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NOTE

EXTENDED DISTRIBUTION OF THE VULNERABLE COOPER'S STONE FLOWER *CORALLODISCUS COOPERI* (GESNERIACEAE) IN INDIA

Vikas Kumar, Samiran Panday, Sudhansu Sekhar Dash, Bipin Kumar Sinha & Paramjit Singh

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C.B. Clarke (1883) first established the genus *Didissandra* under the tribe Cyrtandreae. While describing the genus, he mentioned seven species under four sections, of which six belonged to the Malayan region and one (i.e., *D. lanuginosa*) to the Himalayan region (Shimla, Kumaun, Garhwal, Sikkim, and Khasia Hills in India, Bhutan, and China). Batalin (1892) established the genus *Corallodiscus* based on a specimen *C. conchaeifolius* collected from China. Craib (1919a,b), while dealing with *Didissandra* and its allied genera in the context of India and China, recorded 16 species under the genus. According to Burt (1947), however, the species mentioned under *Didissandra* by Craib (1919b) shows affinity with *Corallodiscus*, and hence he transferred all of Craib's species to *Corallodiscus*. Currently, most of the species have been synonymized (Wang et al. 1990, 1998; Gao et al. 2012) and the genus is characterized by six species, namely *C. bhutanicus* (Craib) B.L. Burt, *C. cooperi* (Craib) B.L. Burt, *C. conchaeifolius* Batalin, *C. grandis* (Craib) B.L. Burt, *C. kingianus* (Craib) B.L. Burt, and *C. lanuginosus* (Wall. ex DC.) B.L. Burt (The Plant List 2013). According to Mabberley (2018), this genus comprises 3–5 species, distributed from the Himalaya to northwestern China and southeastern Asia. So far, only *C. kingianus* and *C. lanuginosus* have been reported from India.

During our floristic and ecological study in Tawang District of Arunachal Pradesh under the project titled 'Biodiversity Assessment through Long-term Monitoring Plots in Indian Himalayan Landscape', we collected an

EXTENDED DISTRIBUTION OF THE VULNERABLE COOPER'S STONE FLOWER *CORALLODISCUS COOPERI* (GESNERIACEAE) IN INDIA

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interesting species belonging to *Corallodiscus*. Upon critical analysis and scrutiny of authentic literature (Ridley 1905; Craib 1919a,b; Wang et al. 1998; Hilliard 2001; Kamble et al. 2006; Giri et al. 2008; Rout et al. 2008; Möller et al. 2017) and study of herbarium material form Botanical Survey of India, Arunachal Pradesh Regional Centre, Itanagar (ARUN), Botanical Survey of India, Eastern Regional Centre, Shillong (ASSAM), Central National Herbarium, Howrah (CAL), and Royal Botanic Garden, Edinburgh (E), the identity of the species was confirmed as *Corallodiscus cooperi* (Craib) B.L. Burt., hitherto not reported from India. According to IUCN (2017) criteria, the species is listed under the Vulnerable category and was previously only reported from Bhutan. Therefore, the collection of this species from Zemithang establishes its extended distribution and occurrence in India. A detailed description of this newly recorded species along with field images, locality map (Fig. 1), and notes are provided herewith to facilitate its easy

