



RESEARCH ARTICLE

Taxonomic assessment of *Saussurea* subgenus *Amphilaena* (Asteraceae) in India

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Abstract

Saussurea subgenus *Amphilaena*, one of the four accepted subgenera of *Saussurea* is assessed here for its taxonomic position, nomenclature, distribution and diversity in India. We accept eight species of this subgenus in India with mainly alpine distribution. Comprehensive nomenclature notes are provided based on careful analyses of the protologues, original materials, live specimens and relevant literature. Lectotypes are designated wherever necessary and inconsistent type information in earlier literature has been corrected. Taxonomic confusions in identity of certain species have been resolved and detailed morphological comparisons are provided to avoid future misidentifications. Distribution data has been updated through examination of herbarium as well as live specimens. Detailed descriptions of the species and taxonomic key are provided for easy identification in the field along with their distribution map.

Keywords: Cardueae, Himalayas, Lectotype, Morphology, Nomenclature.

Introduction

The genus *Saussurea* DC. is a highly complex genus that has undergone extensive taxonomic changes since its establishment by de Candolle (1810). Over the past two centuries, its taxonomy has been shaped by repeated transfers of taxa between *Saussurea* and other genera of tribe Cardueae; changes in species circumscription and rank, including reduction of species to a subspecies or elevation of subspecies to species, and resurrection of previously synonymized taxa as distinct species. These continuous taxonomic changes reflect the evolving understanding of species boundaries and relationships within the genus (Kasana 2019). An important example of these changes is the revision of infrageneric classification of *Saussurea* from six subgenera and 19 sections to the currently accepted four subgenera and 14 sections (Lipschitz 1979, Herrando-Moraira *et al.* 2020).

Saussurea subgenus *Amphilaena* (Stschegl.) Lipsch. is one of the four subgenera of *Saussurea*, distinguished by its characteristic involucre bracts that enclose the inflorescence and hence the name *Amphilaena*, meaning “surrounding coat”. The presence of these colorful bracts subtending the inflorescence is an adaptation for surviving in the high-altitude habitats and due to this particular character, these taxa are popularly known as “Glasshouse plants” (Tsukaya *et al.* 2002, Yoshida 2005, Kasana *et al.* 2022).

This subgenus experienced constant taxonomic changes and was once established as a distinct genus *Amphilaena* by Lipschitz (1954), however it was later treated again at subgeneric rank (Lipschitz 1967). Taxa presently recognized in this subgenus were earlier known under different sections of *Saussurea*, such as *Saussurea* section *Obvallatae* Maxim., *S. sect. Bracteatae* Clarke, and *S. sect. Amphilaena* Stschegl. However, in the past two decades extensive work has been done on *Saussurea* and it has helped resolve various longstanding taxonomic confusions (Garcia-Jacas *et al.* 2002, Raab-Straube 2003, Kita *et al.* 2004, Wang *et al.* 2007, 2013, Barres *et al.* 2013, Szukala *et al.* 2019, Kasana *et al.* 2020, Herrando-Moraira *et al.* 2020, Xu *et al.* 2025).

Presently, *Saussurea* subg. *Amphilaena* is recognized as a distinct subgenus in *Saussurea* but no sectional classification is accepted within this subgenus (Chen 2015, Raab-Straube 2017). *Saussurea* subg. *Amphilaena* comprises 39 taxa globally (Chen *et al.* 2019, Nyamgerel *et al.* 2024) of which eight are reported from India (Figure 1). A comprehensive taxonomic account of the Indian taxa in light of the recent

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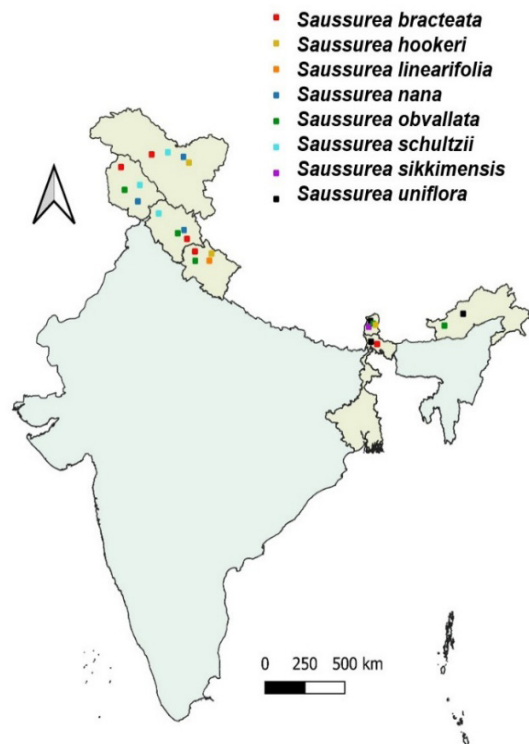


Figure 1: Distribution map of *Saussurea* subg. *Amphilaena* in India

taxonomic changes is lacking. The only work available for the genus in India is the one by Hajra (1988) but it does not focus on subg. *Amphilaena* and is also about four decades old. Therefore, we present here a detailed taxonomic account of *Saussurea* subg. *Amphilaena* in India along with detailed descriptions, a taxonomic key, distribution and nomenclature information.

Materials And Methods

Herbarium consultation

Specimens were examined from various herbaria (ASSAM, BSD, CAL, DD, DUH, KASH, PUN and WII) having collections from Indian Himalayan region, which is the distribution area for the subgenus. Collections from online databases (Global Plants on JSTOR, The Wallich Catalogue, online catalogues of herbaria like BM, E, G, IVH, K, P, PE, etc.) were also consulted. Herbarium acronyms follow Index Herbariorum (Index Herbariorum 2026). Original materials were carefully analyzed and compared with their corresponding protologues following rules of ICNafp (Turland et al. 2025).

Taxon sampling

Plant materials were collected from different areas of Indian Himalayan Region (Figure 2). The specimens were identified using the identification keys and morphological descriptions provided in the protologues and by previous workers (Hajra 1988, 1995, Shi *et al.* 2011, Chen 2015, Raab-Straube 2017). The identity was reconfirmed by referring to the type images.



Figure 2: Habitat of *Saussurea* subg. *Amphilaena* in the Indian Himalayan Region (above: *Saussurea obvallata* and its habitat in Uttarakhand; below: *S. schultzii* and its habitat in Ladakh).

Herbarium specimens were prepared following standard protocol and the specimens collected during field visits were deposited in Delhi University Herbarium (DUH).

Morphological analyses

Detailed morphological analysis was done using stereomicroscope (Cilika Medprime Digital Stereo Zoom) and compound microscope (Cilika BT-E Benchtop Biological Digital Microscope).

