

***Adenophora capillaris* subsp. *dzukoensis* (Campanulaceae), a new subspecies from North East India with a note on other Indian taxa of the genus**

A. A. Mao, Nandita Sarma and Dilip Kr. Roy

Botanical Survey of India, Eastern Regional Centre, Shillong-793003, Meghalaya, India
E-mails: aamao2008@gmail.com; nanditasarma9@gmail.com; dilipbsierc@gmail.com

[Received 12.04.2015; Revised & accepted 16.05.2015; Published 30.06.2015]

Abstract

In this paper, a new subspecies of *Adenophora* Fischer (Campanulaceae Juss.), *A. capillaris* Hemsley subsp. *dzukoensis*, from the state of Nagaland, North East India is described and illustrated. It is distinct from other three known subspecies of *A. capillaris* Hemsley viz. *A. capillaris* Hemsley subsp. *paniculata*, *A. capillaris* Hemsley subsp. *leptosepala* and *A. capillaris* Hemsley subsp. *capillaris* in having comparatively dwarf habit, ca. 30–45 cm, unbranched; Racemes 5–9 flowered; pedicels 5–9 cm long. Key of the four subspecies of *A. capillaris* and a brief account of Indian *Adenophora* with key are provided.

Key words: *Adenophora capillaris*, Campanulaceae, India, Nagaland, New subspecies.

INTRODUCTION

The Campanulaceae Jussieu is a large, diverse, and cosmopolitan plant family with representatives inhabiting a wide range of ecosystems including tropical, subtropical, temperate, and even frigid zones with exceptional diversification in South Africa and Hawaii (Lammers 2007; Sporck-Koehler *et al.* 2015). It comprises of about 68 genera and over 2300 species (Hong *et al.* 2011). The perennial herbaceous genus *Adenophora* Fischer comprises about 76 taxa (WCSP 2015), geographically distributed in East Asia, South to India and Vietnam, extending in to Europe and Crimean peninsula (Fedorov 1957; Hong *et al.* 2011). Members of this genus are characterized by annular or tubular disc (Nectary) surrounding the base of style, shallowly lobed tubular-campanulate corolla and racemiform or paniculate inflorescences. In India the genus is represented so far by three taxa (Haridasan & Mukherjee 1996).

During field exploration in the month of September 2013 in Dzukou valley, Nagaland, North East India, one of us (AAM) made some collections (all are in flowering) of an interesting member of *Adenophora* Fischer. A critical study of the specimens in consultation with available literature (Clarke 1881; Fedorov 1957; Haridasan & Mukherjee 1996; Clemant 2001; Hong & Song 2010; Hong *et al.* 2011) and herbaria (CAL, ASSAM), the specimens was found to represent a new subspecies of *Adenophora capillaris* Hemsley. Description of the new subspecies along with an account of the Indian *Adenophora* is given. Illustration along with the image (Plate I) of the new taxon is provided for easy identification.

TAXONOMIC TREATMENT

Adenophora capillaris Hemsley, J. Linn. Soc., Bot. 26: 10. 1889; De-Yuang & Song, Novon 20: 426. 2010.

Type: China. Hubei: Patung Distr. [Badong Co.], s.d., A. Henry 954 (Lectotype **K**).

Adenophora capillaris, which now comprises four subspecies, is distributed only in Asia. Subspecies *capillaris*, subspecies *leptosepala* and subspecies *paniculata* are restricted in China at an elevation of 1100 – 3600 m. The new subspecies *dzukoensis* is confined to Dzukou valley (2400 – 2700 m) in Nagaland state of India.

Adenophora capillaris Hemsley subsp. *dzukoensis* A.A. Mao, Nandita Sarma & D.K. Roy, *subsp. nov.* [PLATE - I]

Type: India; Nagaland, Dzukou Valley, 2400 – 2700 m, 03.09.2013, A.A. Mao 110448 (Holotype: ASSAM; Isotype: CAL).

