



## *Begonia erythrofolia*, a new species of Begoniaceae from southeastern Yunnan, China

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**ABSTRACT:** *Begonia erythrofolia*, a new species of *Begonia* sect. *Platycentrum* (Begoniaceae) from Yunnan, China is described and illustrated. Morphologically, it is most similar to *B. dielsiana* and *B. edulis*, but differs in having broadly ovate leaves which are undivided or shallowly triangular lobed, crimson on the abaxial leaf surface, and more veins in the lamina. The new species also resembles *B. subhowii* in its similar leaf shape and in having erect stems when flowering, but differs in its larger leaf size, and smaller bracts and flowers.

**KEY WORDS:** *Begonia daweshanensis*, *B. dielsiana*, *B. edulis*, *B. siamensis*, *B. subhowii*, flora of Yunnan, new taxon, taxonomy.

## INTRODUCTION

The pantropical genus *Begonia* L. (Begoniaceae) is the fifth largest genus of the flowering plants, comprises 2052 species (Hughes *et al.*, 2015–Present), and is distributed worldwide in the tropics and subtropics (Chen *et al.* 2018). The genus level sectional classification was revised by Doorenbos *et al.* (1998) according to 62 morphological features and divided into 63 sections. Moonlight *et al.* (2018) utilized 3 plastid sequences and morphological features and recognized 70 sections, subsequently Shui *et al.* (2019) based on molecular evidence together with morphology, geography and ecology divided the genus into 14 subgenera and 48 sections. In China, the number of *Begonia* species is currently up to 241 (Chen *et al.*, 2021; Ding *et al.*, 2020; Feng *et al.*, 2021a, b; Guo *et al.*, 2021; Tian *et al.*, 2020, 2021a, b, c; Tu *et al.*, 2020; Wang *et al.*, 2020), mainly distributed in Yunnan and Guangxi regions, and many new taxa remain to be discovered and described (Tian *et al.*, 2018).

In March 2019, during field investigations in the karst region of southeastern Yunnan, China, an unknown species of *Begonia* without flowers attracted the attention of the authors. After tracking the phenology of the species, it was found in bloom at the end of July, 2019. This potential new species belongs to *Begonia* sect. *Platycentrum*, characterised by a rhizomatous habit with upright stems, staminate flower with 4 tepals and, pistillate flower with 5 tepals, ovary with three very unequal wings, two locules and axile placentae. *Begonia* sect. *Platycentrum* is the second largest section in Asia, currently containing 230 species (Aung *et al.*, 2020; Chen *et al.*, 2019; Feng *et al.*, 2021a, b; Guo *et al.*, 2021;

Hughes *et al.*, 2019; Krishna *et al.*, 2021; Lanorsavanh *et al.*, 2020; Lin *et al.*, 2021; Maw *et al.*, 2020, 2021; Shui *et al.*, 2019; Souvannakhoummane *et al.*, 2020; Taram *et al.*, 2021; Tian *et al.*, 2020, 2021a, b; Van *et al.*, 2020; Wahlsteen, 2018, 2019; Wang *et al.*, 2019a, b), including all species previously put into *B.* sect. *Sphenanthera*, *B.* sect. *Monopteron*, *B.* sect. *Monolobium* and the rhizomatous species in *B.* sect. *Diplocinium*, distributed from Bhutan, India, Nepal, China to Indo-China, Malaysia and Indonesia.