Results And Discussion

Taxonomic Treatment

Saussurea subg. *Amphilaena* (Stschegl.) Lipsch. in Trudy Moskovsk. Obshch. Isp. Priro., Biol. Ser. 3: 182. 1960. ≡ *Saussurea* sect. *Amphilaena* Stschegl. in Bull. Soc. Imp. Naturalistes Moscou 21(3): 244. 1848. Type: *Saussurea obvallata* (DC.) Sch. Bip.

Perennial herbs; stems erect, leafy, rarely short or absent; leaves undivided; bracts membranous or papery, completely enclosing, half-enclosing or subtending the capitula; capitula one to many, terminal on stem; phyllaries without appendage; receptacles usually with bristles, rarely naked; corolla actinomorphic, always glabrous; corolla lobes five and equal in length; anther appendage sagittate, lacinate to lanate; style "carduoid" type; achene glabrous, homomorphic; pappus dirty white, in two rows, carducous.

Key to Indian species of *Saussurea* subg. *Amphilaena*:

- 1a. Capitula solitary.....2
- 2a. Plants short-stemmed or acaulescent; abaxially white tomentose.....4. *S. nana*
- 2b. Plants not short-stemmed or acaulescent; abaxially green glabrous or glabrescent.....3
- 3a. Stems erect; leaves elliptic.....4

- 4a. Capitulum terminal; achene without crown on apex.....**8. *S. uniflora***
 4b. Capitulum sessile; achene with denticulate crown on apex.....**1. *S. bracteata***
 3b. Stems caespitose; leaves linear.....5
 5a. Caudex branched; receptacle bristles dense.....**3. *S. linearifolia***
 5b. Caudex unbranched; receptacle bristles few **2. *S. hookeri***
 1b. Capitula many.....6
 6a. Bracts completely enclosing capitula; leaves surfaces not scabrid on either side.....7
 7a. Stems densely pilose; phyllaries subequal**7. *S. sikkimensis***
 7b. Stems sparsely pilose; phyllaries strongly differentiated into several rows.....**5. *S. obvallata***
 6b. Bracts half enclosing capitula; leaves surfaces scabrid on both sides.....**6. *S. schultzii***
1. *Saussurea bracteata* Decne., Voy. Inde [Jacquemont] 4(Bot.): 94, t. 102. 1843.

Lectotype (designated by Raab-Straube 2017: 136): INDIA, Himachal Pradesh, Kinnaur, Yurpo et Lamoutche, Jacquemont 1780 (P00836206, digital image!).

Perennial, up to 26 cm tall, caulescent herbs. Caudex simple, sparsely branched, densely covered with brownish scars of old leaves. Stem erect, simple, straw colored, pubescent, 2.0 – 3.0 mm diam. Rosette of basal leaves; lower cauline leaves shortly-petiolate; amplexicaul, lamina narrowly elliptic, 5.0 – 9.0 cm long, 0.2 – 1.8 cm wide, margin irregularly sinuate-dentate, apex acute, adaxially greyish green, pubescent, abaxially green glabrescent. Middle & upper cauline leaves sessile, ovate - narrowly elliptic. Bracts half-enclosing capitula, membranous, yellowish green with purple tinge, margin dentate, base decurrent, apex acuminate. Capitula solitary, 1.5–3.0 cm in diam., 2–2.5 cm tall. Involucre obconic. Phyllaries c. 4 rows, straw colored, margin dark, glabrous to sparsely pilose, outer

ones triangular to ovate, middle ones ovate to linear, inner ones linear. Receptacle bristles subulate. Florets numerous, corolla 1.7 cm long, tube c. 9 mm long, limb (including lobes) c. 8 mm long, purplish-red, glabrous. Anthers c. 9 mm long, lacinate. Achene c. 6 mm long, cylindrical to obovoid, straw colored, glabrous, distinctly ribbed, denticulate crown on apex. Pappus c. 1 cm long, biseriate, dirty white, basally connate into a ring, deciduous as a whole.

Distribution

World: China, India, Nepal, Pakistan, Tibet.

India: Himachal Pradesh, Jammu & Kashmir, Ladakh, Uttarakhand, and West Bengal (present report).

Etymology: Named due to bracts covering the capitulum.

Nomenclature notes: *Saussurea bracteata* was published by Decaisne (1843) citing the collection information as “*Floret ineunte Septembre in summis montibus. Locis glareosis, circa Ghijourmaeut 5200m., et inter Yurpo et Lamoutche, Gatang-Ghauti, alt. 5567 metr. circiter.*” Since these are referring to more than one specimen, these constitute syntypes. Chen (2015) mentioned that the lectotype was designated by Raab-Straube in 2005 and incorrectly cited the accession number as P0036206. There is no specimen with P0036206 at P and Chen’s attribution of the lectotype to Raab-Straube instead of designating the lectotype makes it a mere reference to the specimen and not a formal lectotypification. Also, since Raab-Straube only annotated a specimen in 2005, this does not constitute an effective lectotypification. However, in 2017, during the revisionary work on subgenus *Amphilaena*, Raab-Straube explicitly designated the same specimen annotated in 2005 as lectotype but mentioned P 836206 as the accession number and omitted the two zeroes. Both the citations of the accession numbers by Chen (2015) and Raab-Straube (2017) are erroneous. The original material for *S. bracteata*, annotated by Raab-Straube in 2005 has the barcode P00836206. Under article 9.24 of ICN (Turland *et al.* 2025), such an error in type designation can

Table 1: Differences between *Saussurea bracteata* Decne., *S. nana* (Pamp.) Pamp. and *S. schultzii* Hook.f.

Character	<i>S. bracteata</i> Decne.	<i>S. nana</i> (Pamp.) Pamp.	<i>S. schultzii</i> Hook.f.
Stem	Stem erect, simple	Short stemmed or acaulescent	Stem erect, simple
Caudex	Branched	Branched	Unbranched
Leaf adaxial surface	Pubescent	Glandular	Scabrid
Leaf abaxial surface	Green, glabrescent	White tomentose	Green, scabrid
Leaf base	Amplexicaul	Cuneate-attenuate	Semi-amplexicaul, sheathing
Leaf margin	Irregularly sinuate – dentate	Sharply sinuate – dentate	Irregularly sinuate – dentate
Bracts	Yellowish green with purple tinge	Blackish purple	Yellowish rose
Capitula	Solitary	Solitary	3-8
Involucre shape	Obconic	Campanulate	Obconical to broadly campanulate
Phyllary rows	ca. 4 rows	ca. 3 rows	ca. 3-5 rows
Phyllary color	Straw colored with dark margin	Blackish with white margin	Straw colored with dark margin
Achene	Apex with denticulate crown	-	Apex without pericarp crown

be corrected if the correction does not alter the intent of the original author. Therefore, the specimen with barcode P00836206 should be accepted as the lectotype designated by Raab-Straube (2017), with the incorrect barcode P 836206 treated as a correctable error.

