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### UMBRELLA STARWORT *STELLARIA UMBELLATA* TURCZ. (CARYOPHYLLACEAE): A NEW RECORD TO THE FLORA OF THE WESTERN HIMALAYA, INDIA

Satish Chandra & D.S. Rawat

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## UMBRELLA STARWORT *STELLARIA UMBELLATA* TURCZ. (CARYOPHYLLACEAE): A NEW RECORD TO THE FLORA OF THE WESTERN HIMALAYA, INDIA

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**Abstract:** The species *Stellaria umbellata* is reported as a new record for the western Himalayan flora. Critical examination of the species in nature, Indian herbaria, online herbaria and protologue confirmed its identity as *Stellaria umbellata*. Earlier, it was erroneously identified in the western Himalaya as *Stellaria subumbellata* or *Holosteum umbellatum*. This species was previously not reported from the western, central or eastern Himalaya and thus, it is also a new record for the flora of the Himalaya.

**Keywords:** New record, *Stellaria*, Uttarakhand, western Himalaya.

The genus *Stellaria* L. is cosmopolitan in distribution and represented by 120 species in the world and mainly distributed in the northern temperate regions (Mabberley 2008). *Stellaria* belongs to the Subfamily Alsinoideae (DC.) Fenzl and Tribe Alsineae DC. of the family Caryophyllaceae Juss. (Bittrich 1993). This genus occurs in various habitats from the plains to the alpine regions, often in shady locations or on rocky slopes. In India, the genus is represented by 19 species distributed from the temperate to the alpine regions (Majumdar 1993; Pusalkar & Srivastava 2015; Sekar & Srivastava 2007). It is characterized by exstipulate leaves, free

sepals, bipartite petals varying from mid to base, and fruit a dehiscent capsule, opening by valves twice as many as styles.

*Stellaria umbellata* Turcz. is a Siberian species first described from the Baikal mountain of Siberia (Turczaninow 1842). Now it is known to occur in China, North America, Russia and Kazakhstan (Shishkin 1936; Shilong & Rabeler 2001; Morton 2005) inhabiting high mountain peaks, alpine zones, montane grasslands, forests and steppes. The species flourishes in elevation ranges of 1,000–2,800 m in North America, 1,600–3,800 m in China and present in alpine and subalpine zones in Russia (Shishkin 1936; Shilong & Rabeler 2001; Morton 2005). This species was not reported from the western Himalaya (Pakistan, Jammu & Kashmir, Himachal Pradesh, Uttarakhand), central Himalaya (Nepal) and the eastern Himalaya (Sikkim, Bhutan, Arunachal Pradesh) (Ghazanfar & Nasir 1974; Chowdhery & Wadhwa 1984; Grierson 1984; Majumdar 1993; Hajra et al. 1996; Srivastava 1998; Press et al. 2000; Majumdar 2002; Uniyal et al. 2007). Taxonomically, *S. umbellata* belongs

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to the section *Eustellaria* Fenzl and series *Umbellatae* Schischk. of *Stellaria* genus (Shishkin 1936).

#### MATERIAL AND METHODS

The specimens were collected from different localities of Uttarakhand (the western Himalaya) and deposited at G.B. Pant University Herbarium, Department of Biological Sciences, CBSH Pantnagar, Uttarakhand, India (GBPUH). Herbarium specimens of the Indian western Himalaya housed in the herbarium of the Forest Research Institute (DD) and Botanical Survey of India Northern Circle (BSD) were also thoroughly examined. The specimens were identified by relevant literature on *Stellaria umbellata* (Turczaninow 1842; Schischkin 1936; Shilong & Rabeler 2001; Morton 2005). These were also compared with digital images of specimens of the species housed in the New York Botanical Garden (NY), Royal Botanical Garden Kew (K) and National Museum of Natural History Paris (P).