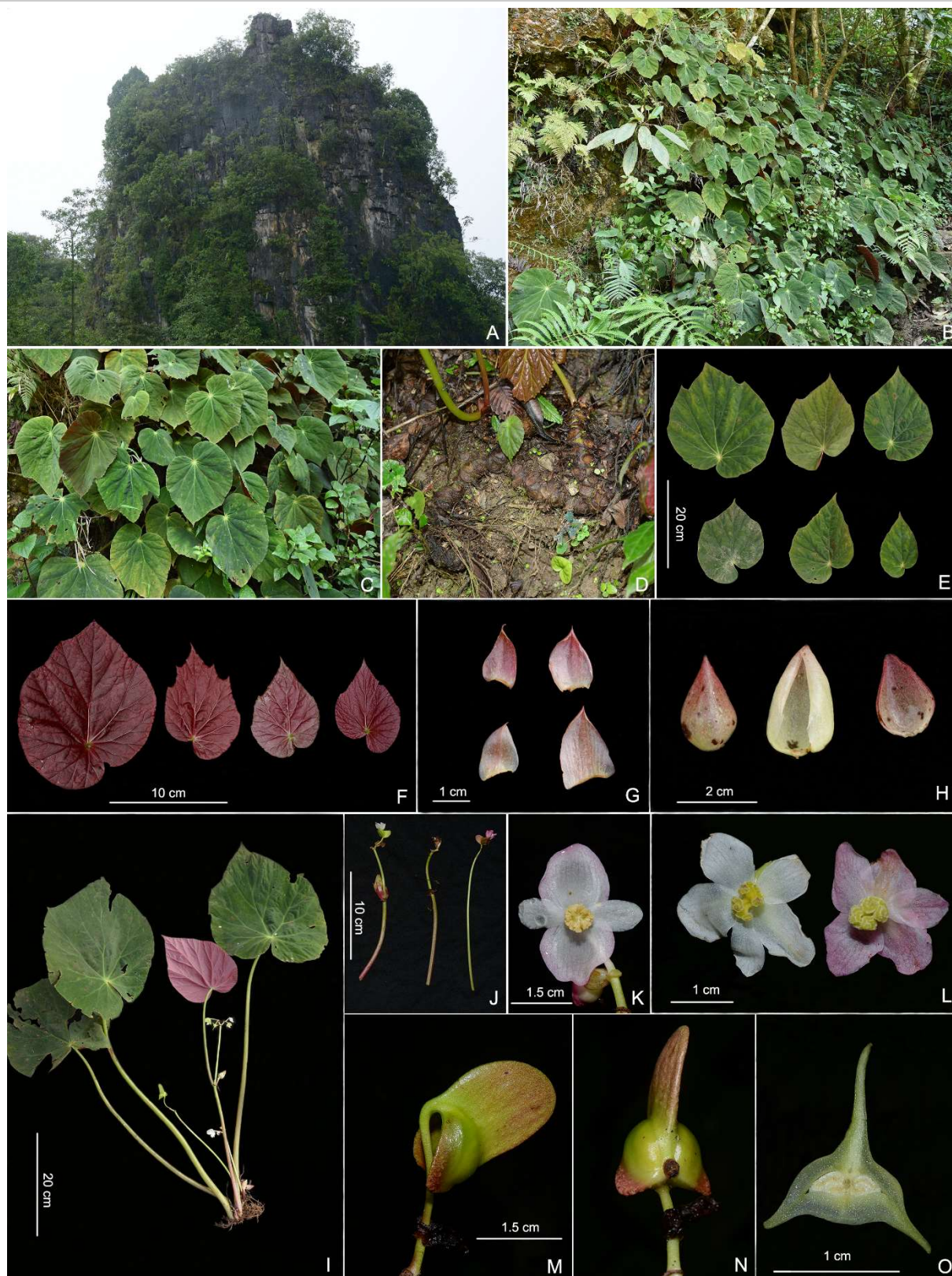
After careful examination of relevant herbarium specimens and literature of the genus *Begonia* within the adjacent region, we concluded that this plant represents a new species to science. Here, the new species *Begonia erythrofolia* Lei Cai, D.M.He & W.G.Wang is described and illustrated, and its morphological characters are compared with the closely related morphologically similar species *B. daweshanensis* S.H.Huang & Y.M.Shui (Huang and Shui, 1994), *B. dielsiana* E.Pritz. (Diels, 1900), *B. edulis* Levl. (Léveillé, 1909), *B. siamensis* Gagnep. (Gagnepain, 1919) and *B. subhowii* S.H.Huang (Shui and Huang, 1999) in table 1.