Taxonomic notes

Taxonomically, it has been observed in various literature that there is confusion in the identity of *Saussurea bracteata*, *S. nana* and *S. schultzii*. Lipschitz (1979) treated *S. schultzii* as a synonym of *S. bracteata* whereas, Chen (2015) treated it as an independent species. Raab-Straube (2017) also treated *S. schultzii* as a distinct species but treated *S. nana* as a synonym of *S. bracteata*; however, Chen (2015) accepted *S. nana* as distinct. Hajra (1988) followed Lipschitz (1979) and therefore, treated *S. schultzii* as a synonym of *S. bracteata* but mentioned that more population studies are needed for merging *S. schultzii* under *S. bracteata*. There are morphological overlaps among these three species, but they are three different taxa based on distinct morphological features (Table 1). Therefore, in the present treatment, we have considered these to be three different species.

Specimens examined

INDIA, Jammu and Kashmir & Ladakh: Kargil, Paarkachy Mountain, 3510m, 01.09.2009, *Akhtar Malik 7360* (KASH!); Kargil, Umba-La, Sankroo Drass road, 4510m, 02.09.2009, *Akhtar Malik 6566, 6597, 7860* (KASH!); Ladakh, 1600m, 07.01.1987, *Manzoor Ahmad s.n.* (KASH!); Heymia, Kungyam, Changthang, 4200m, *Hira Lal Pandit 116* (KASH!); Trangbal, 2000m, 07.01.1985, *G.H. Dar 9369* (KASH!); Ladakh, Lachalung La, 5200m, 01.09.1970, *U.C. Bhattacharyya 40959* (BSD!); On way to KhardungLa, 25.07.2002, *D.K. Singh 101082* (BSD!); Ladakh, Pulu (L) to KhardungLa, 13.08.1976, *B.M. Wadhwa 59911* (BSD!); Zingral chayle, 1600ft, 27.08.1976, *B.M. Wadhwa 60089* (BSD!); On way to Chang La, 10.08.1988, *H.J. Chawdhery & B.P. Uniyal 86126* (BSD!); South pullu, 27.07.1995, *Bipin Balodi 91018* (BSD!); Sorila, 4800m, 27.07.1973, *U.C. Bhattacharyya 52293* (BSD!); Burmer nullah, near Gilgit, year 1892, *J.R. Roberts s.n.* (DD!); Baltistan, Karpuchur Valley, 10.07.1892, *J.F. Duthie s.n.* (DD!); Zing Poche, Ladakh, 18000ft, 01.08.1931, *Walter Koelz 2508a* (DD!); Tor, Ladakh, 15000ft, 17.08.1931, *Walter Koelz 2648a* (DD!); Baltistan, Thalla La, 14000ft, 14.08.1940, *R.R. Stewart 20636* (DD!); Himachal Pradesh: Above Kidar, Spiti, 14000ft, 29.08.1933, *H.A.C. Gill 2069* (DD!); Uttarakhand: Kumaon, above Napuleha in Byas, 13000ft, 13.09.1884, *J.F. Duthie 3080b* (DD!); Dhaul valley, near Bidang, 14–15000ft, 04.09.1884, *J.F. Duthie 3080d* (DD!); Kumaon, Kanti Valley, 12–1300ft, 03.09.1892, *J.F. Duthie 3080* (DD!); Satpura Pass, 14–15000ft, 01.08.1940, *R.R. Stewart 20183* (DD!); West Bengal: Near Lebung Pass, 15–16000ft, 03.08.1886, *J.F. Duthie 5711* (DD!); NEPAL, Navipah Garh, 13–14000ft, 27.07.1886, *J.F. Duthie 5711* (DD!).

2. *Saussurea hookeri* C.B. Clarke, Compos. Ind. 230. 1876.

Lectotype (Step-I designated by Lipschitz 1979: 64;

Step-II designated by Chen 2015: 81): INDIA. Sikkim, 5180m, 14 Sept. 1849, *J.D. Hooker s.n.* (K000250103 digital image!). Perennial, laxly caespitose, 9.0 – 30 cm tall, caulescent herbs. Caudex mostly unbranched, having dense scars of old leaves. Stem erect, simple, solitary, dark purple to black, woolly, 2–3 mm diam. Leaves in rosette, lamina narrowly linear, 5 – 15 cm long, 0.1 – 0.5 cm wide, margin entire, revolute, apex obtuse, adaxially and abaxially green, glabrous, sheathing at base. Middle & upper cauline leaves sessile, linear to ovate, densely sericeous, margin entire to denticulate. Bracts half-enclosing capitula, blackish purple on both sides, margin entire, base attenuate, apex acute. Capitula solitary, terminal, 1.5 – 3.5 cm in diam., 1.8 – 3.0 cm tall. Involucre broadly campanulate. Phyllaries ca. 4 rows, blackish, outer ones triangular to ovate, middle & inner ones narrowly ovate to linear. Receptacle with dense subulate bristles. Florets numerous, corolla 0.9 cm long, tube c. 5.0 mm long, limb (including lobes) c. 4.0 mm long, purple. Anthers c. 5.0 mm long, strongly lacerate. Achene c. 3.0 mm long, cylindrical, straw colored, ribbed, smooth, weak pericarp crown present. Pappus c. 1.2 cm long, biseriate, dirty white, basally connate into a ring, deciduous as a whole.

Distribution

World: Bhutan, China, India, Nepal, Tibet.

India: Ladakh, Sikkim, Uttarakhand.

Etymology: Named in honor of “Sir Joseph Dalton Hooker”.

Nomenclature notes: *Saussurea hookeri* was described by C.B. Clarke (1876) based on Hooker’s collection from Sikkim. There were multiple such collections available at various herbaria like BM, GOET, GH, K M, NY, P (Index Herbariorum 2026). Therefore, Chen (2015) designated a specimen from K as the Lectotype. However, he erroneously mentioned that “lectotype designated here by Raab-Straube ex Y.S. Chen”. Lipschitz (1979) had already inadvertently designated the specimen at K as Lectotype and therefore, Chen’s designation constitutes second step lectotypification.

