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BHUTAN ASIABELL *CODONOPSIS BHUTANICA* LUDLOW (ASTERALES: CAMPANULACEAE): A NEW ADDITION TO THE INDIAN FLORA

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The genus *Codonopsis* Wall. [Campanulaceae] comprises of about 55 species distributed in central, eastern, and southern Asia, with Indochina region as the primary centre of speciation (Hong 2015; Dash 2018; Mabberley 2018). The members of the genus are characterized by perennials herbaceous ascending herbs or twiners, with solitary and large campanulate flowers; and with a peculiar foetid odour. C.B. Clarke (1881) reported 10 species of *Codonopsis* from British India; Kanjilal et al. (1939) reported only two species in Flora of Assam; Haridasan & Mukherjee (1996) dealt with 13 species of *Codonopsis* in Fascicles of Flora of India; and recently Dash & Mao (2011) described a new species *Codonopsis vadsea* S.S. Dash & A.A. Mao from Vadse Hills of Arunachal Pradesh, while Mao & Barbhuiya (2014) reported a *Codonopsis tubulosa* Kom. from Dzukou Valley of Manipur. The present estimate shows that the genus is represented by 15 species in India, primarily

distributed in the Himalayan region and adjacent areas (Dash 2018).

During our field exploration in Tawang District, Arunachal Pradesh in August 2017, some interesting plants of *Codonopsis* were collected from the sub-alpine area of the Bumla region (Images 1 & 2, Figure 1). A thorough study of the live material, available relevant literature (Clarke 1881; Kanjilal et al. 1939; Haridasan & Mukherjee 1996; Clement 2001; Giri et al. 2008; Hong et al. 2011; Dash & Mao 2011; Panday & Sinha 2012; Mao & Barbhuiya 2014; Hong 2015) and comparison of herbarium specimens and images with ASSAM, BM, CAL and K, the identity of the taxa was confirmed as *Codonopsis bhutanica* Ludlow. The species has not been reported from India so far, and thus reported here as an addition to the Indian flora. A detailed taxonomic description along with a photo collage illustrating different features of the plant, and a map showing the locality is provided here.

Codonopsis bhutanica Ludlow,

J. Roy. Hort. Soc. 97: 127. 1972; R.A. Clement in Grierson & D.G. Long (eds.), Fl. Bhutan 2(3): 1385. 2001; Deyuan et al. in Z.G. Wu, P. Raven & D.Y. Hong (eds.), Fl. China 19: 523. 2011. *C. thalictrifolia* sensu Kanwal et al., J. Threat. Taxa 11(9): 14229. 2019 (non. Wall. 1824: 106).

Type: Bhutan, northeastern Bhutan, Shingbe Me La, 27.966°N & 91.650°E, 3810m, 02.vii.1949, F. Ludlow, G. Sherriff & J.H. Hicks. 20786 (BM000996411!).

Plants herbaceous. Stems procumbent, 25–45 cm,



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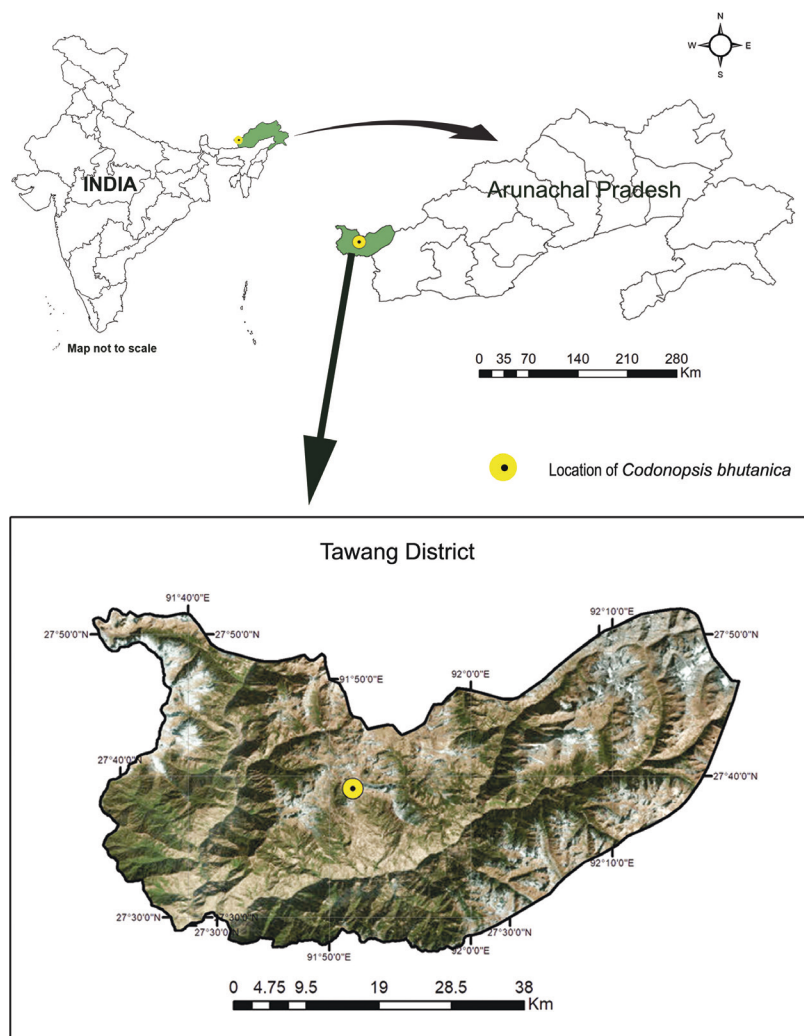


