



## *Ceropegia ansariana* (Apocynaceae: Ceropegieae), a new species from Mizoram, Northeast India

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**ABSTRACT:** *Ceropegia ansariana* (Apocynaceae: Asclepiadoideae: Ceropegieae: Chionopegia: Macranthae), a new species is described and illustrated from Blue mountain forests in Champhai district of Mizoram, Northeast India. The new species is superficially similar to *Ceropegia khasiana* Murug. *et al.*, but it can be distinguished easily by its longer and fewer fascicled roots, 3–15-flowered cymes with 1–3 flowers open at a time, smaller greenish flowers 3.7–4.5 cm long, greenish with purplish maroon streaked and blotched on outer surface of corolla tube, greenish and shorter ovate-lanceolate corolla lobes, shorter inflated base with a few downwardly pointed hairs of different length at the throat and shorter and sparsely ciliate corona lobes. Detailed descriptions, photographic illustrations, phenology and a note on conservation status are provided here.

**KEY WORDS:** Asia, Blue Mountain forests, *Ceropegia khasiana*, Ceropegieae-Stapeliinae, Champhai district, Flora of India.

### INTRODUCTION

Over the past century, the small herbs and twiners of the genus *Ceropegia* L. (Apocynaceae, Asclepiadoideae, Ceropegieae) have been intensively studied. According to its new and expanded phylogenetically based concept, the genus *Ceropegia* L. *sensu lato*, is the largest genus of the family Apocynaceae with the inclusion of the genera belong to highly succulent stapeliads and species of *Brachystelma* R.Br. ex Sims, consists of about 725 species under 63 sections (Bruyns *et al.*, 2017; Rodda and Meve 2017; Bruyns *et al.*, 2018a; Bruyns *et al.*, 2018b; Wu *et al.*, 2019; Bruyns *et al.*, 2020; Kidyoo and Suwannakote, 2020; Suwannakote and Kidyoo, 2020).

Based on the morphological concept, the genus *Ceropegia* L. *sensu stricto* has 330 species (Endress *et al.*, 2018) distributed widely in seasonally dry places in and around the semi-arid regions of the Africa as far north as the Canary islands, Madagascar, Arabian Peninsula, India and China, around the perimeter of the Indian Ocean to New Guinea and northern Australia (Ansari, 1984; Li *et al.*, 1995; Bruyns, 1997, 2003; Jagtap and Singh, 1999; Puneekar *et al.*, 2006; Mabberley, 2008; Rahangdale and Rahangdale, 2012; Manudev *et al.*, 2016; Punjani *et al.*, 2017; Endress *et al.*, 2018; Kumar *et al.*, 2018; Maurya *et al.*, 2018; Kambale and Yadav, 2019; Murugesan *et al.*, 2019; Wu *et al.*, 2019; Kidyoo and Suwannakote, 2020). The maximum diversity of the genus *Ceropegia* occurs in South Africa, followed by Kenya, Madagascar, India and China (Sri Rama Murthy *et al.*, 2012). Apart from these, many new species are being described in various parts of the world.

The genus *Ceropegia sensu stricto* can be

distinguished from other genera of Ceropegieae such as *Brachystelma*, R.Br. ex Sims, *Caralluma* R.Br. by the presence of corolla that unites to form a tube with an inflated lower portion and the distinctive cage-like structure of the flowers formed by the corolla lobes, which are apically connate to various degrees (Clarke, 1883; Huber, 1957; Ansari, 1984; Li *et al.*, 1995; Meve, 2009; Kullayiswamy *et al.*, 2013; Bruyns *et al.*, 2017; Kidyoo and Paliyavuth, 2017). The genus *Ceropegia* shows remarkable diversity with respect to their habit, shape, size, colour and architecture of flower, habitat and ecological adaptations (Dyer, 1983; Bruyns, 1997; Kambale *et al.*, 2012). The basally inflated corolla tube, usually with a zone of downwardly pointing hairs, forms a temporary trap for small flies and hence this group is popularly called the “fly trap flowers” (Masinde, 2004; Ollerton *et al.*, 2009). Many species of this genus are narrow endemics and they are included in various IUCN Red-Lists (Nayar and Sastry, 1987–1989).