Specimens examined: INDIA, Ladakh, Parma Valley, 4432m, 03.08.2008, *G.S. Rawat and B.S. Adhikari 15429* (WIII!); Sikkim, Lachung Valley, Sept, 1892, *G.A. Gammie s.n.* (DD!); BHUTAN Border east of Phari, 16000ft, 01.08.1938, *B.J. Gould 1403* (DD!); TIBET, Linji La, 17000ft, 05.07.1939, *B.J. Gould 2298* (DD!).

3. *Saussurea linearifolia* Ludlow, Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 72 (1956).

Holotype: NEPAL. Rohagaon Suli Gad, 3,300m, 14.09.1952, *Polunin, Sykes & William 3387* (BM000535027 digital image!).

Isotype: K000792067 digital image!; *Paratypes*: NEPAL. Near Dogadi, Khola, 4,200m, 6.08.1954, *Stainton, Sykes and William 3777* (K000891790 digital image!); Tukucha, Kali Gandaki, 4,050m, 10.08.1954, *Stainton, Sykes and William 7749* (K000891792 digital image!); Above Dogadi, Khola, 4,200m, 26.09.1954, *Stainton, Sykes and William 4597* (K000891791 digital image!).

Perennial, 10 – 40 cm tall, caespitose herbs. Caudex branched,

having dense scars of old leaves. Stem erect, simple, many, straw-colored to brown, sometimes with purple tinge, slightly woolly at base but densely woolly in upper part, 3–6 mm diam. Leaves in rosette, lamina long linear, 15 – 30 cm x 1 – 1.5 cm wide, margin irregularly sinuate-dentate, apex acute or acuminate, adaxially and abaxially green, glabrous. Middle & upper cauline leaves sessile, linear, margin minutely dentate. Bracts half-enclosing capitula, green with purple apex or completely purple, margin entire to slightly dentate, apex acute. Capitula solitary, terminal, 2.0 – 2.5 cm in diam., 2.8 – 3.0 cm tall. Involucre broadly campanulate or obconic. Phyllaries 4 to 5 rows, greenish to straw-colored with a purple tinge, outer one ovate to triangular ovate, middle ones narrowly elliptical & inner ones linear. Receptacle with few isolated bristles. Florets numerous, corolla 0.8–0.9 cm long, tube c. 4.0 mm long, limb (including lobes) c. 6.0 mm long, purple. Anthers c. 7.0 mm long, lacerate. Achene c. 5.0 mm long, obovoid, brown, ribbed, smooth with small papillose trichome near apex, weak pericarp crown present. Pappus c. 2.5 cm long, biseriate, dirty white, basally connate into a ring, deciduous as a whole.

Distribution

World: China, India, Nepal.

India: Uttarakhand.

Etymology: Named due to linear leaves.

Taxonomic notes: *Saussurea hookeri* and *S. linearifolia* can be easily confused due to their similar caespitose habit, linear leaves, and solitary capitulum but differs in many morphological characters as described in Table 2.

Specimens examined: NEPAL, Rohagaon, Suli Gad, 14.09.1952, O. Polunin, W.R. Sykes & L.H.J. Williams 3387, (K000792067 digital image!); Tukucha, Kali Candaki, 10.09.1954, J.D.A. Stainton, V.R. Sykes & L. Williams 7749, (K000891792 digital image!); Above Dogadi Khola, 26.09.1954, J.D.A. Stainton, V.R. Sykes & L. Williams 4597, (K000891791 digital image!); Near Dogadi Khola, 06.08.1954, J.D.A. Stainton, V.R. Sykes & L. Williams 3777, (K000891790 digital image!).

4. *Saussurea nana* (Pamp.) Pamp., Sped. Ital. De Filippi Himal. Etc. 1913-14. Sér. II. Xi. (Agg. Fl. Carac.) 176. 1934. ≡

Saussurea schultzei var. *nana* Pamp., Bull. Soc. Bot. Ital. 33. 1915.

Holotype: Caracoram, G. Dainelli & O. Marinelli s.n. (FI012640, digital image!)

Perennial, 2.0 – 9.0 cm tall, short stemmed or acaulescent herbs. Caudex branched, having dense scars of old leaves. Basal leaves in rosette, sessile, lamina oblong - lanceolate, 1.5 – 2.5 cm long, 0.3 – 0.5 cm wide, margin sharply sinuate-dentate, apex acute, base cuneate-attenuate, adaxially green, glandular, abaxially white, tomentose. Upper cauline leaves sessile, subtending capitula; blackish purple. Capitula solitary, enclosed in bracts, 2.0–2.5 cm in diam., 1.0 – 1.5 cm tall. Involucre campanulate. Phyllaries 3 rows, blackish with white margin, outer ones narrowly ovate, middle ones elliptic, inner ones narrowly elliptic. Florets numerous, corolla 1.4 cm long, tube c. 7.0 mm long, limb (including lobes) c. 7.0 mm long, purple. Anthers c. 7.0 mm long, lanate. Achene c. 3.0 mm long, cylindrical, glabrous, distinctly ribbed. Pappus c. 1.0 cm long, biseriate, dirty white, basally connate into a ring, deciduous as a whole.

Distribution

World: China, India.

India: Himachal Pradesh, Jammu & Kashmir, Ladakh.

Etymology: Named due to dwarf habit of the plant.

Taxonomic notes: Shi *et al.* (2011) treated *S. nana* as a synonym of *S. bracteata*, however, it should be treated as a distinct species (see details in *S. bracteata* taxonomic notes). Chen (2015) also clearly mentioned that *S. nana* is more closely related to *S. apus* Maxim. than to *S. bracteata*. Morphologically, *S. apus* and *S. nana* both have sharp sinuate – dentate leaf margins and purplish bracts but differ in their habit (caespitose vs. short-stemmed); leaf indumentum (both surfaces green glandular in *S. apus* vs. green glandular adaxial and white tomentose abaxial surface in *S. nana*); petiole (shortly petioled vs. leaf sessile); leaf apex (acuminate vs. acute); phyllaries (3-5 vs. 3).

Specimens examined: INDIA, Jammu and Kashmir, Ladakh, Pang, 02.07.2006, M. Sanjappa 110730 (BSD!); On way to Tang Lang La, 17.08.1988, H.J. Chawdhery & B.P. Uniyal 86212 (BSD!).

5. *Saussurea obvallata* (Wall. ex DC.) Sch. Bip., Linnaea 19: 331. 1846 (July). *Saussurea obvallata* (DC.) Edgew., Trans. Linn. Soc. London 20: 76. 1846 (Aug.). *Aplotaxis obvallata* DC., Prodr. [A. P. de Candolle] 6: 541. 1838. "*Carduus tectus*" a nomen nudum published by Wallich (1831: 2906). "*Carduus obvallatus*" a nomen nudum published by Wallich (1831: 2905).

