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A new species of *Crawfurdia* (Gentianaceae) from India

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ABSTRACT: *Crawfurdia minuticalyx*, a new species of *Crawfurdia* (Gentianaceae) is described here from Arunachal Pradesh, situated in Eastern part of Indian Himalayan Region (IHR). This new species is unique in its very small calyx from its allied taxa. Morphologically, it shows close affinity towards *C. speciosa* Wall.; however, it can be differentiated by its much smaller leaves with entire margin; minute, non-splitted, calyx; relatively shorter corolla; stamens inserted below the middle of the corolla-tube, oblong anthers; short gynophore, and very short style. A detailed description and illustration are provided here along with comparative table of morphological characters, for easy identification.

KEY WORDS: Arunachal Pradesh, *Crawfurdia minuticalyx*, *Crawfurdia speciosa*, Indian Himalayan Region (IHR), novel species.

INTRODUCTION

The genus *Crawfurdia* was described by Wallich (1826) in his "Tentamen Florae Napalensis Illustratae Consisting of Botanical Descriptions and Lithographic Figures of Select Nipal Plants". It is a twining herbaceous genus with 22 species at present (POWO, 2025), distributed in South to Southeast Asia. *Crawfurdia* along with *Gentiana* Tourn. ex L., *Metagentiana* T.N.Ho & S.W.Liu and *Tripterospermum* Blume belong to the subtribe Gentianinae G.Don under the tribe Gentianeae Colla (Struwe *et al*., 2002; Chen *et al*., 2005). In India, the genus was represented by 5 species (Jayanthi, 2020) from Arunachal Pradesh and Sikkim, in the eastern part of Indian Himalayan Region (IHR). Arunachal Pradesh representing the most part of the Indian Eastern Himalayas, comprised of 4 species (Chowdhery *et al*., 2008; Dash *et al*., 2011; Jayanthi 2020) namely, *Crawfurdia angustata* C.B.Clarke, *C. arunachalensis* S.S.Dash, Gogoi & A.A. Mao, *C. campanulacea* Wall. & Griff. ex C.B.Clarke and *Crawfurdia speciosa* Wall. Recent addition of *C. delavayi* Franch. to the Indian flora from Arunachal Pradesh increases another number of representatives of this genus for the state as well as the country (Maity and Dash, 2025).

In course of documentation of plants from high altitude wetlands, in Arunahcal Pradesh, one of the authors (MRD) came across an interesting *Crawfurdia* in West Kameng district in 2021. Specimens were collected and brought to Botanical Survey of India, Arunchal Pradesh Regional Centre, Itanagar. Scrutiny of relevant literature (Clarke, 1885; Franchet, 1899; Merrill, 1923; Ridley, 1923; Smith, 1965; Liu and Kuo, 1978; Ubolcholaket, 1987; Ho and Pringle, 1995; Zheng and Yao, 1998; Aitken, 1999; Hul, 2002; Chowdhery *et al*., 2008; Dash *et al*., 2011) and studies on herbarium specimens from various herbaria (ARUN, ASSAM, BSHC, CAL, DD, BSD) along with digital images of herbarium specimens from various international herbaria (B, E, K, KUN, P, PE) revealed the collected specimens to be a new species hitherto unknown to science. Therefore, the same is being described here as a novel species. A detail description, a colored field photograph and illustration are also provided herewith for its easy identification. This new species shows affinity towards *C. speciosa* Wall. Morphological differences of these species are tabulated in Table 1. This newly described species is also superficially similar to three Chinese elements in the genus, *viz*., *C. delavayi* Franch., *C. gracilipes* H.Sm. and *C. pricei* (C.Marquand) H.Sm. The differences among these with the *C. minuticalyx* is also elaborated afterwards.

TAXONOMIC TREATMENT

Crawfurdia minuticalyx R.Maity, Debta & S.S.Dash, ***sp.nov.*** **Figs. 1 & 2**

Type: INDIA, Arunachal Pradesh, West Kameng district, near Chhandar, 2950 m a.m.s.l., 25 Sep 2021, *M. R. Debta 44017* (holotype: ARUN, isotype: ARUN)

Diagnosis: *Crawfurdia minuticalyx* show close morphological affinity to *C. speciosa* Wall., but it can be differentiated by its much smaller habit; leaves with entire margin, and slightly flattened, 0.3–0.5 cm long petiole (vs crenulate leaf margin, and terete, 0.5–0.7 cm long petiole,); single bracteate flower (vs 2-bracteate flowers); 0.4–1.0 cm long pedicels (vs 1.0–6.0 cm long pedicels); 1–2 mm long, linear to narrow lanceolate bracts