Figure 1. Locality map of *Codonopsis bhutanica* in Bumla area of Tawang District, Arunachal Pradesh, India.

with several slender branches at lower part; branches with purple spots, faintly hairy. Leaves alternate or nearly opposite, ovate-oblong or narrowly oblong, cordate, 7–22 × 6–18 mm, entire or thickened at margin, often recurved, obtuse at apex, sparsely hispidulous on both surface, more along the midrib on ventral surface; sessile or shortly petiolate, petiole 2–4 mm long. Flowers solitary, terminal on the main stem and sometimes on upper branches, rachis 6–10 cm long, often with purple patches; calyx adnate to ovary up to middle, lobes linear, or narrowly ovate, 6–11 × 3–5 mm, glabrous or hispidulous. Corolla tubular, 12–16 mm, deeply purple, violet at base; outer surface of corolla pale blue or purplish, inner surface of corolla whitish with purple spots; corolla lobe 5, rounded. Stamens 5; filaments dilated at base, pale yellow, glabrous, 3–4 mm long; anthers basifixed, yellow, 2–2.5 mm. Gynoecium 8–12 mm long, lower half of style with ovary deep violet, upper half with stigma pale violet in colour; ovary

inferior, 3-locular with numerous ovules; stigma 3-fid, c. 2mm across. Capsules conical, green, 12–15 × 8–12 mm. Seeds numerous, ellipsoid.

Flowering & Fruiting: July–October.

Habitat and ecology: Rarely found in grassy slopes or thickets, 3,500–4,500 m.

Distribution: Bhutan, Nepal, India (Arunachal Pradesh—this report).

Specimen examined: 87971 (CAL!), 31.viii.2017, India, Arunachal Pradesh, Tawang District, Bumla, Near Nagula Lake, 27.651°N & 91.861°E, 4,100m, coll. V. Kumar & S. Panday (Image 3).

Associated species: The species is found associated with *Meconopsis simplicifolia* (D. Don) Walp., *Pedicularis siphonantha* D. Don, *Codonopsis foetens* Hook.f. & Thomson, *Juncus cephalostigma* Sam., *Gypsophila cerastoides* D. Don etc.

Notes: The species was previously reported only from Nepal and Bhutan and considered as endemic to