In India, the genus is represented by 70 taxa including the recently described *Ceropegia khasiana* Murug. *et al.*, (63 species, two subspecies and five varieties) (Manudev *et al.*, 2016; Kambale and Yadav, 2019; Murugesan *et al.*, 2019), of which 37 are endemic to Peninsular India (Ahmedullah and Nayar, 1987; Kumar *et al.*, 2018; Kambale and Yadav, 2019). There are 12 species in the North-eastern region of India, viz., *Ceropegia angustifolia* Wight, *C. arnottiana* Wight, *C. hookeri* C.B. Clarke ex Hook.f., *C. kachinensis* Prain, *C. khasiana* Murug. *et al.*, *C. longifolia* Wall., *C. lucida* Wall., *C. macrantha* Wight, *C. mizoramensis* Ram. Kumar & S. Sharma, *C. murlensis* Ram. Kumar & S. Sharma, *C. pubescens* Wall. and *C. wallichii* Wight.



## MATERIALS AND METHODS

A plant exploration team of Botanical Survey of India, Eastern Regional Centre, Shillong, Meghalaya explored Blue Mountain forested areas in Champhai district of Mizoram, Northeast India to collect live plants for *ex situ* conservation projects during 2012 and 2013. During this exploration trip, one of the team members (Shri. Naim Ansari) collected 4 individual live plants of a *Ceropegia* species with tubers, flowers and fruits and planted in his residential garden in the office residential complex of Botanical Survey of India, Eastern Regional Centre, Shillong. These plants were left unidentified for around 4 years. In 2018, the authors noticed these plants with flowers during the month of June and collected a few specimens with flowers for identification. An individual of this same species has been introduced by one of the authors in the Experimental Botanical Garden, Barapani, Shillong, Meghalaya for *ex situ* conservation purpose. After critical examination of these plants, comparison with the relevant literatures (Ansari, 1984; Li *et al.*, 1995; Bruyns, 1997, 2003; Jagtap and Singh, 1999; Punekar *et al.*, 2006; Mabberley, 2008; Rahangdale and Rahangdale, 2012; Kidyoo, 2015; Manudev *et al.*, 2016; Punjani *et al.*, 2017; Endress *et al.*, 2018; Kumar *et al.*, 2018; Maurya *et al.*, 2018; Kambale and Yadav, 2019; Murugesan *et al.*, 2019; Wu *et al.*, 2019; Kidyoo and Suwannakote, 2020) and the study of herbarium material deposited in ARUN, ASSAM, BSHC, CAL, MH, K, E, L, BM and P, we concluded that these materials did not match any described species. Therefore, it is described here as a new species and it is named as *Ceropegia ansariana* *sp. nov.* (Apocynaceae: Asclepiadoideae: Ceropegieae: Chionopegia: Macranthae) (Bruyns, *et al.*, 2017). The description of this new species is based on the live specimens collected by the authors from an individual plant which is under *ex situ* conservation. All the dissections and measurements were taken from the same live materials under light microscope. Additionally, a morphological comparison with the closely allied species are provided (Fig. 1; Table 1; Supplement 1).