Perennial herbs. Roots carrot-like. Stems 1 – 2 from a single root, erect, ca. 30 – 45 cm, simple, thinly hirsute. Leaves alternate, hairy on veins of both surfaces. Basal leaves petiolate; blade ovate-lanceolate, 4.0 – 5.2 x 1.3 – 1.5 cm; base attenuate, apex acuminate, margin serrate; petiole up to 4 mm. Cauline leaves sessile; blade elliptic-lanceolate to linear-lanceolate, 2.3 – 4.6 x 0.3 – 0.7 cm; base acute-rounded, apex acuminate, margin serrate. Inflorescence un-branched raceme, 5 – 9 flowered, 12 – 22 cm long. Pedicel slender, glabrous, ca. 5 – 9 cm. Flower solitary, bluish-white, up to 0.5 cm across, drooping. Hypanthium subglobose, glabrous. Calyx lobes filiform, ca. 0.7 cm, margin entire. Corolla bluish-white, campanulate, 1.3 – 1.5 cm; lobes triangular, 3 x 2 mm, apex acute. Stamen 5, ca. 1.4 cm long, anthers yellow, ca. 0.3 – 0.4 cm long, lower part of the filament expanded, lanceolate, densely long ciliate. Disc narrowly tubular, 2.5 – 3.0 mm, ca. 1 mm in diam. Style strongly exserted, ca. 2.0 – 2.5 cm, longer than corolla by 0.7 – 1.2 cm; stigma 3-lobed. Capsule not seen.

Flowering: August – September.

Habitat: Currently known only from the type locality. The species was found growing on hilly slopes at an elevation of 2400 – 2700 m.

Distribution: India: Nagaland; endemic.

Threat status: Not evaluated. The field assessment at the type locality and vicinity have shown that the occurrence and population status of the new taxon is very rare and low. So, further investigation is required in the entire areas of the Dzukou Valley to ascertain its IUCN status.

Etymology: The new subspecies is named in reference to its type locality, i.e. Dzukou Valley in Nagaland state, India.

The subspecies has the affinities with *Adenophora capillaris* Hemsley subsp. *paniculata*, *Adenophora capillaris* Hemsley subsp. *capillaris* Hemsley and *Adenophora capillaris* Hemsley subsp. *leptosepala* in several characters, including simple stems, sessile cauline leaves, long pedicel, filiform calyx lobes, triangular corolla lobes, strongly exserted style, and narrowly tubular disc. But it differs from *Adenophora capillaris* subsp. *capillaris* in having hirsute stems and leaves, shorter calyx lobes; from *Adenophora capillaris* subsp. *leptosepala* in having shorter and entire calyx lobes. It is distinct from them in having comparatively dwarf habit, ca. 30–45 cm; unbranched, 5–9 flowered raceme inflorescences. A comparative account of the key morphological characters of all the four subspecies of *Adenophora capillaris* is given in Table 1.

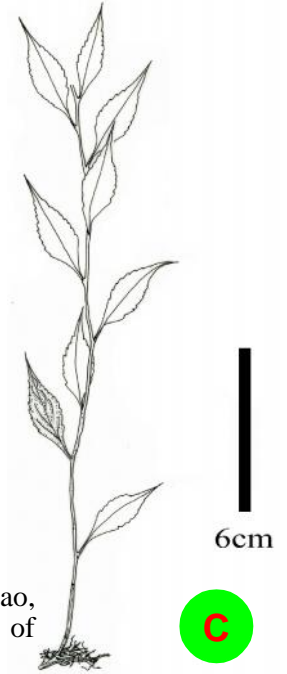
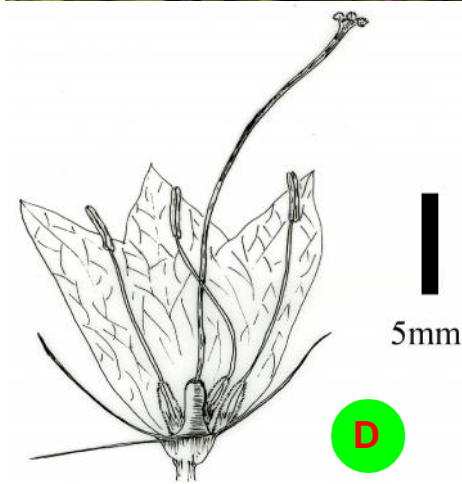


Plate I. *Adenophora capillaris* Hemsley subsp. *dzukoensis* A.A. Mao, Nandita Sarma & D.K. Roy: **A.** Plant *in situ*; **B.** Upper portion of plant; **C.** Lower half of plant; **D.** Vertical section of corolla.

