

# Notes on the recollection of *Asarum cordifolium* (Aristolochiaceae) after a gap of 80 years from India and its typification

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**Abstract:** *Asarum cordifolium* C.E.C. Fisch. has been recollected from the East Kameng district of Arunachal Pradesh, India. This species was first collected from Arunachal Pradesh, India in 1928 and recollected by the author after a gap of 80 years. A detailed description and photographs are provided along with comments on the typification, possible threats and conservation status.

**Keywords:** Arunachal Pradesh, *Aristolochiaceae*, lectotype, India.

## Introduction

The genus *Asarum* L. (Aristolochiaceae) comprises perennial, rhizomatous, herbs with cordate or sagittate leaves and long petioles. The genus is represented by 132 species of which 2 are found in India (Mishra & Sanjappa, 2020; POWO, 2023). While documenting the flora of East Kameng district of Arunachal Pradesh, as part of the Flora of India project, author collected specimens of an interesting plant. After perusal of the relevant literature (Fischer, 1930; Giri *et al.*, 2009; Dash & Singh, 2017), and consultation of herbarium specimens housed at ARUN, ASSAM, BSD, BSI, BSID, BM, BSS, BSIS, CAL, DD and digital images at E, K, MH, NY, P, PBL, PE, the collected plant material was identified as *Asarum cordifolium* C.E.C.Fisch. This species was described by Fischer (1930) based on the collections of F. Kingdon-Ward from Myanmar in 1926 and the Delei Hills, Arunachal Pradesh in 1928. In a treatment of the family Aristolochiaceae, Giri *et al.* (2009) reported

only *A. himalaicum* Hook.f. & Thomson ex Klotzsch from Arunachal Pradesh. However, Mishra and Sanjappa (2020) included the species in their treatment based on the collections of Kingdon-Ward. This species has also been reported from Bangladesh and Vietnam (Nguyen *et al.*, 2012; Pasha and Uddin, 2013). But the species was never collected from India after the type collections. Therefore, the present collection from Arunachal Pradesh constitutes the first from India after F. Kingdon-Ward. After Fischer's contribution, no thorough description of the plant exists in the Indian literature, hence, further detailed account is provided here.

## Taxonomic Treatment

***Asarum cordifolium*** C.E.C. Fischer, Bull. Misc. Inform. Kew 1930(6): 241. 1930. *Lectotype* (designated here): INDIA, **Arunachal Pradesh**, Delei Valley, 3000–4000 ft., 23.04.1928, F. Kingdon-Ward 8123 (K [K000634499 digital image!]; *Isolecto* CAL [CAL0000020772!]. *Residual syntypes*: MYANMAR, Mali-Nam, Tamai Divide, 3000–4000 ft., 28.04.1926, F. Kingdon-Ward 6661 (K [K000634500 digital image!]). **Figs. 1 & 2**

Annual, rhizomatous herbs; rhizomes horizontal or vertical; stems 15–20 cm tall, internodes 0.5–1 cm long, with densely white pilose. Cataphylls 2–2.5 cm long, sparsely hairy. Leaves 3–4, coetaneous with the fleshy dark olive flowers; lamina ovate, 7–11 × 7.5–12 cm, cordate with two basal lobes, lobes rounded, sinus narrow, 1.5–2 × 3–4 cm, slightly undulate at margins, acute to acuminate