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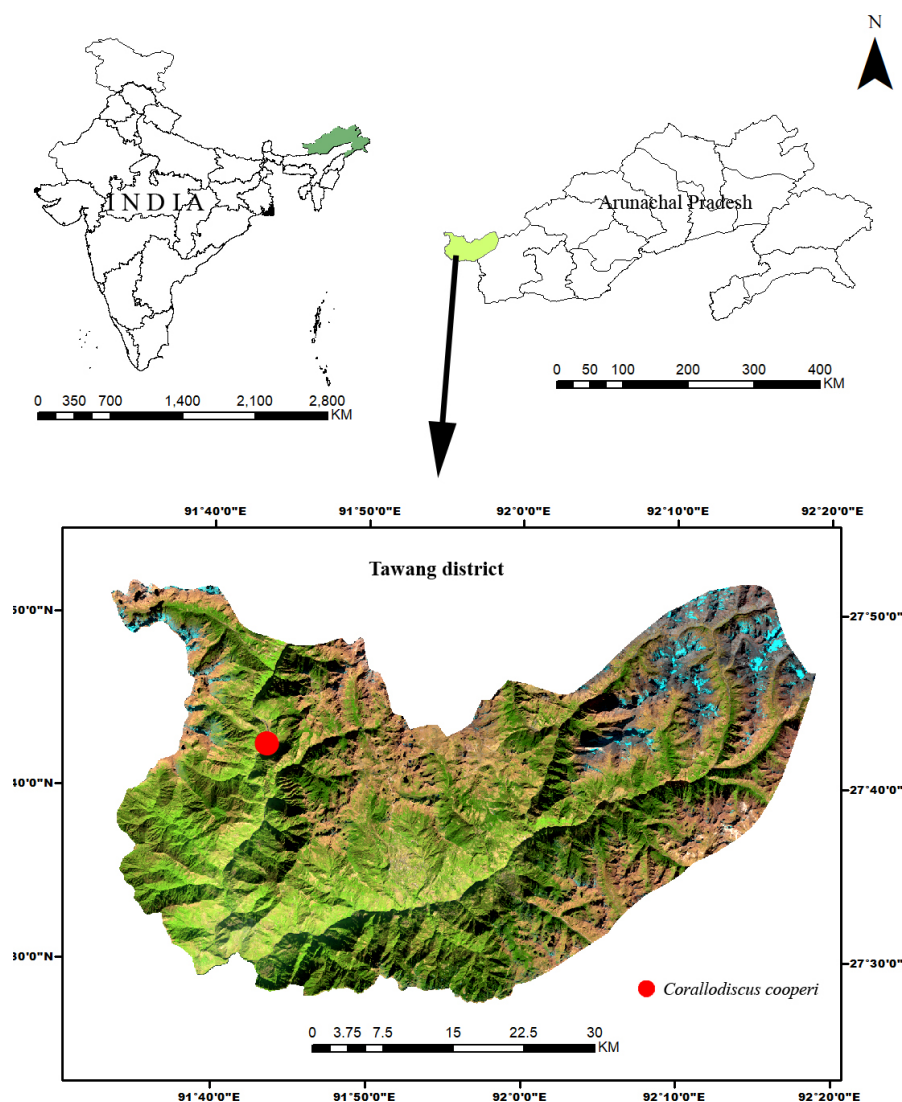


Figure 1. *Corallodiscus cooperi* in Zemithang in Tawang District, Arunachal Pradesh, India (Landsat-8; false colour composite using 6,5,4 bands).

identification.

Material and Methods

Flowering specimens of the species were collected from Zemithang Valley in August 2017. The floral parts were dissected and observed under the light microscope (Olympus SZ61) for detailed macro- and micromorphology. Images were taken in the field with a Sony DSC-HX60V camera. Colour photoplates were made using Adobe Photoshop CS3 and the locality map using Arc Map (ver. 10.1).

Corallodiscus cooperi (Craib) B.L. Burtt.

in Gard. Chron. III, 122: 212. 1947; Hilliards in A.J.C. Grierson & D.G. Long (Eds.) Flora of Bhutan, 2(3): 1322. 2001. Type: Bhutan, Dotena Timphu, 8000ft, *Cooper*

2508/a (E-image!) (Image 1).

Didissandra cooperi Craib in Notes Roy. Bot. Gard. Edinburgh 11: 241–242. 1919.