#### *Stellaria umbellata* (Image 1)

Turcz., Bull. Soc. Imp. Naturalistes Moscou. 15: 173. 1842. *Stellaria subumbellata sensu* Edgew. in Hook.f., Fl. Brit. India 1: 233. 1874; Majumdar in B.D. Sharma & N.P. Balakr., Fl. India 2: 589. 1993.

Herb, perennial. Stem slender, branched, ascending, 5–15 cm long, glabrous, hairy near the base of distal 2–3 leaf pairs. Trichomes multicellular, uniseriate, nonglandular, 250–800 µm long. Leaves elliptic–oblong, 3–13 × 2–7 mm, distal 2–3 leaf pairs larger than proximal

leaves, apex acute–obtuse, both surfaces glabrous, proximal leaves subsessile, distal leaves sessile, leaf base hairy in distal 2–3 leaf pairs. Flowers in terminal umbellate cyme, flowers 3–7, subtended by scarious bracts; peduncle long, slender, glabrous. Bracts 3–7, ovate–lanceolate, unequal, 1.5–2.5 × 0.5 mm, glabrous, margins broadly scarious. Pedicel 5–20 mm long, slender, glabrous, curved in fruits. Flowers minute, apetalous. Sepals 5, ovate–lanceolate, 2–3 × 1 mm, glabrous, veins 3, margin scarious, scarcely serrate. Petals absent. Stamens 5–10; if 5 present all fertile, if 10 present then either all fertile or 2–4 staminodes, unequal in length, antisepalous larger than alternisepalous stamens, shorter than sepals, anther yellow. Ovary ovoid–oblong, 1.5–2.5 mm; styles 3, 0.75 mm long. Capsule ovate–oblong, 3–4 mm, 1.5 – 2 times longer than persistent sepals, open by six valves, dehiscent up to the base. Seeds 3–8 per fruit, suborbicular–oblong, compressed, surface smooth, brown (Fig. 1 A–N).

Flowering: August–September.

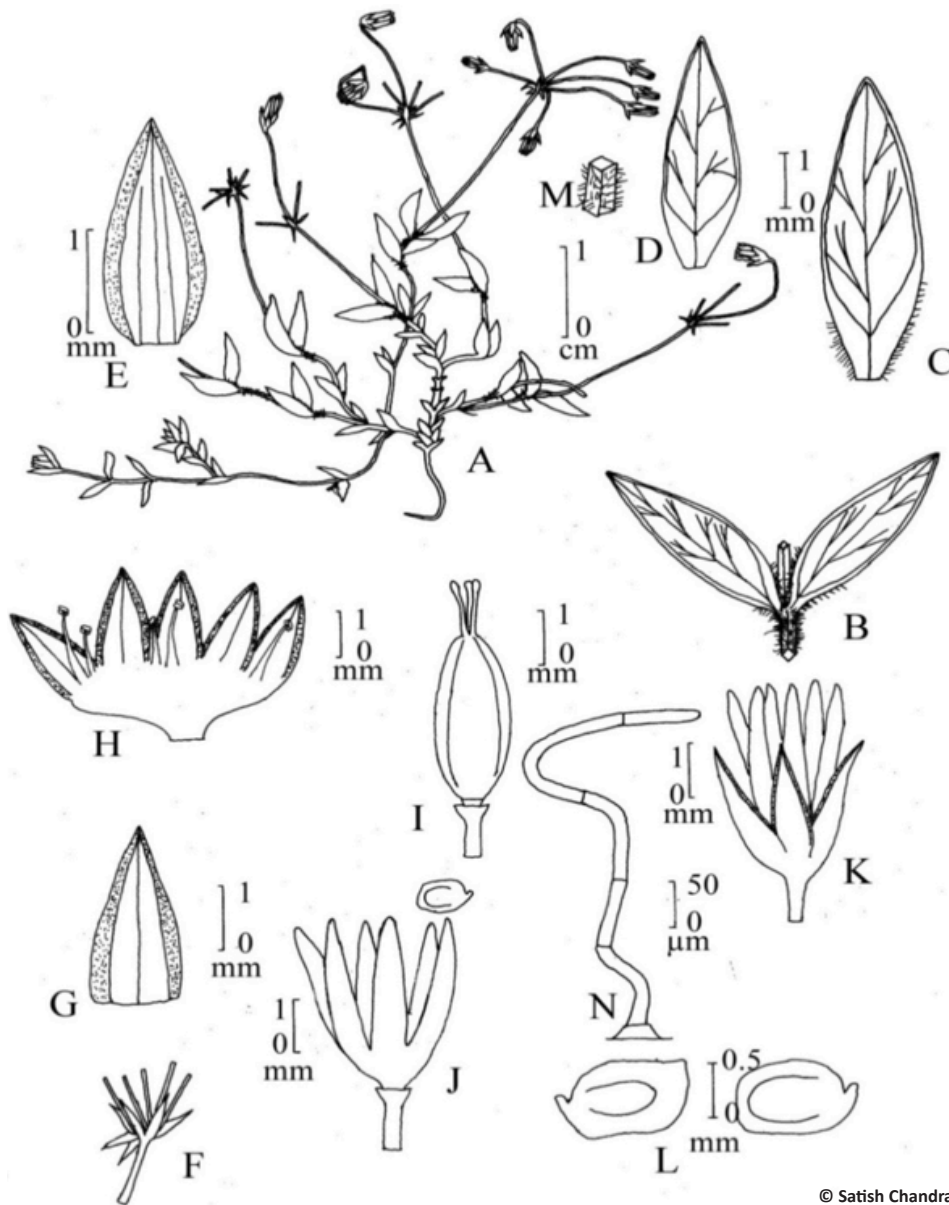
Fruiting: September–October.

