962/bhl.title.286>
- DRURY D.G. 1970. A fresh approach to the classification of the genus *Gnaphalium* with particular reference to the species present in New Zealand (Inuleae-Compositae). *New Zealand Journal of Botany* 8: 222–248. <https://doi.org/10.1080/0028825X.1970.10429122>
- GHOSH A. & T.K. PAUL 2019. Enumeration of flowering plants of Sanchal Wildlife Sanctuary, West Bengal, India. *Pleione* 13: 305–316. <https://doi.org/10.26679/Pleione.13.2.2019.305-316>.
- GLENNY D. 1997. A revision of the genus *Anaphalioides* (Asteraceae: Gnaphalieae). *New Zealand Journal of Botany* 35: 451–477. <https://doi.org/10.1080/0028825X.1987.10410170>
- GRIERSON A.J.C. & D.G. LONG 2001. Compositae. In: SPRINGATE L.S. (ed.), *Flora of Bhutan, including a record of plants from Sikkim and Darjeeling*. Volume 2(3). Royal Botanic Garden Edinburgh, Edinburgh, and Royal Government of Bhutan. pp. 1397–1630.
- HOOKE J.D. 1881. *Flora of British India*. Volume 3(8). L. Reeve & Co., London. pp. 279–287. <https://doi.org/10.5962/bhl.title.678>
- HOOKE J.D. 1854. *Himalayan Journals; or Notes of a Naturalist in Bengal, the Sikkim and Nepal Himalayas, The Khasia mountains, & c.* Volume 2. John Murray, Albemarle Street, London. <https://www.biodiversitylibrary.org/item/123012#page/13/mode/1up>
- KARTHIKEYAN S., SANJAPPA M., BHATTACHARJEE B., DASH S.S., MEENA S.L. & V.K. MASTAKAR 2020. Asteraceae. In: MAO A.A. & S.S. DASH (eds.), *Flowering Plants of India: An Annotated Checklist, Dicotyledons*. Volume 1. Botanical Survey of India, Kolkata. pp. 713–816.
- KUMAR A. 2010. *Anaphalis hookeri* C. B. Clarke ex Hook. f. (Asteraceae): A New Record for Arunachal Pradesh. *Indian Forester* 136: 812–814. <https://doi.org/10.36808/if/2010/v136i6/3781>

- KUSHWAHA P.S. & A. BHATTACHARJEE 2025. A comprehensive overview of the genus *Anaphalis* DC. (Asteraceae: Gnaphalieae) in India. *Nelumbo* 67: 41–61. <https://doi.org/10.20324/nelumbo/v67/2025/173513>
- MABBERLEY D.J. 2018. *Mabberley's Plant-Book: A Portable Dictionary of Plants, their Classification and Uses* (South Asian Edition). Cambridge University Press, New Delhi. pp.46.
- NARASIMHAN D. & S.J. IRWIN 2021. *Flowering plants of Tamil Nadu: A Compendium*. Care Earth Trust, Chennai. pp. 167–194.
- NIE Z.L., FUNK V., SUN H., DENG T., MENG Y. & J. WEN 2013. Molecular phylogeny of *Anaphalis* (Asteraceae, Gnaphalieae) with biogeographic implications in the Northern Hemisphere. *Journal of Plant Research* 126: 17–32. <https://doi.org/10.1007/s10265-012-0506-6>
- PANT P.C. 1995. Gnaphalieae. In: HAJRA P.K., RAO R.R., SINGH D.K. & UNİYAL B.P. (eds), *Flora of India, Asteraceae (Inuleae – Vernonieae)*. Volume 13. Botanical Survey of India, Calcutta. pp. 51–84.
- POWO 2026. *Plants of the World Online*. Facilitated by the Royal Botanic Gardens, Kew. Available at: <https://powo.science.kew.org/> (Accessed on 15.07.2026).
- REMYA S., MUHSINA A.A., KANAKAMBIKA G., ATHIRA S. & C. N. MAYA 2024. *Anaphalis munnarensis* (Asteraceae: Asteroideae: Gnaphalieae): a new species from southern Western Ghats, Kerala, India. *Phytotaxa* 637(1): 113–119. <https://doi.org/10.11646/phytotaxa.637.1.9>
- REMYA S., PRABHUKUMAR K.M., G. KANAKAMBIKA, & C. N. MAYA 2026 *Anaphalis sahyadrica* (Asteraceae), a New Species from Southern Western Ghats, Keralam, India. *Novon* 34: 134–142. <https://doi.org/10.3417/20261045>
- SINGH P., KARTHIGEYAN K., LAKSHMINARASIMHAN P. & S.S. DASH 2015. *Endemic Vascular Plants of India*. Botanical Survey of India, Kolkata.
- STAFLEU F.A. & R.S. COWAN 1985. *Taxonomic literature: a selective guide to botanical publications and collections with dates, commentaries and types*. Second edition. Volume 5 (Sal–Ste). Bohn, Scheltema & Holkema, Utrecht. <https://www.sil.si.edu/DigitalCollections/tl-2/>
- STAFLEU F.A. & R.S. COWAN 1979. *Taxonomic literature: a selective guide to botanical publications and collections with dates, commentaries and types*. Second edition. Volume 2(H–Le). Bohn, Scheltema & Holkema, Utrecht. <https://www.sil.si.edu/DigitalCollections/tl-2/>
- THIERS B.M. 2026 (continuously updated). *Index Herbariorum: A Global Directory of Public Herbaria and Associated Staff*. New York Botanical Garden's Virtual Herbarium, New York. Available at: <http://sweetgum.nybg.org/science/ih/> (Accessed on 15.07.2026).
- TORRES C. & L. GALETTO 2007. Style morphological diversity of some Asteraceae species from Argentina: systematic and functional implications. *Journal of Plant Research* 120 (3): 359–64. <https://doi.org/10.1007/s10265-007-0081-4>
- TURLAND N.J., BARRIE F.R., GANDHI K.N., GRAVENDYCKJ., GREUTER W., HAWKSWORTH D.L., HERENDEEN P.S., KLOPPER R.R., KNAPP S., KUSBER W.H., LI D.-Z., MAY T.W., MONRO A.M., PRADO J., PRICE M.J., SMITH G.F. & J.C.Z. SENORET 2025. *International Code of Nomenclature for algae, fungi, and plants (Madrid Code) adopted by the Twentieth International Botanical Congress, Madrid, Spain, July 2024*. Regnum Vegetabile 162. The University of Chicago Press, London. https://www.iaptglobal.org/_functions/code/madrid
- XU X., WEI Z., ZHANG T. & S. ZHU 2021. Achene micro-morphology of *Anaphalis* DC. (Gnaphalieae-Asteraceae) from China. *Pakistan Journal of Botany* 53(5): 1883–1892. [https://doi.org/10.30848/PJB2021-5\(10\)](https://doi.org/10.30848/PJB2021-5(10))
- XU X. M., XU H., YANG Z., WEI Z., GU J. Y., LIU D. H., LIU Q. R. & S. X. ZHU 2024. Phylogeny, biogeography, and character evolution of *Anaphalis* (Gnaphalieae, Asteraceae). *Frontiers in Plant Science* 15: 1336229. <https://doi.org/10.3389/fpls.2024.1336229>