



# *Isotrema cangyuanense*, a new species of Aristolochiaceae from Yunnan, China

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**ABSTRACT:** *Isotrema cangyuanense*, a new species from Cangyuan, Yunnan, China, is described and illustrated. This species is morphologically similar to *I. kunmingense* in the shape of leaf blade and calyx, but clearly differs in its epidermal hair of leaf blade, the colour of calyx tube and throat, the surface texture of calyx limb. Photographs and a comparison table of related species are provided.

**KEY WORDS:** *Aristolochia*, Flora of Yunnan, *Isotrema kunmingense*, *Isotrema moupinense*, new species, China.

## INTRODUCTION

Traditionally, the genus *Aristolochia* L. *sensu lato* is the largest genus of the family Aristolochiaceae comprises about 600 species, and widely distributes in tropical, subtropical and temperate regions of the world (Hwang, 2003; González, 2012; Zhu *et al.*, 2019a,b,c). Some researchers suggested that *Aristolochia sensu lato* was a single genus, and it was classified into three subgenera: subgen. *Aristolochia*, subgen. *Pararistolochia* (Hutch. & Dalziel) Schmidt and subgen. *Siphisia* (Duch.) Schmidt (Wanke *et al.*, 2006; Do *et al.*, 2015). Others thought that *Aristolochia sensu lato* should be classified into two subtribes and four genera: subtrib. Aristolochiinae comprises *Aristolochia* and *Pararistolochia* Hutch. & Dalziel, subtrib. Isotrematinae Huber comprises *Endodeca* Raf. and *Isotrema* Raf. (Huber, 1993; Zhu *et al.*, 2019b,c; Lu *et al.*, 2022). According to recent morphological and phylogenetic studies, *Aristolochia* subgen. *Siphisia* was reinstated as an independent genus *Isotrema* Raf. Herein, with the inclusion of the traditional *Isotrema* and *Endodeca* (Zhu *et al.*, 2019b,c). The key characters of *Isotrema* are calyx tubes strongly curved, gynostemium 3-lobed, anthers adnate in pairs to the base of gynostemium, and capsules basipetally dehiscent (Zhu *et al.*, 2019b; Huang *et al.*, 2022).

During botanical exploration in the Menglai Grand Canyon, Cangyuan County, Yunnan Province, southwest of China, an unknown species of *Isotrema* was collected, which the adaxial leaf surface is densely villous, the inside of calyx tube has dark reddish-brown papillae in upper portion, the calyx throat and adaxial surface of calyx limb are brownish, with densely dark reddish-brown papillae. After literature review as well as morphological examination, we confirm that it represents a new species and report it below.