Small, acaulescent, rosetiform, stoloniferous, lithophytic herb. Rhizome usually grows above ground. Leaves radical, rosette, erect or suberect, smooth; petiole 1.2–1.5 cm long, woolly; lamina narrowly elliptic to oblong or subspathulate, (1.5) 5–8 cm × 3.0–3.5 cm, narrowly cuneate at base, gradually tapering to an elongated petiole, entire at margin, acute to obtuse at apex; lateral veins 2–3 pairs, thick, faint on upper surface, prominent on lower surface; adaxially glabrous, glaucous, slightly woolly along veins at abaxial surface. Flower axillary, solitary, 1.6–2.0 cm long, purplish-white; pedicel, 6.5–8.0 cm long, cylindrical, usually drooping at apex in bud, purplish-brown, woolly at base, glabrescent

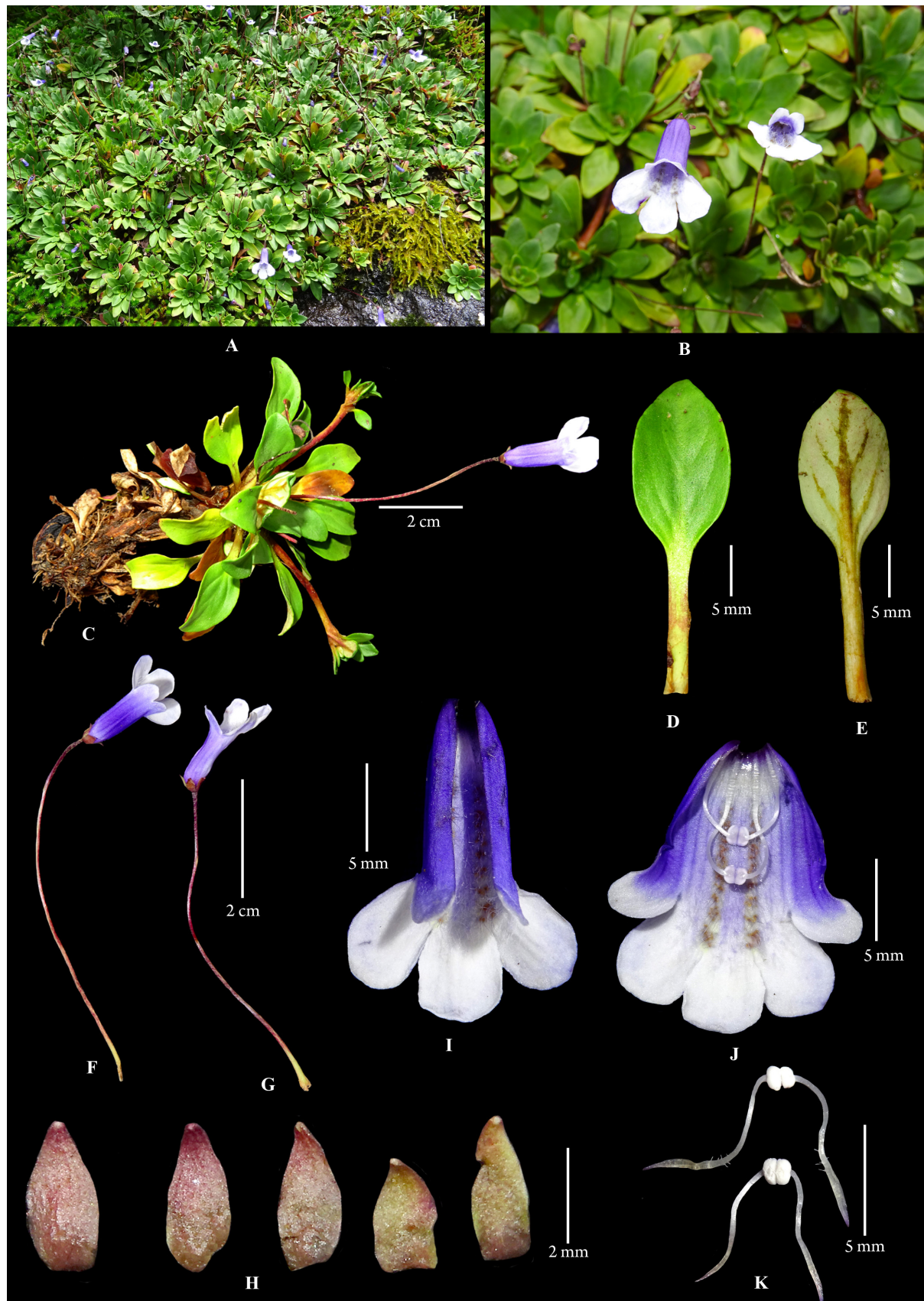


Image 1. A, B & C - Habit of *Coraliodiscus cooperi* | D - Adaxial view of leaf | E - Abaxial view of leaf | F & G - Flower | H - Sepals | I - Corolla | J - Corolla showing stamens | K - Stamens. © Vikas Kumar.

Key to the species of *Corallodiscus* in India

- 1a. Flowers solitary; peduncles, pedicels and calyx persistently woolly *C. kingianus*
- 1b. Flowers 1–many; peduncles, pedicels and calyx glabrous or glabrescent 2
- 2a. Plant stoloniferous; leaf glabrous adaxially, 2–3 pairs of lateral veins, faint on adaxial surface; margin entire; cyme 1-flowered *C. cooperi*
- 2b. Plant not stoloniferous; leaf usually hairy adaxially, 3–5 pairs of lateral veins, prominent on adaxial surface; margin entire or subcrenate; cymes 1–many flowered *C. lanuginosus*

towards apex. Calyx bell-shaped, segments equal in size, connate at base, sepals 5, imbricate, ovate, 2–3 mm × 1.0–1.5 mm, apex acute and minutely recurved, brown, margin entire. Corolla tubular, ca. 7.5 mm long, bilipped, purplish; inside with two rows of yellow spots, outer surface glabrous, inner surface woolly; upper