Lectotype (Step-I designated by Lipschitz 1979: 58; Step-II designated by Raab-Straube, 2017:80): INDIA. Kumaon, Wallich 2905/15 (G-DC, G00474710, digital image!)

Perennial, 13 – 70 cm tall, caulescent herbs. Caudex simple, branched. Stem erect, simple, solitary or many, 0.4 - 1.5 cm diam., straw colored with purple tinge; sparsely pilose with reflexed flagellate hairs. Basal leaves in rosette, lower

Table 2: Differences between *Saussurea hookeri* C.B.Clarke and *S. linearifolia* Ludlow

Characters	<i>S. hookeri</i> C.B.Clarke	<i>S. linearifolia</i> Ludlow
Habit	Laxly caespitose	Caespitose
Caudex	Unbranched	Branched
Flowering stem	Dark purple to black	Straw-colored to brown
Leaf	Narrowly linear	Linear
Leaf margin	Entire, involute	Irregularly sinuate – dentate
Receptacle	Densely bristly	Few isolated bristles
Achene	Cylindrical	Obovoid

cauline leaves petioled, lamina ovate to obovate, 15–21 cm long, 1.2–4.8 cm wide, margin irregularly sinuate-dentate, apex acute to obtuse, adaxially greyish green, pubescent, abaxially pilose, hairy, glabrescent. Middle and upper cauline leaves sessile, ovate to narrowly elliptic. Uppermost cauline leaves completely enclosing inflorescence, pale yellow, boat-shaped, adaxially pilose with reflexed flagellate hairs; abaxially sparsely pilose, densely on veins. Capitula many, enclosed in papery bracts, with blackish purple peduncle, 1.5–2.5 cm in diam., 2–3 cm tall. Involucre globose to broadly campanulate. Phyllaries clearly differentiated into 3 to 5 rows, straw coloured, margin dark, glabrescent, outer ones triangular to ovate, middle ones ovate, inner ones linear. Florets numerous, corolla 1.2 cm long, tube c. 6 mm long, limb (including lobes) c. 5 mm long, purple. Anthers c. 4.5 mm long, laciniated. Achene c. 5 mm long, cylindrical, straw coloured, glabrous, no pericarp crown. Pappus c. 0.9 cm long, biseriate, dirty white, basally connate into a ring, deciduous as a whole (Figure 3).

Distribution

World: China, India, Nepal, Tibet.

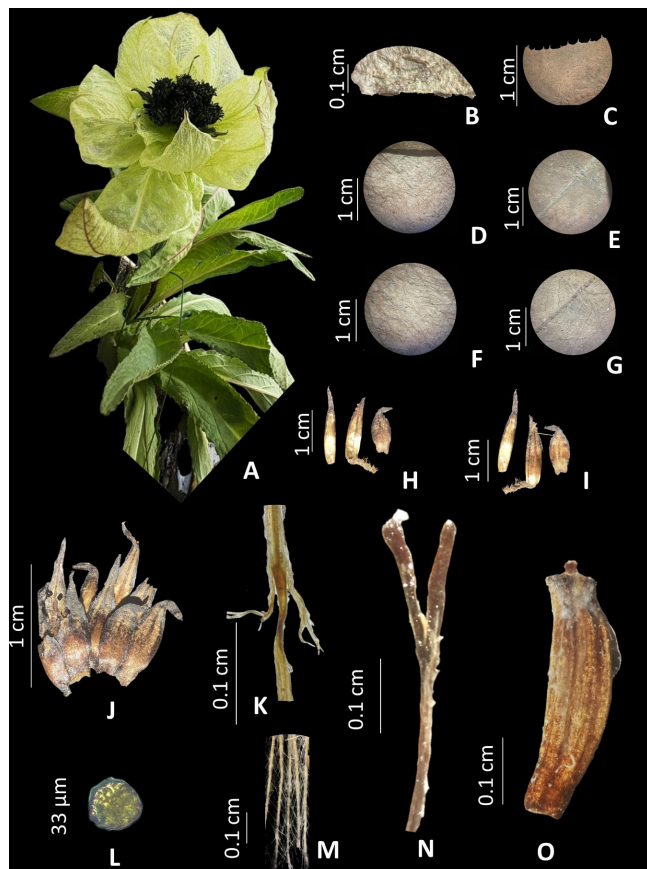


Figure 3: *Saussurea obvallata*: A. Flowering plant, B. Bract margin, C. Leaf margin, D. Bract upper surface, E. Leaf upper surface, F. Bract lower surface, G. Leaf lower surface, H. Involucral bract upper surface (arranged inner to outer) I. Involucral bract lower surface (arranged inner to outer), J. Involucral bract, K. Anther tails, L. Pollen, M. Pappus, N. Stigma, O. Achene.

India: Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir, Sikkim, Uttarakhand.

Etymology: Named because capitula are enclosed within leafy bracts.

Nomenclature notes

Aplotaxis obvallata was described by de Candolle (1837) based on two Wallich catalogue entries 2905 and 2906. Lipschitz (1979) inadvertently lectotypified the G specimens, but four specimens are available at G-DC. Therefore, Raab-Straube (2017) designated the specimen labelled '15' as lectotype. However, he wrote "ex icon" while designating the lectotype but the details given in the notes clearly indicate that he was referring to an actual specimen and not an illustration. Additionally, he did not explicitly mention any herbarium barcode or accession number that can help determine with surety the specimen he was referring to. He was probably referring to the specimen with barcode G00474710 as it is the only one having the details "15. *Carduus obvallatus* Wall. in herb. (*Saussurea*?)/Kamaon, Srinaghur/Comp. angl. des indes /1830". However, this particular sheet contains two specimens as Raab-Straube (2017) also noted that this sheet has two complete plants mounted on the same sheet. Although he did not specify which of the two specimens, he intended to lectotypify, it is evident that these two specimens belong to the same gathering as indicated by the number 15 marked on both the specimens, therefore, the two specimens may actually represent the same element.

Taxonomic notes

Raab-Straube (2017) specified that *S. obvallata* is found only in NW India and the ones in Sikkim are actually *S. sikkimensis*. However, we believe that *S. obvallata* is also there in Sikkim and Arunachal Pradesh. *Saussurea sikkimensis* is only described from herbarium specimens and hence it creates difficulty in accurate identification as all characters are not visible on herbarium sheets (color of upper bracts, peduncle etc.). The morphological limitations make it difficult to differentiate accurately the herbarium specimens of *S. obvallata* from *S. sikkimensis*. There is an urgent need to analyze the *S. obvallata* complex in India in detail.