## TAXONOMIC TREATMENT

*Begonia erythrofolia* Lei Cai, D.M.He & W.G.Wang, *sp. nov.* 红背秋海棠 Fig. 1

**Type:** CHINA. Yunnan Province, Wenshan City, Xinjie Town, Caoguoshan Village, Qiqiutian, 23°06'N, 103°57'E, elev. 1390 m, growing in rocky crevices under limestone forest, 29 July 2020, Lei Cai & De-Ming He, HDM1173 (holotype: KUN!, isotypes: KUN!).

**Diagnosis:** The new species is mostly similar to *Begonia dielsiana*, *B. edulis* and *B. subhowii* in having



**Fig. 1.** Habitat and morphology of *Begonia erythrofolia* Lei Cai, D.M.He & W.G.Wang, sp. nov. **A.** Habitat; **B, C.** Habit; **D.** Rhizome; **E.** Leaf shape and size; **F.** Leaf shape and deep red color on abaxial surface; **G.** Stipules; **H.** Bracts; **I.** Blooming mature individual; **J.** Inflorescences; **K.** Front view of the staminate flower; **L.** Pistillate flowers, showing different colors; **M, N.** Fruits; **O.** Cross section of an immature capsule showing placenta.

**Table 1.** Comparison of *Begonia erythrofolia* with *B. edulis*, *B. daweishanensis*, *B. dielsiana*, *B. siamensis* and *B. subhowii*.

Characters	<i>B. erythrofolia</i>	<i>B. edulis</i>	<i>B. daweishanensis</i>	<i>B. dielsiana</i>	<i>B. siamensis</i>	<i>B. subhowii</i>
Plant height (cm)	16–60	30–150	ca. 30	15–70	20–90	13–28
Leaf abaxial colour	red	dark green or occasionally red	green	light-green	light green	light-green
Leaf shape	broadly ovate, undivided or with 3 shallowly lobed	orbicular or oblate-orbicular, 5–13 shallowly lobed, divided to ca. 1/3 of leaf length	ovate, very shallowly lobed	broadly oblong-ovate, 5–10 shallowly divided	ovate, rarely lanceolate-elliptic, very shallowly lobed	obliquely ovate, undivided or with 3 very shallowly lobed
Blade size (cm)	12–30 × 8–25	12.8–43 × 14.5–40	8–12 × 7–10	9–31 × 7–22	10–18 × 7–20	4.5–9 × 10–11
Leaf abaxial surface	velvety, glabrous	membranous, subglabrous or sparsely hairy	slightly corrugate, puberulous	membranous, glabrous	waxy, densely brown pubescent	waxy, glabrous
Petiole	glabrous	glabrous to subglabrous	densely pubescent	glabrous to subglabrous	densely brown pubescent	glabrous
Staminate flower	pedicels and tepals glabrous	pedicels and tepals glabrous	pedicels and outer tepals puberulous	pedicels and tepals glabrous	pedicels with brown villous hairs, tepals glabrous	pedicels and tepals glabrous
Pistillate flower corolla size (mm)	21–28	18–28	ca. 36	40–50	ca. 40	ca. 37
Ovary	glabrous	glabrous	puberulous	glabrous	densely brown tomentose	glabrous

similar leaf shape and with erect stems when flowering, but differs from *B. dielsiana* in having leaves undivided or with 3 very shallow lobes (vs. 5–10 lobes shallowly divided), smaller pistillate flowers (21–28 mm vs. 40–50 mm in diameter), the number of pistillate tepals (5 vs. 6, rarely 5) and the color of the lower surface of leaf blade (dark red vs. green); differs from *B. edulis* in being a shorter plant (16–60 cm vs. 30–150 cm) with smaller leaves (12–30 × 8–25 cm vs. 12.8–43 × 14.5–40), blade undivided or with 3 very shallow lobes (vs. 5–13 shallowly lobed, divided to ca. 1/3 of leaf length); differs from *B. subhowii* in being a larger plant (16–60 cm vs. 13–28 cm) with leaf blades 12–30 × 8–25 cm (vs. 4.5–9 × 10–11 cm), and smaller bracts (18–26.7 mm vs. ca. 50 mm), and the color of leaf blade (upper surface dark-green, abaxially red vs. green on both sides).