## TAXONOMIC TREATMENT

*Ceropegia ansariana* Murug. & A.A. Mao *sp. nov.*

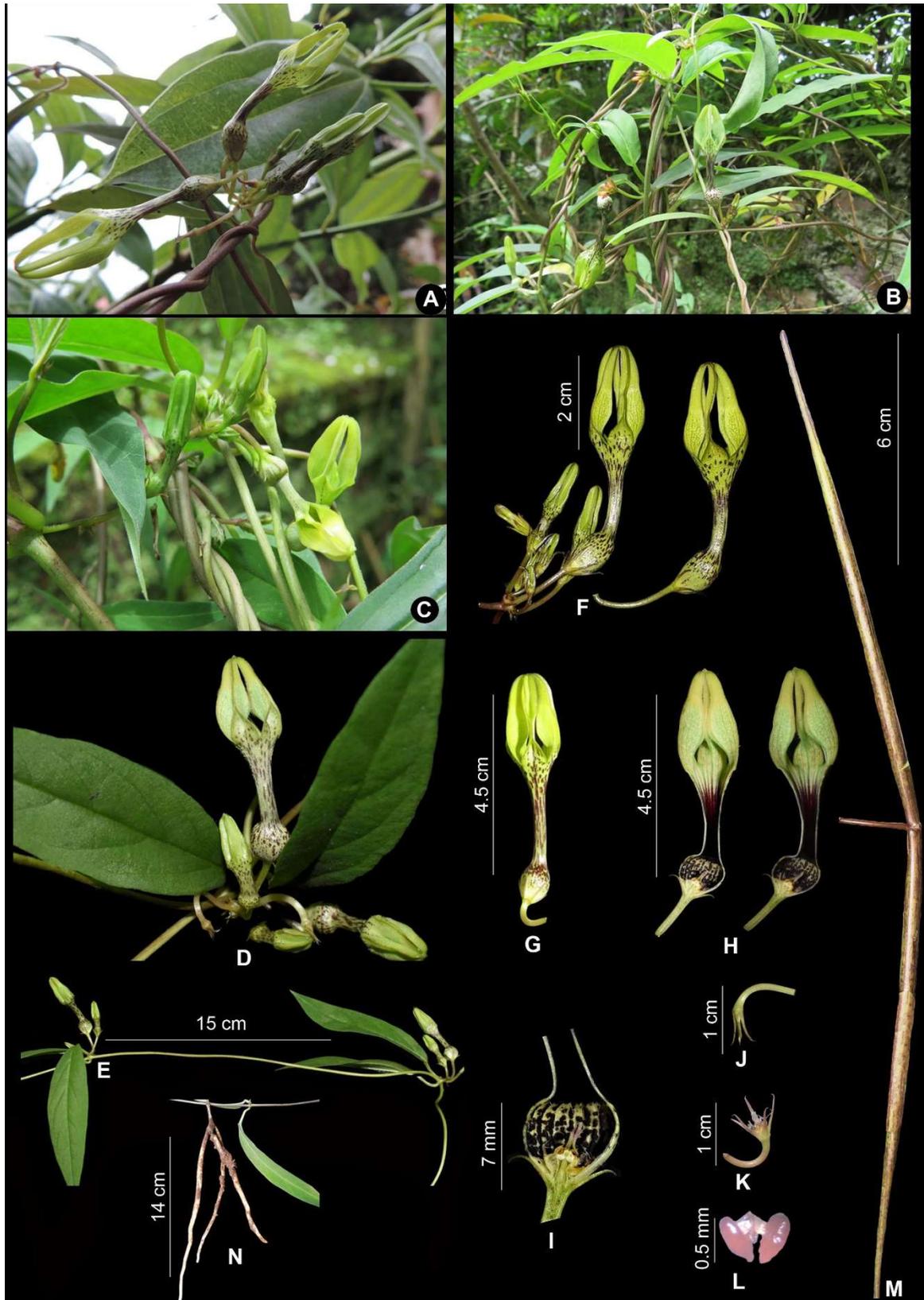
**Fig. 1**

**Type:** INDIA, Mizoarm, Champhai District, Blue mountain forest areas (22°37'48.0"N 93°02'18.70"E), 1250 m elevation, 14 July 2018, Naim Ansari & M. Murugesan 137396 (holotype ASSAM; isotype MH!).

**Diagnosis:** The new species is morphologically closely allied to *Ceropegia khasiana* but it differs in having longer and fewer fascicled roots, 3–15-flowered cymes with 1–3 flowers open at a time, smaller greenish flowers 3.7–4.5 cm long, greenish with purplish maroon streaked and blotched on outer surface of corolla tube,

greenish and shorter ovate-lanceolate corolla lobes with short ciliate, shorter inflated base with a few downwardly pointed trichomes of different length at the throat and shorter and sparsely ciliate corona lobes (Table 1).