lip 2-lobed, ca. 4 mm long, suborbicular, obtuse at apex; lower lip 3-lobed, ca. 5 mm × 4 mm, obovate to suborbicular. Stamens 4, didynamous, epipetalous, longer stamens 8–9 mm long, shorter ones 5–6 mm long; anthers dorsifixed, each pair of anther connate at apex, white; staminode 1. Carpels ca. 5 mm × 1 mm, glabrous; ovary ca. 2 mm long, unilocular; style ca. 3 mm long, slender; stigma bilobed.

Flowering: August–September.

Habitat and ecology: Grows on slopes, in rocky crevices, and on moss-covered boulders at an altitude of ca. 1,900–2,000 m. Three populations with ca. 35 mature individuals were observed along a 1 km-long trail during our field visit of which, two specimens (same field no.) were collected for herbarium. The associated species were *Lycopodium japonicum* Thunb., *Selaginella monospora* Spring., *Cyanotis vaga* Schult. & Schult.f., and *Nephrolepis cordifolia* (L.) C. Presl.

Distribution: India (Arunachal Pradesh) and Bhutan.

Status: Vulnerable (IUCN 2017).

Specimen examined: 87268 (CAL!), 14.viii.2017, Arunachal Pradesh, Tawang District, Zemithang Valley, 27.706°N & 91.724°E, 2,075 m, coll. V. Kumar & S. Panday.

Notes: Though *Corallodiscus cooperi* is allied to *C. lanuginosus*, it differs from it in having a stoloniferous habit, smooth leaf blades, glabrous and glaucous upper leaf surface, faint and inconspicuous veins, and inflorescence with solitary flower. It also shows similarities with *C. bhutanicus* and *C. conchifolius* in habit, but differs from *C. bhutanicus* in having narrowly elliptic-oblong to subspatulate leaves and smaller size of calyx and from *C. conchifolius* by the presence of leaves having an entire margin, sparsely woolly hairs restricted to the veins on abaxial surface, and small size of calyx (ca. 2 mm long).

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