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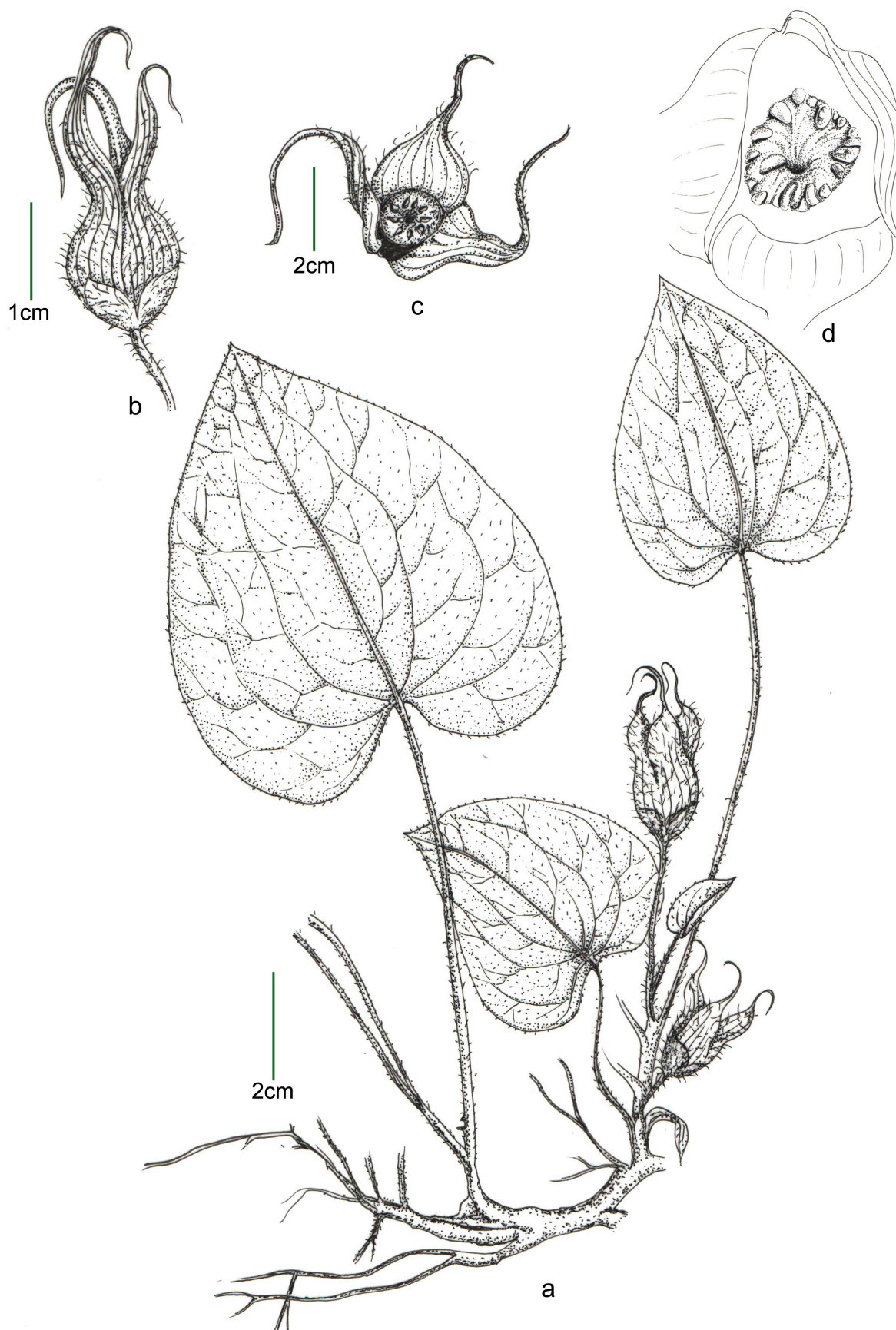
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at apex, sparsely puberulous, minutely pellucid-dotted, palmately 7-veined; veins reticulating to form areolas with included T-shaped free venules,

veins and veinlets crisped hairy on both surfaces; petioles 6–14 cm long, densely white, puberulous. Flowers radical, solitary, pubescent with stellate



Fig. 1. *Asarum cordifolium* C.E.C.Fisch.: a. Habit; b. Cataphyll; c. Flower; d. Flower—top view showing stamens and pistils.



**Fig. 2.** *Asarum cordifolium* C.E.C. Fisch.: **a.** Habit; **b.** Flower; **c.** Flower–top view; **d.** Flower–top view showing stamens and pistils.

hairs outside, glabrous inside; pedicels 0.5–4 cm long, densely pubescent with white hairs. Perianth campanulate, 3-lobed; lobes triangular to lanceolate with caudate tips, fused to form a tube, free above, c. 3 cm long, including the 6–7 mm long filiform puberulous tail, olive green to purple; Stamens 12; filaments 4–5 mm long; anthers red-purple, as long as filaments, slightly dilated below; connectives shortly produced. Ovary semi-inferior, 6-celled, apocarpous; styles 6, united into a conical column, free at apex. Capsules fleshy, with persistent calyx tube.