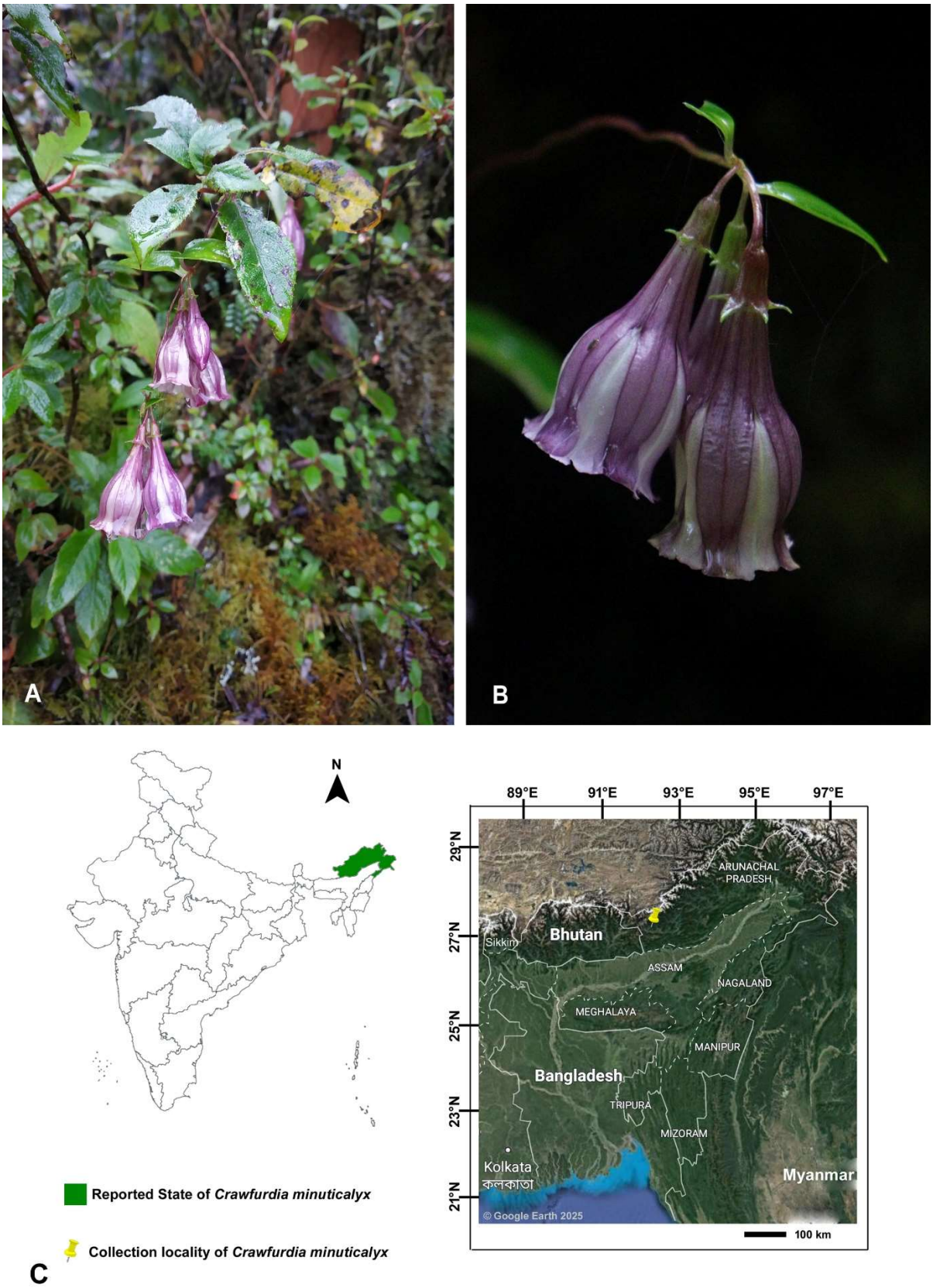

Fig. 1. Field photograph of ***Crawfurdia minuticalyx*** R.Maity, Debta & S.S.Dash. **A.** Habit (credit: Dr. Manas Ranjan Debta), **B.** (credit Mr. Bipankar Hajong). **C.** Distribution map.

Table 1. Comparison of morphological characters of ***Crawfurdia minuticalyx*** with ***Crawfurdia speciosa***.