Table 1. Comparative account of the key morphological characters of the four *Adenophora capillaris* subspecies.

Characters	<i>Adenophora capillaris</i> subsp. <i>dzukoensis</i>	<i>Adenophora capillaris</i> subsp. <i>paniculata</i>	<i>Adenophora capillaris</i> subsp. <i>leptosepala</i>	<i>Adenophora capillaris</i> subsp. <i>capillaris</i>
Stem	Hirsute	Glabrous or hirsute	Hirsute	Glabrous
Leaf	Hirsute	Glabrous or hirsute	Hirsute	Glabrous
Inflorescence	Terminal, unbranched, raceme	Terminal, branched, branches shorter, robust panicle	Terminal or axillary, branched, branches longer, less-robust panicle	Terminal, branched, branches longer, less-robust panicle
Calyx lobes	Filiform, ca. 0.7 cm, margin entire	Filiform, (0.2–) 0.3 – 0.5 (–0.7) cm, margin entire	Filiform, (0.4–) 0.9 – 1.4 cm, margin usually toothed	Filiform, (0.3–) 0.6 – 0.9 (–2.0) cm, margin usually entire
Corolla	1.3–1.5 cm	1.0–1.4 cm	1.3–1.8 cm	1.0–1.4 (–1.7) cm

Key to the subspecies of *Adenophora capillaris*:

- 1a. Inflorescences branched, forming a lax or narrow panicle..... 2
 1b. Inflorescences un-branched, several flowered raceme *Adenophora capillaris*
 subsp. *dzukoensis*
- 2a. Calyx lobes shorter, margin always entire; inflorescence branches shorter, robust.....
 *Adenophora capillaris* subsp. *paniculata*
- 2b. Calyx lobes longer, margin rarely entire or verrucose denticulate below; inflorescence
 branches longer, less robust 3
- 3a. Stems and leaves mostly glabrous; calyx lobes entire; corolla 1.0–1.4 (–1.7) cm
 *Adenophora capillaris* subsp. *capillaris*
- 3b. Stems and leaves mostly hirsute; calyx lobes verrucose denticulate; corolla 1.3–1.8 cm
 *Adenophora capillaris* subsp. *leptosepala*

AN ACCOUNT OF THE INDIAN ADENOPHORA

In India the genus is represented so far by three taxa namely *Adenophora himalayana* Feer subsp. *alpina* (Nannfeldt) D.Y. Hong, *A. himalayana* Feer subsp. *himalayana* and *A. khasiana* (J. D. Hooker & Thomson) Oliver ex Collett & Hemsley (Haridasan & Mukherjee 1996). Now with this new subspecies, the genus comprises four taxa in India and two in North East India.

Adenophora capillaris Hemsley subsp. *dzukoensis* A.A. Mao, Nandita Sarma & D.K. Roy, *subsp. nov.*

Distribution: INDIA: Nagaland, Endemic.

Adenophora himalayana Feer, Bot. Jahrb. Syst. 14: 618. 1890 subsp. *alpina* (Nannfeldt) D.Y. Hong, Fl. Reipubl. Popularis Sin. 73(2): 132. 1983. *A. alpina* Nannfeldt, Acta Horti Gothob. 5: 14. 1930; Haridasan & Mukherjee in Fascicl. Fl. India 27. 1996.

Distribution: INDIA: Himachal Pradesh; CHINA.

Adenophora himalayana Feer, Bot. Jahrb. Syst. 14: 618. 1890 subsp. *himalayana*.

Distribution: INDIA. Uttar Pradesh; CHINA, KAZAKHSTAN, KYRGYZSTAN, NEPAL, TAJIKISTAN.

Adenophora khasiana (J. D. Hooker & Thomson) Oliver *ex* Collett & Hemsley, J. Linn. Soc., Bot. 28: 80. 1890; Kanjilal, Prelim. List Pl. Upper Assam 52. 1914; Haridasan & Mukherjee in Fascicl. Fl. India 31. 1996. *Campanula khasiana* J.D. Hooker & Thomson, J. Proc. Linn. Soc., Bot. 2: 25. 1857; C.B. Clarke in Hooker *f.*, Fl. Brit. India 3: 439. 1881; Rao & Balakrishnan in Rec. Bot. Surv. Ind. 20: 134. 1973.