## TAXONOMIC TREATMENT

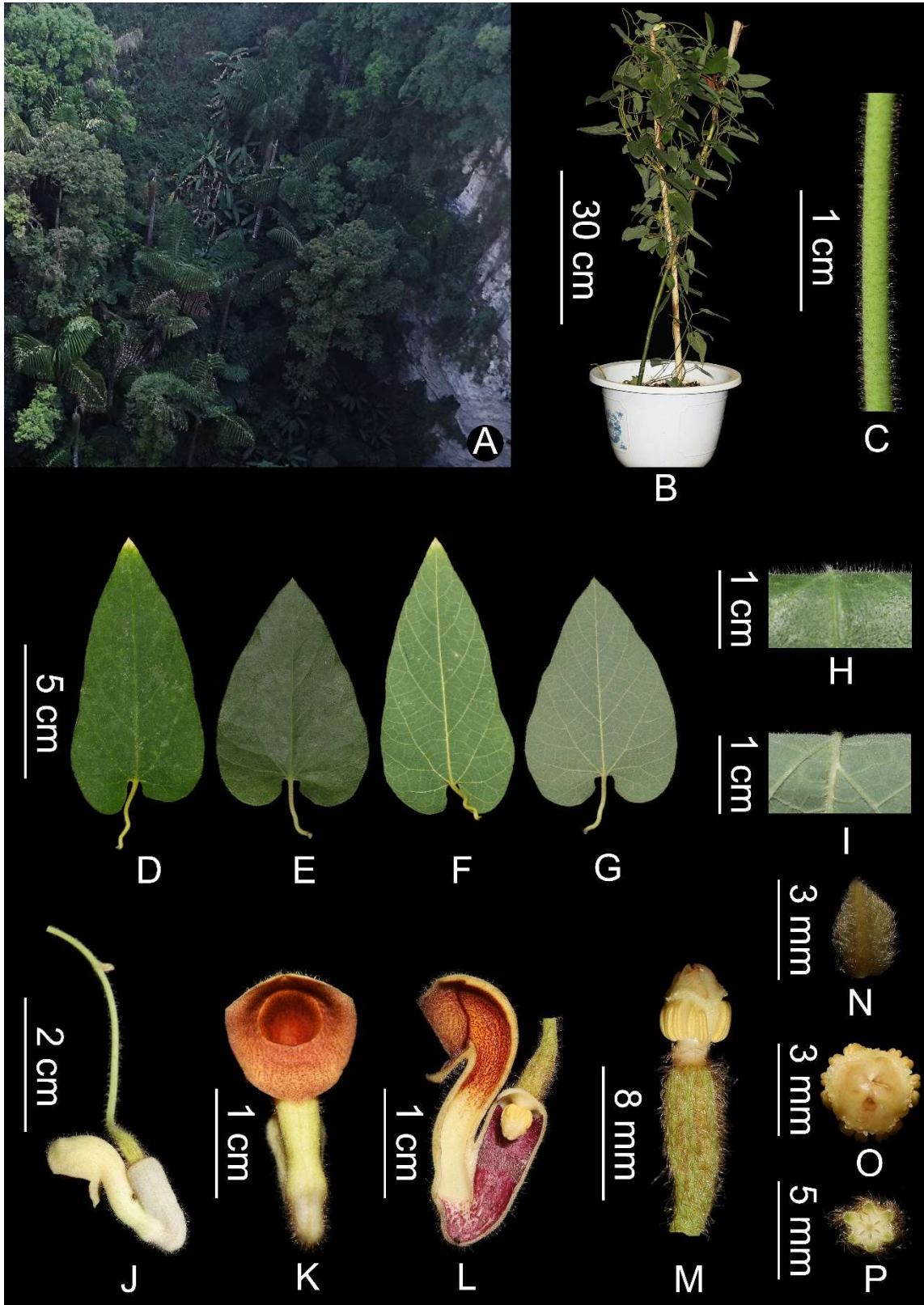
*Isotrema cangyuanense* X. D. Ma & J. Y. Shen, *sp. nov.*

**Fig. 1**

**Type:** CHINA, Yunnan Province, Cangyuan County, Menglai Township, Sigangli, limestone forest, twining around branches in the thickets, 23°19'N, 99°19'E, alt. 1204 m, the vouchers from a cultivated plant at Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, 10 October 2022, *Xing-da Ma & Jian-yong Shen 1255* (holotype: HITBC; isotype: KUN).

**Diagnosis:** This species is morphologically similar to *Isotrema kunmingense* and *I. moupinense*, but easily distinguished by its densely villous leaf blade; utricle 1.5–1.8 cm long; the inner surface of tube is yellowish white in the lower portion, brownish with densely dark reddish-brown papillae in the upper portion; throat brownish with densely dark reddish-brown papillae, ca. 6 mm in diameter; limb 1–1.3 cm in diameter, the adaxial surface brownish with densely dark reddish-brown papillae.

Perennial, woody liana. Stem terete, up to 2.5 m long; young branches greenish, densely villous, becoming glabrescent; bark corky and with irregular longitudinal fissures. Leaves alternate; petiole terete, 2–3 cm long, ca. 1.5 mm in diameter, densely light rusty villous; leaf blade ovate-cordate or oblong-ovate, 8–10 × 4.5–6 cm, subcoriaceous, densely villous, adaxially green, abaxially pale green, base deeply cordate, apex acuminate, margin entire, ciliate; basal veins 5–7, palmate, secondary veins 4–5 pairs, pinnate, tertiary veins coarsely reticulate, adaxially flat, abaxially prominent. Flower solitary, axillary; pedicel 4.5–5 cm long, ca. 1 mm in diameter, densely brownish villous, with a bractlet on the middle part of pedicel; bractlet ovate, ca. 3 × 2 mm, brownish, apex acuminate, densely brownish villous. Calyx geniculately curved, outside white to yellowish and densely yellowish to brownish villous; utricle distinct from the tube, 1.5–1.8 cm long, ca. 6 mm in diameter,



**Fig. 1.** Illustration of *Isotrema cangyuanense*. **A:** Habitat. **B:** Plants. **C:** Young branch. **D–E:** Adaxial leaf surfaces. **F–G:** Abaxial leaf surfaces. **H:** Adaxial leaf surface enlarged. **I:** Abaxial leaf surface enlarged. **J:** Side view of flower. **K:** Front view of calyx. **L:** Half dissected calyx tube, showing the color and villous of the interior. **M:** Gynostemium and ovary. **N:** Abaxial surface of bractlet. **O:** Top view of gynostemium. **P:** Cross section of ovary.