**Description:** Perennial, twining herb up to 5 m long. Roots 2–6, fascicled, fusiform, fleshy, to 19 cm long, 2–4 mm in diam. Stem wiry, slender, terete, greenish, pale green or pinkish or red-maroon sparsely minutely hairy or rarely glabrous; internodes 7–15 cm long, 1.0–2.0 mm in diam. Leaves simple, opposite, decussate, petiolate; petiole up to 1.5 cm long, 1.2–2.2 mm in diam., channelled above, with sparse row of trichomes, rarely glaucous; blade lanceolate or linear-lanceolate, 5–15 × 0.5–2 cm, base slightly attenuate or cuneate or truncate, margins entire, apex acute to long-acuminate, abaxially glabrous, except on veins, adaxially minutely pubescent and along margins. Inflorescences extra-axillary, one or very rarely two per node, umbel-like cymes, 3–15-flowered, 1–3 flowers open at a time; peduncle, 0.4–2.5 cm long, 1.2–1.8 mm in diam., greenish-pinkish, sparsely pubescent; pedicels 0.7–2.2 cm long, 1–1.2 mm in diam., greenish-pinkish, sparsely pubescent or sometimes glabrous; bracts 1 or 2 at base of pedicel, caducous, lanceolate, 1.5–2 mm long, greenish-pinkish, apex acute, margins ciliate. Sepals 5, greenish at base, pinkish towards apex, 5–7 × 0.6–0.9 mm, linear-lanceolate, apex acute-acuminate, usually glabrous or rarely very sparsely pubescent, reflexed at maturity, prominently shorter than the inflated corolla base. Corolla tubular with lobes facing upwards and fused at apex, 3.7–4.5 cm long overall, exterior usually glabrous, sometimes sparsely minutely pubescent, denser towards apex, interior glabrous; inflated base 5–9 × 5.5–8 mm, exterior greenish white streaked and blotched at apex with purplish maroon; interior greenish white to yellowish white with dark purplish maroon blotch at middle and a few downwardly pointed trichomes of different lengths at the throat; corolla tube 20–30 × 7.5–11.5 mm, widening to 11.5 mm at apex, exterior greenish streaked and blotched with pale purplish maroon, interior reddish-maroon except for widened apex which is greenish white or yellowish white with red or maroon lines; lobes 5, 1.5–2.0 × 0.6–0.9 cm, broadly ovate-lanceolate, longitudinally folded, keeled, exterior greenish or yellowish-green streaked and blotched with purplish maroon, glabrous, interior greenish or yellowish-green at base with clear greenish reticulate veins, apex broad, solid greenish or yellowish green, usually glabrous or rarely sparsely hairy without, prominently, densely ciliate within, connate at apex to form ovoid cage. Corona biseriate; outer lobes five, bifid, 0.7–1.0 mm long, each lobe very sparsely to densely ciliate, hairs 0.5–1.0 mm long; inner lobes linear-lanceolate, 2–2.7 mm long, greenish-yellowish at base, translucent pinkish or yellowish white towards rounded or obtuse apex, glabrous. Pollinia pinkish or reddish,



**Fig 1.** *Ceropegia ansariana* sp. nov.: **A & B.** Under *Ex-situ* conservation, **C.** Under natural Habitat, **D.** A flowering branch, **E.** Branch showing internodes **F.** Mature flowers, **G.** Young flower, **H.** L.S. of flower, **I.** L.S. of flower with corona, **J.** Calyx, **K.** Corona, **L.** Pollinia, **M.** Follicular mericarp **N.** Fascicled roots.

**Table 1.** Major differences between *Ceropegia ansariana* sp. nov. and its closely allied species *Ceropegia khasiana* Murug. et al.,