Specimens examined

INDIA, Himachal Pradesh, Kulu, Beas Kund, 3500m, 15.08.1989, *Daya Singh* 15435 (PUN!); Dogsa-Gue Valley, 4600m, 20.08.1994, *S.K. Muthi/Surrender Singh* 88488 (BSD!); Approach to Rupan Pass Bashahr, 4500m, 23.09.1964, *N.C. Nair* 34252 (BSD!); Raksham Kanda (Baspas Valley), 15000ft, 13.08.1973, *K.P. Janardhanan* 52721 (BSD!); Taranda, Bashahr state, 11000ft, 07.10.1950, *M.B. Raizada* 19846 (DD!); Bashahr, Manangzang Range, 15000ft, 01.08.1890, *J.H. Lace s.n.* (DD!); Jammu & Kashmir, Baltistan, Marpu nullah, 13000ft, 04.07.1892, *s.col.* 11802 (DD!); Uttarakhand, Chamoli, Hemkund, 4500m, 04.09.1979, *R.C. Gupta* 6893

(PUN); Hemkund, 4000m, 22.10.1963, M.A. Rau 31767 (DUH!); Baguabasa, 01.09.1993, *Bipin Balodi* 77794 (BSD!); Near Roopkund, 07.09.1989, *P.K. Hajra* 87863 (BSD!); Dharansi, *P.K. Hajra* 87394 (BSD!); Khalia top, 3500m, *Bipin Balodi* 75300 (BSD!); Kedarkharak Rudragaira route1, 07.08.2003, *Prashant K. Pusalkar* 104285 (BSD!); Hatta valley, 4000m, 23.08.1987, *Dev Raj Agarwal* 84331 (BSD!); Tapovan, 26.09.2014, *Virendra Madhukar, S.K. Srivastava & Amber Srivastava* 114684 (BSD!); Hemkund, 42–4400m, 02.10.1962, *U.C. Bhattacharyya* 24289 (BSD!); Hills above Kedarnath, 3950m, 12.10.1965, *N.C. Nair* 35894 (BSD!); Pindari Bugyal, 3500–5000m, 24.09.1957, *T.A. Rao* 4526 (BSD!); Chifola, 42–45000ft, 12.08.1972, *C.M. Arora* 49900 (BSD!); Valley of Flowers, 21.10.1962, *U.C. Bhattacharyya* 24572 (BSD!); Way to Dunagiri, 3900m, 22.08.1974, *B.D. Naithani* 54149 (BSD!); Sahastratal, 5300m, 16.09.1979, *A.K. Goel* 67913 (BSD!); Hemkund, 4800m, 17.08.1963, *U.C. Bhattacharyya* 29441 (BSD!); Way to Hemkund, 4200m, 18.10.1965, *N.C. Nair* 35952 (BSD!); Brizganga-Dhura (Ralam Valley), 4500–5000m, 17.09.1969, *Pant & Niathani* 39752 (BSD!); Hemkund, 30.09.1964, *B.V. Shetty* 33143 (BSD!); Kailu Vinayak, 4000m, 01.10.1963, *U.C. Bhattacharyya* 30941 (BSD!); Gangotri, Tehri Gharwal, 13–14000ft, 01.09.1997, *Keshavanand* 2 (DD!); Hemkund, Chamoli gharwal, 10.08.1983, *H.B. Naithani* 1036 (DD!); Tehri gharwal, Rudraghera, 15–16000ft, 20.07.1883, *J.F. Duthie* 822 (DD!); Jamdar Glacier, above Har ki doon, 13500 ft, 12.09.1958, *K.C. Sahni* 23985 (DD!); Hemkund, Lokpal Lake, 14250 ft, 15.10.1957, *K.M. Vaid s.n.* (DD!); Tehri gharwal, Above Kedar Kanta, Tans Forest Division, 05.09.1955, *K.C. Sahni* 21974 (DD!); Rallam Valley, Kumaon, 16.08.2000, *Inayat* 24540 (DD!); Rallam Valley, Kumaon, *J.F. Duthie* 3076 (DD!); Tehri Gharwal, Ganges valley, 16.07.1883, *J.F. Duthie* 968 a (DD!); s. loc., 16000ft, 01.09.1864, *D. Brandis* 3918 (DD!); Badrinath, North Gharwal, 11500ft, 24.10.1919, *A.E. Osmaston* 1136, 1127 (DD!); Lebung Glacier, 15–16000ft, 03.08.1986, *G.H. Dar* 5707 (DD!); BHUTAN, Gantsa to Phari, 12–143000ft, 13.08.1938, *B.J. Gould* 1447 (DD!); TIBET, Gantsa to Chumbi Valley, 12000ft, 05.08.1936, *F. Spencer Chapman* 1107 (DD!); CHINA borealis, prov. Tschili, Schansi, 12.08.1885, *G.N. Potanin s.n.* (DD!).

6. *Saussurea schultzii* Hook. f., Fl. Brit. Ind. [J.D. Hooker] 3(8): 366. 1881

Lectotype (Step-I designated by Lipschitz 1979: 60; Step-II designated by Raab-Straube 2017: 130): INDIA. Nubra Regio Alp., 16–17000ft., Aug. 1848, *T. Thomson s.n.* (K000891798, digital image!)

Perennial, up to 45 cm tall, caulescent herb. Caudex simple, unbranched, densely covered with brownish scars of old leaves. Stem erect, simple, straw colored with purple tinge, glabrous to glabrescent, 3.0 – 7.0 mm diam. Rosette of basal leaves; lower cauline leaves petiolate; semi-amplexicaul, sheathing, lamina narrowly elliptic to obovate, 8.0 – 18.0 cm long, 1.2 – 2.8 cm wide, margin irregularly sinuate-dentate, apex acute, both surfaces green, scabrid. Middle & upper cauline leaves sessile, ovate - elliptic. Bracts half-enclosing capitula, membranous, yellowish rose,

margin dentate, base decurrent, apex acuminate. Capitula 3-8, 2.5–10.0 cm in diam. Involucre obconic to broadly campanulate. Phyllaries c. 3-5 rows, straw colored, margin dark, glabrous (pilose near apex), outer ones narrowly triangular, middle ones elliptic to linear, inner ones linear. Receptacle bristles subulate. Florets numerous, corolla 1.9 cm long, tube c. 10 mm long, limb (including lobes) c. 9 mm long, purple, glabrous. Anthers c. 10 mm long, lacinate. Achene c. 5 mm long, obovoid to cylindrical, brown, glabrous, distinctly ribbed, without crown on apex. Pappus c. 0.5 cm long, biseriate, dirty white, basally connate into a ring, deciduous as a whole (Figure 4).