Characters	Crawfurdia minuticalyx	Crawfurdia speciosa
Pedicel	slightly flattened, 0.3–0.5 cm long.	terete, 0.5–0.7 cm long.
Leaves	leaf blade ovate to narrow ovate or lanceolate, 1.8–4.5 × 0.9–2.0 cm, margin entire.	leaf blade ovate, 4.0–7.0 × 1.5–3.0 cm, margin crenulate.
Pedicel	0.4–1.0 cm long.	1.0–6.0 cm long.
Bract	mostly absent; if present, 1-per flower, very minute, linear to narrow lanceolate, 1–2 mm long.	present in a pair, lanceolate, 7–10 mm long.
Calyx	campanulate; tube entire, 0.2–0.5 cm long, ridged; lobes ovate to narrow ovate or lanceolate, 0.1–0.2 cm long.	tubular; tube split on one side, 1.0–1.2 cm long, smooth; lobes triangular, 0.2–0.3 cm long.
Corolla	2.0–2.5 cm long, pinkish-purple to mauve, tube ventricose, 1.8–2.4 cm long; lobes broadly ovate, 0.5–1.5 × 3–4 mm, apex with short acumen, plicae semicircular, 0.5–0.7 × 1.5–2 mm, margin erose.	4.5–5.0 cm long, blue-purple to purple; tube ventricose, 4–4.5 cm long, lobes broadly ovate-triangular, 3.0–5.0 × 4.5–5.0 mm, apex acute; plicae semiorbicular to truncate, oblique, 0.8–1.2 × 3–4 mm, margin crenulate.
Stamens	inserted below middle of the corolla tube; filaments obclavate, 0.5–0.8 cm long; anthers oblong, 0.1–0.2 cm long.	inserted at middle of corolla tube; filaments linear-subulate, 1–1.5 cm long; anthers sagittate, ca. 6 mm long.
Style	0.1–0.3 cm long.	0.5–0.7 mm long.
Gynophore	0.5–0.9 cm long.	1.5–3.5 cm long.

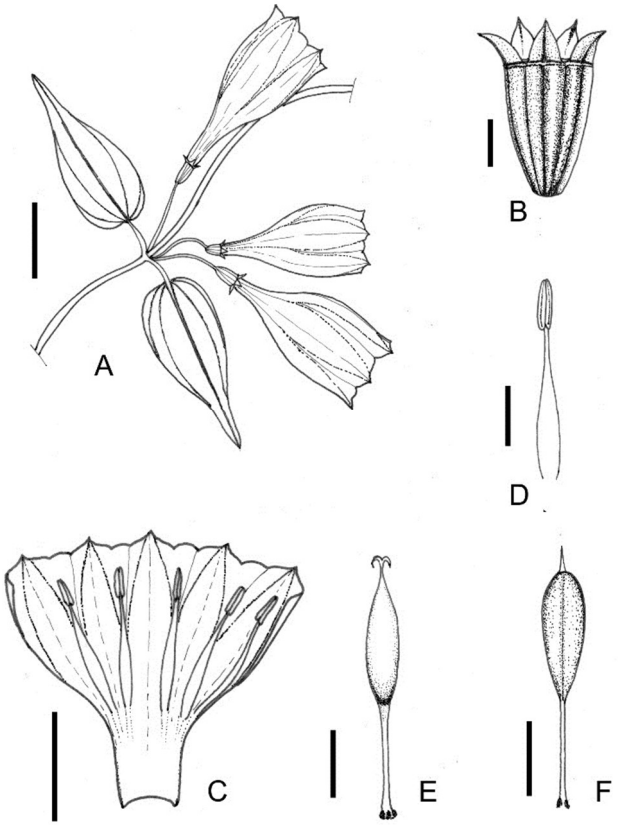

Fig. 2. Illustration of ***Crawfurdia minuticalyx*** R.Maity, Debta & S.S.Dash. **A.** portion of twig, **B.** calyx, **C.** corolla (split open), **D.** stamen, **E.** gynoecium, **F.** fruit. Scale bar: A = 1 cm; B = 1.5 mm; C = 1 cm; D = 2 mm; E = 5 mm; F = 1 cm. (Drawn by R.Maity from *M. R. Debta 44017*)

(vs 7–10 mm long, lanceolate bract); 0.2–0.5 cm long, ridged, campanulate, non-splitted calyx with 0.1–0.2 cm long, ovate to narrow ovate or lanceolate lobes (1.0–1.2 cm long, smooth, tubular calyx with split on one side, with 0.2–0.3 cm long, triangular lobes); 2.0–2.5 cm long, pinkish-purple to mauve corolla (vs 4.5–5.0 cm long, blue-purple to purple corolla); stamens inserted below the mid-length of the corolla tube, with 0.5–0.8 cm long, obclavate filaments, having 0.1–0.2 cm long, oblong anthers (vs stamens inserted at middle of corolla tube, with 1–1.5 cm long linear-subulate filaments, having ca. 6 mm long sagittate anthers); 0.1–0.3 cm long style (vs 0.5–0.7 mm long style); 0.5–0.9 cm long gynophore (vs 1.5–3.5 cm long gynophore).