Characters	<i>Ceropegia ansariana</i> sp. nov.	<i>Ceropegia khasiana</i> Murug. et al.,
<b>Fascicled roots</b>	2–6, up to 18 cm long	7–19, up to 8 cm long.
<b>Leaves</b>	Lanceolate or linear-lanceolate, apex acute to long-acuminate	Linear-lanceolate, apex long-acuminate
<b>Inflorescence</b>	1(or 2) per node, 3–15-flowered, 1–3 flower(s) open at a time in an umbel.	2 per node, 12–18-flowered, two flowers open at a time in an umbel.
<b>Dilated base of corolla tube: exterior interior</b>	Exterior greenish white streaked and blotched with purplish maroon at apex Interior surface greenish white to yellowish white with dark purplish maroon blotch at middle	Exterior pinkish white, streaked and blotched purplish maroon at apex on outer surface Interior pink blotched at middle, pinkish or greenish white at base and apex
<b>Corolla tube</b>	Exterior greenish streaked and blotched with purplish maroon, interior reddish-maroon except at apex of tube which is greenish or yellowish white with red or maroon lines towards top	Exterior purplish maroon streaked and blotched with pinkish white, interior reddish-maroon except at apex of tube which is pinkish white with red lines towards top.
<b>Corolla lobes</b>	Broadly ovate-lanceolate, exterior greenish or yellowish-green streaked and blotched with purplish maroon, interior base greenish or yellowish-green with greenish reticulate veins apex greenish or yellowish green	Lanceolate or linear-lanceolate, exterior pinkish white streaked and blotched with purplish maroon, interior base pinkish with reddish reticulate veins; apex pinkish or maroon
<b>Pollinia</b>	Pinkish-reddish	Yellowish
<b>Follicular Mericarps</b>	Pairs equal in length	Pairs unequal in length

oblongoid, with pellucid margin, 0.4–0.5 × 0.2–0.35 mm, caudicles short, c. 0.25 mm long, corpusculum clavate, minute, 0.2–0.3 mm long, pinkish. Ovary conical, c. 2 × 0.5 mm, glabrous. Follicular mericarps up to 12 cm long, greenish when young, becomes brownish on maturity, usually straight or rarely slightly curved above the middle, tapering at both ends, blunt at tips, glabrous. Seeds up to 8.5 × 1.2 mm; brownish black, comose; coma up to 2.5 cm long, silky white.

**Distribution:** So far known only from Blue Mountain forested areas, Champhai district of Mizoram, India. Also introduced in Botanical Garden of Botanical Survey of India, Shillong, Meghalaya, India for *ex situ* conservation purposes.

**Ecology:** Occasional along forest margins at an altitudinal range between 1000 and 1250 m above sea level. A total of nine mature individuals were located in the type locality.

**Etymology:** The new species is named in honour of Dr. M.Y. Ansari for his significant contribution on Indian *Ceropegia*.

**Phenology:** Flowering: July–September. Fruiting: September–October.

**Taxonomic notes.** *Ceropegia ansariana* is a member of the *Ceropegia longifolia* complex. This complex includes *Ceropegia khasiana* *C. longifolia*, *C. longifolia* subsp. *sinensis* H.Huber var. *sinensis* H.Huber, *C. macrantha*, *C. mizoramensis* and *C. murlensis* (Bruyins, et al., 2017; Kumar et al., 2018; Murugesan et al., 2019). Species from this complex are slender climbers with fleshy swollen roots, annual twining glabrous to pubescent stems, inflorescences pedunculate to sessile, corolla with slender tube inflated at base and lobes remaining joined at tips, and pendulous white-coloured trichomes at the interior throat of the inflated base of corolla tube. *C. ansariana* and *C. khasiana* share character of fascicled roots, hairs within inflated portion

of corolla tube and sparsely hairy outer corona. The corolla lobes in the latter are linear-lanceolate and have a prominent ring of pendulous white-coloured trichomes whereas, in the former the lobes are ovate-lanceolate and a few downwardly pointed trichomes of different lengths at the throat.

**Conservation status:** The new species is currently known only from the type locality. During the field surveys we have located only nine mature individuals within this forest which covers an area of 5 km<sup>2</sup>. The investigation has not been thorough enough to fully understand the distribution of species. According to the IUCN Red List Categories version 3.1 (IUCN, 2017) and this species has been provisionally assessed here as Data Deficient (DD). However, it is also suggested that, further extensive explorations in similar habitats and micro environment in the adjacent localities are required to analyse its distribution in other parts of Northeast India for the better understanding of its population size, area of occupancy and extent of occurrence and threats, if any, to assess the exact threat category of the species. The major threats such as, monoculture, habitat destruction caused by wild fires, landslides, various developmental activities, mining, collection Minor Forest Produces (MFP) by local people, fire wood collection and cattle grazing were observed in the study area during the study period.

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Supplementary materials are available from Journal Website.