*Flowering and Fruiting:* Flowering and Fruiting from April to July.

*Distribution:* India: Arunachal Pradesh; Bangladesh, Myanmar and Vietnam.

*Habitat & ecology:* The species grows in a moist habitat at 30–45° C in a gentle slope, between 1000–1500 m, along small streams in association with *Ficus semicordata* Buch.-Ham. ex Sm., *Ficus chartacea* (Wall. ex Kurz) Wall. ex King, *Ficus filicauda* Hand.-Mazz., *Saurauia roxburghii* Wall., *Melastoma malabathricum* subsp. *normale* (D. Don) Karst. Mey, *Alpinia nigra* (Gaertn.) Burt, *Musa acuminata* Colla, *Trevesia palmata* (Roxb. ex Lindl.) Vis., and *Strobilanthes paniculata* (Nees) Miq.

*Specimen examined:* INDIA, **Arunachal Pradesh**, East Kameng, Seppa, Tara View Point, 27°18'30.4"N, 93°03'46.1"E, 1230 m, 14.04.2018, U.L. Tiwari 40540 (CAL [CAL0000266933]); East Kameng, Chiyang Tajo, Dorpu Bagang, 27°34'38.3"N, 93°09'16.8"E, 1368 m, 04.04.2019, U.L. Tiwari 40889 (CAL [CAL0000266932]); MYANMAR, *s.l., s.d., Vernay & Cutting s.n.* (E [E166 E00973830 digital image!]); **Hatawgaw**, 4000 ft., 27.12.1938, *F. Kingdon-Ward* 166 (NY [NYBG02649469 digital image!]).

*Notes:* Fischer (1930) described *Asarum cordifolium* based on the collections of F. Kingdon-Ward from India and Myanmar and cited F. Kingdon-Ward 8123 as type in the protologue. Two sheets of F. Kingdon-Ward 8123 were traced, one each at CAL

and K which are deemed syntypes under the article 9.10 of Shenzhen code (Turland *et al.*, 2018). Among these, the specimen K000634499 with detailed information on morphology and its collection, is designated here as lectotype conforming to the provisions of Shenzhen Code (Turland *et al.*, 2018).

*Conservation status:* So far, the species is distributed in Bangladesh, India, Myanmar and Vietnam and known from seven collections having seven subpopulations. India has three populations in Arunachal Pradesh, Myanmar has two populations and one in Vietnam and Bangladesh. There are two subpopulations with 12 and 15 individuals at each location in East Kameng district, Arunachal Pradesh and no information is available on other subpopulations. In North East India shifting (Jhum) cultivation is a common practice due to which it leads to habitat loss or increase in population of invasive species or soil degradation and by which the population of this species may get extinct from existing localities. Location available on GBIF were also used to find out the extent of occurrence of species. Overall, seven populations were identified and these points are plotted on map and the extent of occurrence (EOO) and Area of occupancy (AOO) were calculated as 5,08,079.19 km<sup>2</sup> and 28 km<sup>2</sup> respectively by using GeoCAT (Bachman *et al.*, 2011) (Fig. 3) based on a cell area of 4 km<sup>2</sup>. While the EOO exceeds the threshold value for the threatened category under criteria B, the AOO qualifies for Endangered under Criteria B2. The population of the species is severely fragmented and only found in 7 subpopulations, individuals of species are continuously declining and inferred in area of occupancy and number of locations. Based on the present observations it can be provisionally assessed as 'Endangered' [EN B2ab(ii,iv)] as per the IUCN Red List Categories and Criteria (IUCN 2012; 2019).

### Key to the species of *Asarum* in India

- 1a. Plants with 3–4 leaves; cataphylls present; perianth with long filiform cauda.... *A. cordifolium*
- 1b. Plants with single leaf; cataphylls absent; perianth without any cauda ..... *A. himalaicum*

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