Distribution: INDIA: Arunachal Pradesh, Meghalaya; BHUTAN, CHINA, MYANMAR.

Key to the Indian taxa of *Adenophora*

- 1a. Pedicels 5 – 9 cm long; style strongly exerted, longer than corolla by 0.7 – 1.2 cm..... *Adenophora capillaris* subsp. *dzukoensis*
- 1b. Pedicels 0.15 – 2.2 cm long; style included or slightly exerted2
- 2a. Stem simple; cauline leaves elliptic-lanceolate to linear-lanceolate; calyx lobes oblong-lanceolate to triangular, 0.4 – 0.7 cm; corolla tubular–campanulate; disc pubescent ...3
- 2b. Stem branched; cauline leaves ovate to elliptic-lanceolate; pedicel 0.15 – 0.4 cm long; calyx lobes linear to lanceolate, 0.5 – 1.3 cm long; corolla infundibular-campanulate; disc glabrous *Adenophora khasiana*
- 3a. Calyx lobes oblong-lanceolate, callose-dentate at one point on either side of the margin, occasionally entire; style as long as the corolla, 1.5 cm long; disc pubescent in the upper half; pedicels 0.2 – 0.3 cm long *Adenophora himalayana* subsp. *alpina*
- 3b. Calyx lobes triangular, entire; style as long as the corolla or slighter exerted, 1.9 – 2.3 cm long; disc pubescent entirely; pedicels 0.3 – 2.2 cm long *Adenophora himalayana* subsp. *himalayana*

Acknowledgements

The authors are grateful to Dr. Paramjit Singh, Director, Botanical Survey of India, Kolkata for encouragement and facilities. They are also thankful to the In-charge, Central National Herbarium for providing the herbarium images of *Adenophora* spp. during our study.

LITERATURE CITED

- Clarke, C.B. 1881. Campanulaceae. In: J.D. Hooker (ed.), *The Flora of British India*. Vol. 3. L. Reeve & Co., London.
- Clemant, R.A. 2001. Campanulaceae. In: A.J.C. Grierson & D.G. Long (eds.), *Flora of Bhutan*. Vol. 2(3): 1375 – 1396. Royal Botanic Garden, Edinburgh.
- Fedorov, A.A. 1957 [translated from Russian, 1986]. Campanulaceae -In: B.K. Shishkin & E.G. Bobrov (eds.), *Flora of the U. S. S. R.* Vol. 24. Pp. 92 – 322. Bishen Singh Mahendra Pal Singh and Koeltz Scientific Books.

216 *Adenophora capillaris* subsp. *dzukoensis* : new subsp.

Haridasan, V.K. & Mukherjee, P.K. 1996. Campanulaceae. In: P.K. Hajra & M. Sanjappa (eds.), *Fascicles of Flora of India*. Vol. 22. Pp. 25 – 8. Botanical Survey of India, Calcutta.

Hong De-yuan; Song, G.; Lammers, T.G. & Klein, L.L. 2011. Campanulaceae. In: *Flora of China*. Vol. 19: 536 – 551. Science press, Beijing and Missouri Botanical Garden, St. Louis.

Hong De-yuan & Song, G. 2010. Taxonomic notes on the genus *Adenophora* (Campanulaceae) in China. *Novon* 20(4): 426 – 428.

Lammers, T.G. 2007. *World Checklist and Bibliography of Campanulaceae* Pp.675. Royal Botanic Gardens, Kew.

Sporck-Koehler, M.; Koehler, T.; Marquez, S.; Waite, M. & Williams, A. 2015. A new species of *Cyanea* (Campanulaceae, Lobelioideae), from the Ko‘olau Mountains of O‘ahu, Hawaiian Islands. *PhytoKeys* 46: 45 – 60.

WCSP 2015. *World checklist of selected plant families*. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet; <http://apps.kew.org/wcsp/> (accessed: 16 March. 2015).