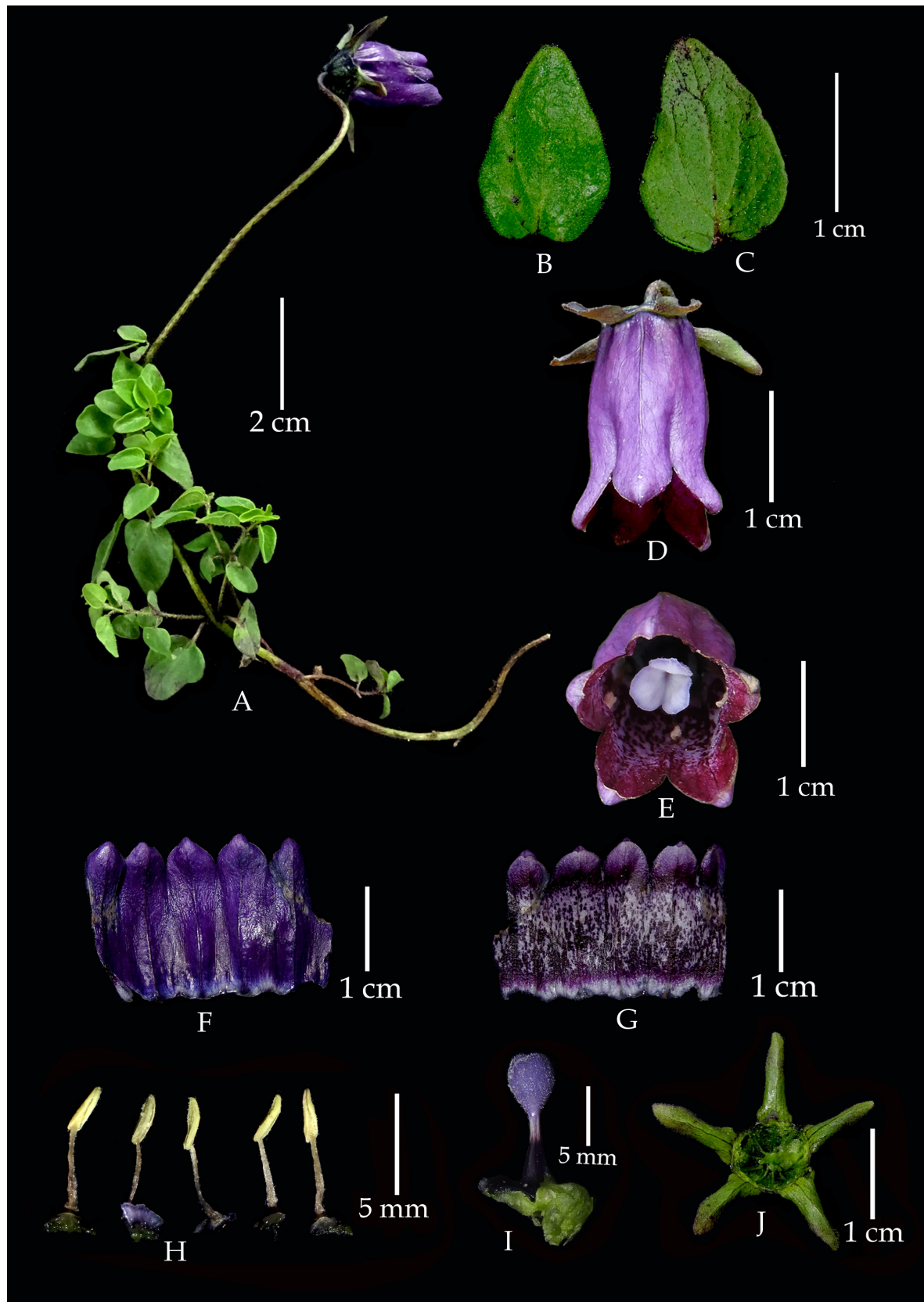


Image 1. *Codonopsis bhutanica*: A—plant habit | B—leaf – ventral surface | C—leaf – dorsal surface | D—lateral view of a flower | E—front view of a flower | F—opened corolla tube showing outer surface | G—opened corolla tube showing inner surface | H—stamens | I—gynoecium | J—fruit. © Samiran Panday.



Image 2. Habit of *Codonopsis bhutanica*.

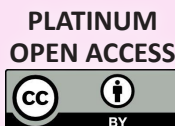
central and eastern Nepal and Bhutan (Hong 2015); however, the collection of this species from the Bumla area of Arunachal Pradesh confirms its occurrences in India and shows an eastern extension from its type locality. Kanwal et al. (2019) have erroneously reported *Codonopsis thalictrifolia* as a new distributional record for Arunachal Pradesh. The herbarium and coloured image provided by Kanwal et al. (2019) shows that the flowers are campanulate, deep reddish-purple, corolla c. 1.4 cm long, corolla lobes triangular-ovate in shape and all these characters refer to the species *C. bhutanica* instead of *C. thalictrifolia* in which flowers are tubular, flared at mouth, pale blue, corolla 2.5–5.5 cm long, corolla lobes broadly oblong in shape.

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Image 3. Herbarium image of *Codonopsis bhutanica* (CALI, 87971).



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