Specimens examined : India, Uttarakhand: Garhwal, Chamoli District, Roopkund area, near Jurangali, 30.26416667°N & 79.73583333°E, 4,700m, 01.ix.2014, coll. D.S. Rawat & Satish Chandra s.n. acc. no. 800 (Govind Ballabh Pant University Herbarium Pantnagar, Uttarakhand, India!); Rudraprayag, Kedarnath, Madhuganga valley, 4,500m, 30.74916667°N & 79.04333333°E, 03.x.2007, coll. D.S. Rawat & Satish Chandra s.n. acc. no. 801 (Govind Ballabh Pant



Image 1. *Stellaria umbellata* - plant in nature





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Figure 1. *Stellaria umbellata* Turcz.

A - plant habit, B - upper leaf pair, C - upper Leaf, D - lower leaf, E - sepal, F - bracts in inflorescence, G - bract, H - open flower, I - gynoecium, J - fruit, K - fruit enclosed within sepals, L - seeds, M - trichomes arrangement on stem near upper leaf base, N - eglandular trichome.

University Herbarium Pantnagar, Uttarakhand, India!) (Image 2); Uttarkashi District, Base camp, 4,725m, 27.ix.1967, B.D. Naithani 37469 (BSD!); Kedar Dome area, 5,400m, 1.x.1967, B.D. Naithani 37419 (BSD!); on way to Kedarkharak, 6.viii.2003, P.K. Pusalkar 103889 (BSD!); Kumaon, Pithoragarh District, Ralam Valley, 4,500m, 29.viii.1884, J.F. Duthie 2755 (DD!); Ralam Pass, 4,572m, 29.viii.1884, J.F.Duthie 000723649 (K Image!); Byans Valley, Kutti-Yangti Valley near Gohnika Lake, 4,500m, 7.ix.1884, J.F. Duthie 2755 (DD!); Lebung Pass, 5,100m, 6.ix.1884, J.F. Duthie 2755 (DD!); Nan Hatti-Chhota Hathi, 4,800m, 19.vii.2004, G.S. Rawat 14559

(Herbarium of Wild Life Institute of India Dehradun!).