**Table 1.** Comparison of *Isotrema cangyuanense*, *I. kunmingense* and *I. moupinense*.

Characters	<i>I. cangyuanense</i>	<i>I. kunmingense</i>	<i>I. moupinense</i>
Leaf surface	Both surfaces densely villous	adaxially glabrous, abaxially pubescent or glabrous	adaxially sparsely gray strigose, abaxially densely gray-yellow villous
Utricle	1.5–1.8 cm long, inside dark purple	2–3 cm long, inside dark purple	ca. 3 cm long, inside dark purple in the lower portion, yellowish with purple stripes or patches in the upper portion
Tube	inside brownish with densely dark reddish-brown papillae in the upper portion	inside getting yellow in the upper portion	inside getting yellow in the upper portion
Calyx throat	brownish with densely dark reddish-brown papillae, ca. 6 mm in diameter	yellow, ca. 5 mm in diameter	yellow, 8–11 mm in diameter
Calyx limb	1–1.3 cm in diameter, adaxial surface brownish with densely dark reddish-brown papillae	ca. 1 cm in diameter, adaxial surface dark red	2–2.5 cm in diameter, adaxial surface yellow to dark red, sometimes yellow with red spots

inside dark purple, densely villous at base; tube 1.6–1.8 cm long, ca. 5 mm in diameter, inside yellowish white in the lower portion, brownish with densely dark reddish-brown papillae in the upper portion; limb discoid, 1–1.3 cm in diameter, outer surface yellowish and densely brownish villous, inner surface brownish with densely dark reddish-brown papillae, shallowly 3-lobed, lobes broadly triangular; throat roughly circular, brownish with densely dark reddish-brown papillae, ca. 6 mm in diameter. Gynostemium 4–5 mm long, 3–3.2 mm in diameter, apex 3-lobed, lobes acute; anthers 6, oblong, yellow, ca. 2 mm long, adnate in pairs to the base of gynostemium. Ovary oblong, 6-angled, 7–9 mm long, ca. 2.5 mm in diameter, densely brown villous, 6-loculed, carpels connate. Capsule not seen.

**Phenology:** Flowers were observed in October.

**Etymology:** This new species is named after the type locality, Cangyuan County.

**Distribution and habitat:** *Isotrema cangyuanense* is currently known only from Sigangli Village, Menglai Township, Cangyuan County, Yunnan Province, China, grows in limestone forest at ca. 1200 m high elevation, on the southern slope, and the soil type is red soil. The dominant species in the area included *Castanopsis echidnocarpa* Miq., *Sterculia villosa* Roxb., *Alphonsea hainanensis* Merr. et Chun and *Caryota obtusa* Griffith.

**Conservation assessment:** Although field investigations have been conducted in the Menglai Grand Canyon (Menglai Township, Cangyuan County, Yunnan Province, China) five times from 2019 to 2022, only one subpopulation of *Isotrema cangyuanense* and less than 50 individuals were found. As a new species, however, field surveys are still limited. It is probable that more subpopulations should be found in similar habitats in this region and around areas. According to the IUCN Red List Categories and Criteria (IUCN, 2022), the new species should be assessed as ‘Data Deficient’ (DD) based on current data. Nevertheless, as a famous tourist destination, a large number of tourists often visit the Sigangli Cave (the type locality), and the local villagers often cut firewood on the hillside, inevitably damaging the habitat of this new species. This subpopulation should be protected as soon as possible.

**Note:** *Isotrema cangyuanense* is morphologically similar to *I. kunmingense*, but clearly differs in that both surfaces of leaf blade are densely villous (vs. adaxially glabrous, abaxially pubescent or glabrous); the inner surface of tube brownish, with densely dark reddish-brown papillae in the upper portion (vs. yellow, without papillae); throat brownish with densely dark reddish-brown papillae (vs. yellow, without papillae); the adaxial surface of limb is brownish with densely dark reddish-brown papillae (vs. dark red). The new species is also similar to *I. moupinense*, but easily distinguished by its both surface of densely villous leaf blade (vs. adaxially sparsely gray strigose, abaxially densely villous); shorter utricle (1.5–1.8 cm vs. ca. 3 cm); the inner surface of tube brownish, with densely dark reddish-brown papillae in the upper portion (vs. yellow, without papillae); throat brownish, with densely dark reddish-brown papillae, ca. 6 mm in diameter (vs. yellow, 8–11 mm in diameter, without papillae); limb 1–1.3 cm in diameter, the adaxial surface brownish with densely dark reddish-brown papillae (vs. 2–2.5 cm in diameter, the adaxial surface yellow to dark red, sometimes yellow with red spots). A comparison with two related species is also provided (Table 1).