Herb rhizomatous, perennial, 16–60 cm tall. Rhizome, short, 9–25 cm long, 4–8 mm internode, 10–30 mm thick. **Stipule** pink, triangular, 14–22 × 11–14 mm, glabrous on both surfaces, margin entire, apex cuspidate (1–2 mm), persistent; **Leaves** 2–6 per plant, mostly basal. **Petiole** green or red, cylindrical, glabrous, 15–45 cm long, 5–12 mm thick. **Blade** broadly ovate, undivided or very shallowly 3-lobed, 12–30 cm long, 8–25 cm wide, basal lobes 1.4–6.4 cm long, adaxial surface dark green, sparsely hairy when young, glabrous when mature, abaxial surface deep red, glabrous; base oblique, cordate, margin slightly denticulate; venation palmate, 8–12 veined, adaxial slightly impressed, abaxial distinctly prominent. **Inflorescences** 1–6, cymose, monoecious, basal or occasionally terminal on short stem with 1–2 internodes, 8–20 cm long. Primary peduncle green or pinkish, glabrous, 6–15 cm long, 2–4 mm in diameter. **Flowers** 5–12 per inflorescence, protandrous. **Bracts** pale red, ovate-triangular, deciduous, glabrous, 18–27 mm long, 24–36 mm wide, margin entire. **Staminate**

**flower:** pedicel pale green or white, glabrous, 14.7–16 mm long, 1.4–1.8 mm in diameter; corolla 27–30 × 24–33 mm; tepals 4, outer 2 larger, white, broadly ovate, 13–17 × 12–21 mm, stripes distinct on adaxial surface, glabrous, apex rounded; inner 2 smaller, white, obovate, 12–16 × 5–9 mm, stripes distinct. **Androecium** ca. 6 mm long, ca. 7 mm in diameter; stamens 116–123, filaments ca. 2 mm long, 0.3 mm thick, upper 2/3 free, lower 1/3 fused; anthers yellow, obovate, nearly 2 mm long, ca. 1 mm thick, apex obtuse. **Pistillate flower:** pedicel pale green or white, glabrous, 13–29 mm long, ca. 1 mm in diameter; corolla 22–28 × 21–27 mm; tepals 5, ovate, glabrous, white or pinkish, 8–11 × 4–6 mm, inner smaller, stripes distinct on adaxial surface. **Styles** 2, free, ca. 3 mm long; stigmas 2, golden yellow, U-shaped, ca. 2 mm long, 2 circles spiraled. **Ovary** green, glabrous, 2-loculed, placentae axile, bifid. **Capsule** nodding, ovoid, glabrous, unequally 3-winged; abaxial wing nearly ligulate, 16–18 × 16–17 mm; lateral wings shorter, 4–5 × 15–17 mm. Seeds numerous, brown, ellipsoid, ovoid.

**Etymology:** The epithet “*erythrofolia*” is derived from two Latin words “erythro” meaning “red colored” and “folia” meaning “leaves” referring to its leaves which are dark red on the abaxial surface.

**Phenology:** The plants bloom between July and August, the fruits ripen from September to November.

**Distribution and ecology:** *Begonia erythrofolia* is endemic to China, currently known only from the type locality in karst region of Yunnan Province, Wenshan City, Xinjie Town, Caoguoshan Village, Qiqitian. The species grows in humid rocky crevices under limestone forest.

**Conservation status:** Data Deficient (DD). This new species is restricted to karst limestone and known only from the type locality in Wenshan City. Further exploration is required to assess the species’ current range (IUCN, 2019).



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