India, Jammu & Kashmir: Kashmir, Burgil Pass, 3,900m, 14.ix.1893, J.F. Duthie s.n.(DD!); Cherar Lake, Deosai Planes, 3,900m, 15.ix.1893, J.F. Duthie 14134 (DD!); Burzil Pass, 3,000–3,300 m, 13.ix.1893, J.F. Duthie 14017 (DD!); Burzil Valley, 3,000–3,300 m, 13.ix.1893, J.F. Duthie P05436785 (P Image!) Kamri Valley near Kalapani, 3,300–3,600 m, 15.vii.1892, J.F. Duthie 11846 (DD!); Kargil Valley, 4,200–4,600 m, 23.viii.1893, J.F. Duthie 14137 (DD!); Gamhara Pass, Suid Valley, 4,200–4,600 m, 30.viii.1893, J.F. Duthie s.n. (DD!); Kampatri Nullah near Zogi La, 3,600m, 20.viii.1893, J.F. Duthie

14140 (DD!).

United States of America. Arizona: Coconino country, Uninta Mountains 2,600m, 14.vii.2008, G. Rink. 01191927 (NY Image!); Utah: Wasatch Country, 2,895m, 18.viii.1998, Neol H. Holemogren & Patricia K. Holemogren, 01192094 (NY Image!); Rich Country, 2,535m, 18.viii.2011, Neol H. Holemogren & Patricia K. Holemogren, 01425016 (NY Image!); Idaho: Franklin Country, near Bear lake, 2255 m, 14.vii.2007, Neol H. Holemogren & Patricia K. Holemogren, 01192095 (NY Image!); Wasatch range, 2,430m, 21.vii. 2010, Neol H. Holemogren & Patricia K. Holemogren, 01207789 (NY Image!).

Distribution: This species is known from Siberia, China, North America and Kazakhstan (Shishkin 1936; Shilong & Rabeler 2001; Morton 2005) and from India. It often occurs near the snow line in the western Himalaya on rocks with mosses in small populations.

#### Morphological variation within species

The species *S. umbellata* shows remarkable morphological variations according to geographical regions. In the Baikal mountains in Russia and in China plant height of the species commonly reaches up to 5–15 cm, while in Indian and North American populations it may reach up to 20cm and 40cm respectively. The shape and size of leaves are also variable. In Russian populations leaves are 5–15 × 2–7 mm, elliptic - oblong, apex acute-acuminate and proximal leaves are smaller than the distal leaves but in the North American population leaves are 3–9 cm × 1–3 mm, elliptic - lanceolate, somewhat succulent and all leaves are almost equal in length. Numbers of flowers in terminal cymose umbel are 3–10 in Russian, Chinese and Indian populations but extend up to 20 in North American populations. Number of stamens ranges in the species from 5–10. In North American populations five stamens are recorded while 10 stamens are present in Russian and Chinese population. In Indian population the number of stamens ranges from 5–10. If five stamens are present then all are fertile, if 10 stamens are present then either all are fertile or 2–4 are staminodes (Turczaninow 1842; Shishkin 1936; Shilong & Rabeler 2001; Morton 2005). Flora of China (Shilong & Rabeler 2001) distinguished *S. subumbellata* from *S. umbellata* on the basis of stamen number and leaf shape. They considered stem tufted, leaves linear to linear-lanceolate and five stamens in *S. subumbellata* while, solitary stem, elliptic leaves and 10 stamens in *S. umbellata*. These characters, however, are not reliable due to the presence of five stamens and linear-lanceolate leaves in *S. umbellata*.