Distribution

World: China, India, Nepal, Pakistan, Tibet.

India: Himachal Pradesh, Jammu and Kashmir, Ladakh.

Etymology: Named in honor of Carl Heinrich Schultz Bipontinus.

Taxonomic notes: Hajra (1988) mentioned this as synonym of *Saussurea bracteata* and as per the description, the species has solitary capitula, however, *S. schultzii* has more than one capitula (detailed comparison in Table 1).

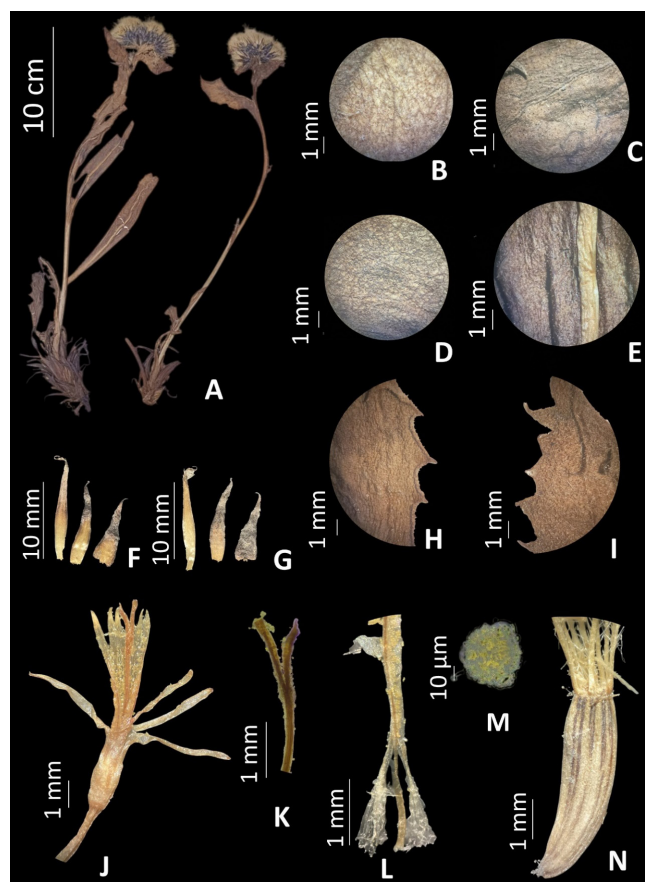


Figure 4: *Saussurea schultzii*. A. Flowering Plant, B. Bract Upper Surface, C. Leaf Upper Surface, D. Bract Lower Surface, E. Leaf Lower Surface, F. Involucral Bracts Upper Surface, G. Involucral Bracts Lower Surface, H. Leaf Margin, I. Bract Margin, J. Floret, K. Stigma, L. Anther Tails, M. Pollen, N. Achene.

Specimens examined: INDIA, Ladakh: Hemis National Park, Stock La, Upper Rumbak, 10.08.1990, G.S. Rawat 2901, 2902 (WII!); Ladakh, Jingrol, 4500m, 19.08.1980, U.C. Bhattacharyya 71735 (BSD!); Ladakh, Chang La, 5200m, 13.08.1980, U.C. Bhattacharyya 71651 (BSD!); Nubra valley, Khardung village, 4134m, 15.08.1998, Goraya et al.s.n. (BSD!).

7. *Saussurea sikkimensis* Raab-Straube, Englera 34: 86. 2017.

Holotype: Sikkim, J.D. Hooker s.n. (GH00970150, digital image!). *Isotypes*: (BM, FI, G, GH, GOET, K, L, M, S, W).

Perennial, 20 – 90 cm tall, caulescent herbs. Caudex simple, having dense scars of old leaves. Stem erect, simple, straw colored to brown, pilose, 8.0 – 15 mm diam., densely pilose with straight flagellate hairs. Basal leaves in rosette, lower cauline leaves petiolate, semi-amplexicaule, lamina ovate – elliptic, 15 – 20 cm long, 5 – 6 cm wide, margin coarsely and irregularly dentate, adaxially & abaxially green, pubescent. Middle and upper cauline leaves sessile, narrowly elliptic to ovate. Capitula many, completely enclosed in boat shaped pale-yellow bracts with margin and veins on both surfaces covered in few isolated straight flagellate hairs, 5.5–9.0 cm in diam., 2–2.5 cm tall, peduncle brown or straw-colored. Involucre broadly campanulate. Phyllaries 4 to 5 relatively subequal rows, straw colored, margin dark brown, pilose, outer ones ovate, middle ones ovate to linear, inner ones linear. Florets numerous, corolla 1.2 cm long, tube c. 6 mm long, limb (including lobes) c. 4 mm long, purple, glabrous. Anthers c. 5 mm long, lacinate. Achene c. 5 mm long, obconic, brown, glabrous, denticulate pericarp crown present. Pappus c. 1 cm long, biseriate, dirty whitish, basally connate into a ring, deciduous as a whole.

Distribution

World: Bhutan, India, Nepal, Tibet.

India: Sikkim.

Etymology

Named after the type locality Sikkim.

Taxonomic notes

This species was described by Raab-Straube (2017) as part of the *Saussurea obvallata* complex. He cautioned that the two species are morphologically very similar and are often misidentified. They can be easily confused by the semitransparent whitish yellow bracts that enclose the capitula but Raab-Straube (2017) mentioned that the long peduncle as well as subequal involucre bracts are diagnostic features of this species. The morphological features differentiating *S. obvallata* from *S. sikkimensis* are listed in Table 3.

Specimens examined

INDIA, Sikkim, Natula, 14000ft, 21.08.1945, Bor's collector 322 (DD!); Lachung, 01.08.1892, G.A. Gammie s.n. (DD!).

8. *Saussurea uniflora* (DC.) Wall. ex Sch. Bip., Linnaea 19: 320. 1846. *Aplotaxis uniflora* DC., Prodr. [A. P. de Candolle]

Table 3: Differences between *Saussurea obvallata* (Wall. ex DC.) Sch. Bip. and *S. sikkimensis* Raab-Straube

Character	<i>S. obvallata</i> (Wall. ex DC.) Sch. Bip.	<i>S. sikkimensis</i> Raab-Straube
Stem colour	Straw colored with purple tinge	Straw-colored to brown
Stem indumentum	Sparsely pilose with reflexed flagellate hairs	Densely pilose with straight flagellate hairs
Basal leaves	Ovate to obovate	Elliptic to ovate
Leaf margin	Irregularly sinuate-dentate	Coarsely and irregularly dentate
Bract indumentum	Adaxially pilose with reflexed flagellate hairs; abaxially sparsely pilose, densely on veins	Margin and veins on both surfaces with few isolated straight flagellate hairs
Peduncles	Blackish purple	Brown or straw colored
Involucral bracts	Strongly differentiated into 3 to 5 rows	Rows relatively subequal
Achene	No pericarp crown	Denticulate pericarp crown present

6: 539. 1838.