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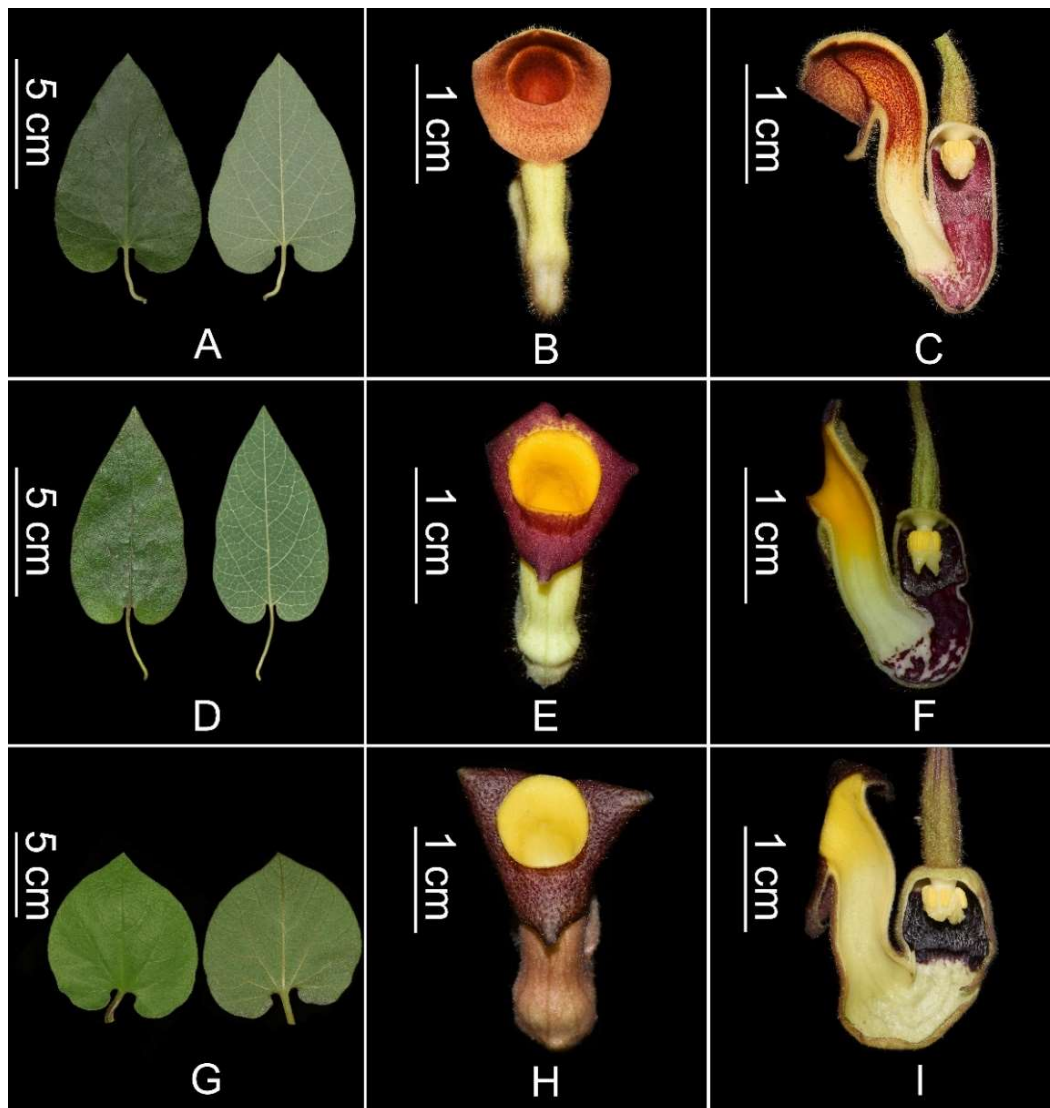


Fig. 2. Morphological comparisons of the leaves and flowers of *Isotrema cangyuanense* (A–C), *I. kunmingense* (D–F) and *I. moupinense* (G–I).