#### Dubious identity of *Stellaria subumbellata*

Edgeworth described *S. subumbellata* Edgew. in the Flora of British India (Edgeworth & Hooker f. 1874) on the basis of specimens collected by T. Thomson from Nubra Valley, western Tibet (K000723653!) and J.D. Hooker from Sikkim, India (K000723651!, K000723652!, K000723654!, K000723655!) in 1849. Edgeworth described the new species *S. subumbellata* after distinguishing it from *S. umbellata* on the basis of seed surface pattern and the presence of fewer bracts. But in his publication he did not mention the total number of bracts present in *S. subumbellata*. All the above-mentioned specimens from India are placed erroneously in the *Stellaria irrigua* section in the Kew virtual herbarium. Though, *Stellaria irrigua* is not reported from India till date. In the flora of Pakistan Ghazanfar & Nasir (1986) also mentioned that the *S. subumbellata* is not different from *S. umbellata*. Moreover, description of *S. subumbellata* as per Ghazanfar & Nasir (1986) matches closely with our specimens except granular seeds. Another allied Chinese species *S. parviumbellata* Y. Z. Zhao contains 2 bracts but differ from species of *S. umbellata* and *S. subumbellata* by having pilose stem, ovate-orbicular leaves and fruit slightly longer than persistent sepals. Pusalkar & Singh (2012) have also described *S. subumbellata* in the Flora of Gangotri National Park as petaliferous or non petaliferous species but in all specimens studied by us petals were absent. All other characters of *S. subumbellata* described by Pusalkar & Singh (2012) match well with our plant specimens.

After examining plants in nature, studying herbarium specimens and relevant literature (Shishkin 1936; Turczaninow 1842; Shilong & Rabeler 2001; Morton 2005) it is clear that in the western Himalaya this species is erroneously identified as *S. subumbellata*. After checking herbarium sheets wrongly identified as *S. subumbellata* housed in DD and BSD herbarium and images of herbarium sheets from K and P herbaria it is concluded here that this species is common in the western Himalaya.

The fate of Edgeworth's *S. subumbellata* can only be decided after examining bract number and seed surface structure in the specimens from the eastern Himalaya. This examination will make it clear that whether this species was an erroneous identification of *S. umbellata* or a different and distinct species.

#### Erroneous identification

Some specimens from Uttarakhand, India housed in BSD (37469, 37419, 103889) are erroneously identified

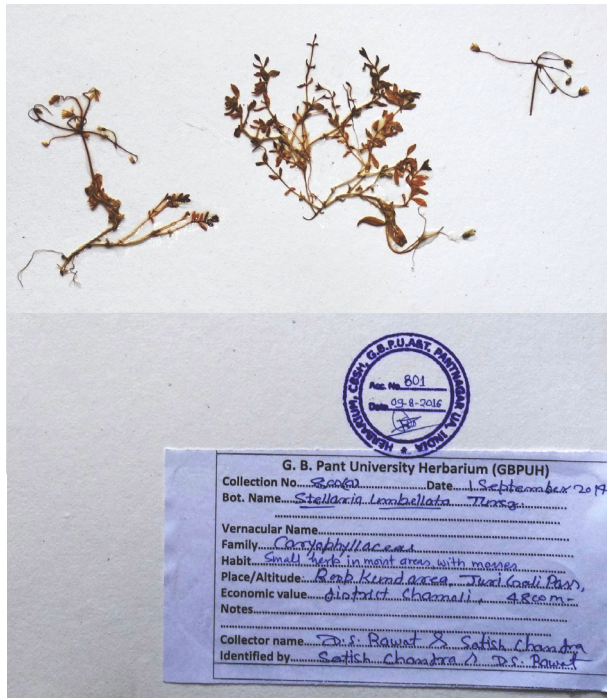


Image 2. Herbarium sheet of *Stellaria umbellata* (Acc. no. 801)

as *Holosteum umbellatum* L. whereas *H. umbellatum* is a very different species of large size forming cluster of leaves at stem base, with distinct petals longer than sepals, and seeds being shield-shaped and minutely bumpy (Ghazanfar & Nasir 1986; Shilong & Rabeler 2001; Sadeghian et al. 2014).

## CONCLUSION

Plants collected during this study and specimens of species from the western Himalaya (housed in DD and BSD herbaria) have 3–7 unequal scarious bracts and smooth seed surface, hence fulfil all the characters of *S. umbellata*. The species *S. umbellata* is a new record for the flora of the Himalaya and India. The genus *Holosteum* is present only in Jammu & Kashmir in India and absent in Uttarakhand.

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