Description: Twining herb. **Stem** terete, spirally twisted, glabrous. **Leaves** opposite, chartaceous, petiolate; petiole slightly flattened, 0.3–0.5 cm long, grooved towards stem, slightly broadened towards base; lamina ovate– narrow ovate or lanceolate, 1.8–4.5 × 0.9–2.0 cm, base rounded to cordate, margin entire, apex caudate to acuminate, glabrous on both surfaces, bright green adaxially, pale green abaxially; venation multi-costate, reticulate, basal nerves 5, slightly raised beneath. **Inflorescence** axillary, 1–3-flowered at each node; pedicels terete, 0.4–1.0 cm long, glabrous; bracts mostly absent, if present, at the base of pedicels, very minute, linear to narrow lanceolate, 1.0–2.0 mm long, green–purple. **Calyx** campanulate, 5-lobed at apex; lobes free, ovate to narrow ovate or lanceolate, 0.1–0.2 cm long, non-reflexed, margin entire, apex acute, glabrous, green; tube entire, non-splitted, 0.2–0.5 cm long, ridged, apex with a transparent intracalycular membrane, glabrous, green to pinkish purple. **Corolla** infundibuliform, 2.0–2.5 cm long, glabrous, pinkish-purple to mauve; tube ventricose, 1.8–2.4 cm long; lobes broadly ovate, 0.5–1.5 × 3.0–4.0 mm, apex with short acumen, plicae slightly semicircular, 0.5–0.7 × 1.5–2.0 mm, margin erose, paler than the lobes. **Stamens** 5, inserted below the mid-length of the corolla tube; filaments erect, free portion obclavate, 0.5–0.8 cm long, all equal, glabrous, compressed, broadened below; anthers oblong, 0.1–0.2 cm long, glabrous, white. **Gynoecium** shorter than corolla tube, creamy-green to pinkish purple, glabrous; gynophore 0.5–0.9 cm long, slender, with 5 oval nectary glands at base; ovary oblong, 0.7–1.0 cm long; style short, stout, 0.1–0.3 cm long; stigma bifid, often recurved, creamy to pinkish. **Fruit** capsule, included within corolla, elliptic to clavate,

1.7–2.0 cm long, brown to blackish, glabrous, with persistent style.

Flowering & Fruiting: August–October

Habitat and Distribution: *Crawfurdia minuticalyx* is a twining herb found in the open and clear areas with abundant light in the temperate forests of Western Arunachal Pradesh, India (Fig. 1C).

Etymology: The specific epithet "*minuticalyx*" denotes very small or minute size of calyx which has been observed in the specimen during study and makes this species unique from other allied taxa.

Conservation status: *Crawfurdia minuticalyx* is only known from its type locality in West Kameng district of Arunachal Pradesh, where only 15–20 mature plants were located. This newly described species faces threat due to anthropogenic activities and grazing. Apart from these, due to unavailability of sufficient data at present, this newly described species is unable to be assessed under any threat category proposed by IUCN. Therefore, it has been assigned under "Data Deficient" (DD) category based on the IUCN categories and criteria (IUCN, 2022).

Similar species: This newly discovered, *Crawfurdia minuticalyx*, also shows superficial similaries with *C. pricei* (C.Marquand) H.Sm., in its flower colour, but the latter is distinct in having longer, smooth calyx, with very minute, reflexed calyx lobes, and much longer gynophore (2–3 cm long). *C. minuticalyx* shows superficial similarities on its corolla morphology with *C. delavayi* Franch. but the latter is devoid of intracalycular membrane on the apex of calyx tube, but splitted on the one side. Presence and absence of intracalycular membrane on the calyx tube has been regarded as one the key taxonomic characters for delimitating species in *Crawfurdia* by many of the previous workers (Clarke, 1885; Smith, 1965; Ho and Pringle, 1995; Giri *et al*., 2008). The morphometry of corolla in *C. gracilipes* H.Sm. and *C. minuticalyx* are much similar, but the former has longer pedicels and no intracalycular membrane in calyx. Also, the gynophores in *C. gracilipes* are much longer and produces fruits which are excluded from the corolla.

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