Lectotype (Step-I designated by Lipschitz 1979: 60; Step-II designated here: Nepal, Gossain Than, Wallich #2916 (G00474743, digital image!) (Figure 5A).

Saussurea conica C.B. Clarke, Compos. Ind. 224. 1876.

Saussurea uniflora var. *conica* (C.B. Clarke) Hook.f., Fl. Brit. India 3: 366. 1881.

Lectotype (designated here): INDIA, Sikkim, C.B. Clarke s.n. (K000250083 digital image!) (Figure 5B).

Perennial, 10 – 50 cm tall, caulescent herbs. Caudex simple to branched. Stem erect, simple, solitary, pubescent, 3–5 mm diam. Basal leaves in rosette, lower cauline leaves petiolate, lamina narrowly elliptic to oblong or obovate, 3 – 30 cm long, 2.0 – 5.5 cm wide, margin dentate, apex obtuse, adaxially green, pubescent, abaxially green, glabrescent. Middle and upper cauline leaves sessile, ovate to narrowly elliptic. Capitula solitary, enclosed in papery bracts, sessile, terminal, 2.5 – 3.5 cm in diam., 1 – 1.5 cm tall. Involucre obconic. Phyllaries 4 rows, outer ones triangular to ovate, middle and inner ones ovate to linear. Florets numerous, corolla 1.2 cm long, tube c. 6 mm long, limb (including lobes) c. 6 mm long, purplish-blue. Anthers c. 6 mm long. Achene c. 4.5 mm long, cylindrical, brown, glabrous, ribbed. Pappus c. 0.9 cm long, biseriate, dirty white, basally connate into a ring, deciduous as a whole.

Distribution

World: Bhutan, China, India, Nepal, Tibet.

India: Arunachal Pradesh (present report), Sikkim, West Bengal (present report).

Etymology: Named due to solitary capitulum.

Nomenclature notes: *Aplotaxis uniflora* was described by de Candolle (1837) based on the collection by Wallich from

Nepal (collection number 2916). There were multiple such collections available at various herbaria like G, K, LE, but Lipschitz (1979) cited the specimen at G as Holotype, thereby inadvertently designating first – step lectotype. Chen (2015) and Raab-Straube (2017) also cited the G specimen as holotype, which is incorrect. There are two specimens available at G (G00474743 and G00301828) and to bring it down to a single specimen, we designate here the specimen with barcode G00474743 as the second step lectotype following art. 9.17 of ICN (Turland *et al.* 2025), as it matches well with protologue.

Saussurea conica was described by C.B. Clarke (1876) based on the collections from Sikkim at an altitude of 11,000-15,000 ft. without any details of the collector and collection number. Later, the species was reduced to a variety of *S. uniflora* as *S. uniflora* var. *conica* by Hooker (1881) where he cited specimens collected by Clarke from Sikkim and Singalelah (in Darjeeling, West Bengal). Lipschitz (1979) while mentioning the type of *S. uniflora* var. *conica* cited the specimen collected by Clarke from Singalelah as syntypes. This information was probably used by Raab-Straube (2017) to designate the specimen collected from Darjeeling as the lectotype but the specimen selected as lectotype is from West Bengal and the collection cited in the protologue by Clarke are from Sikkim. Even though both the collections are by Clarke and predates the publication date of *Saussurea conica*, it is not evident that these constitute original materials for this name. Also, it is evident from the annotations on the herbarium labels of the specimens collected from Darjeeling that Clarke was probably not sure about the identity of these specimens and therefore, he did not include their information in the protologue. It was only Hooker (1881) who associated the Darjeeling collection with *Saussurea uniflora* var. *conica* and this does not make it an



Figure 5: A. Step-II lectotype for *Saussurea uniflora* (DC.) Wall. ex Sch. Bip. (©Jardin Botanique de Genève); B. Lectotype for *Saussurea conica* C.B. Clarke (©Royal Botanic Gardens, Kew; <http://specimens.kew.org/Herbarium/K000250083>);

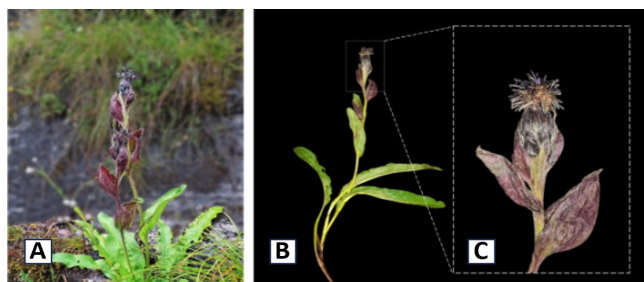


Figure 6: *Saussurea uniflora* (DC.) Wall. ex Sch. Bip. A. Habitat B. Flowering plant; C. Enlarged Capitulum

original material. Therefore, the designation of lectotype by Raab-Straube (2017) is incorrect as it is not clear that the Darjeeling specimens are original materials for the name and hence, we designate here the specimen collected from Sikkim by Clarke (K000250083) as the lectotype following the rules of ICN (Turland *et al.*, 2025).

Taxonomic notes

Dutta *et al.* (2013) reported *Saussurea globosa* (as '*S. globosa*') from Arunachal Pradesh as new record for India, as it was previously known only from China. However, the identity of the specimen used for this conclusion is doubtful as the image shown in the concerned paper appears to be that of *S. uniflora*. The same image can be seen on efloraofIndia platform where it was uploaded by the first author for identification and it was identified there as *S. globosa*. It can be observed from the image that the specimen is having solitary, campanulate capitulum which is characteristic of *S. uniflora* (Figure 6) and does not correspond to the diagnostic features of *S. globosa*. *Saussurea globosa* generally has more than 2 capitula (rarely solitary) but the capitulum shape is characteristically globose. Therefore, it is clear that based on the work of Dutta *et al.* (2013) it cannot be confirmed that *S. globosa* is present in India and hence, it is excluded from the present work and their collection marks a new record of *S. uniflora* for Arunachal Pradesh.

Specimens examined

INDIA, Sikkim, Kopup, 13000ft, 31.08.1945, *Bor's collector 354* (DD!); Lachung, 01.08.1892, *G.A. Gammie s.n.* (DD!).

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Declaration

There is no conflict of interest among the authors.

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