



Two new species of Begoniaceae from China mainland

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ABSTRACT: China has an exceptional diversity in *Begonia*, holding the second largest number of described species in this genus at the national level. Many new taxa need to be explored and described. This paper reports two new species, *Begonia ruchengensis* (*B. sect. Reichenheimia*) and *B. auritalata* (*B. sect. Platycentrum*), from Hunan province and Guizhou province, respectively. Besides the detailed morphology description, color illustrations, and line drawings, the diagnoses of these two species distinguished from their allied taxa are provided. Their conservation statuses are evaluated according to The Guidelines for Using the IUCN Red List Categories.

KEY WORDS: *Begonia ruchengensis*, *Begonia auritalata*, new taxa, taxonomy, flora of China, morphology, conservation.

INTRODUCTION

Begonia L. (Begoniaceae) is a mega-diverse genus with 2133 accepted species (Hughes *et al.*, 2015–Present). It is widely distributed in the tropical and subtropical regions of Asia, America and Africa. China has an exceptional diversity in *Begonia* with 261 accepted species (data to December 31, 2023), the second largest number of species described in this genus at the national level (communicated with Dr. Mark Hughes). In the past three years, some new species have been described (Tian *et al.*, 2020, 2021a,b,c,d, 2022; Dong *et al.*, 2021; Feng *et al.*, 2021a,b, 2022, 2023; Guo *et al.*, 2021; Cai *et al.*, 2022; Ding *et al.*, 2022, 2023) and more new taxa are waiting for further exploration and description. Here, we report two new *Begonia* species in China, *Begonia ruchengensis* D.K.Tian (*B. sect. Reichenheimia*) from southeastern Hunan, and *B. auritalata* D.K.Tian & H.J.Wei (*B. sect. Platycentrum*) from southern Guizhou.

TAXONOMIC TREATMENT

Begonia ruchengensis D.K.Tian, *sp. nov.*
(sect. *Reichenheimia*)

汝城秋海棠 (rǔ chéng qiū hǎi táng) Figs. 1–3

Type: CHINA. Hunan province, Rucheng county, Jiulongjiang Forest Park, 25°26'16.41"N, 113°48'12.29"E, elev. 480 m, (Fig. 4), growing usually on mossy rock surface or in rocky crevices under secondary forest, 27 July 2022, Daike Tian, Lei Wu, Cunzhong Huang & Xiaojun Sun TDK4970 (holotype: CSH0200330, CSH!; isotypes: CSH!).

Diagnosis: This new species is mostly similar to *B. fimbriatipula* Hance in similar plant size, leaf shape, leaf hairs, and morphology of flowers and fruits, but differs mainly in its thickly unillamellate (vs. thinly bilamellate) placentae of the ovary, later (Jun.–Oct. vs. Apr.–Jun.) flowering time, and smaller flower size (5–11 × 5–10 mm vs. 8–15 × 8–12 mm outer tepals of staminate flower).

Description: **Herb** deciduous perennial; tubers spherical, 5–10 mm in diameter, 2–5 connected, arranged in a straight line or irregularly, white from the current year, red from the previous years; aerial stem absent or occasionally very short. **Leaf:** solitary; petiole green or red, ungrooved, 0.7–6.5 cm long, 1–2 mm thick, white or red pubescent; blade slightly asymmetric to rarely near symmetrical, broadly ovate-cordate, occasionally long-ovate to lanceolate, rarely elliptic, 3.2–20 × 2.7–15 cm, wide side 1.4–9.5 cm, narrow side 1.3–7.5 cm, basal lobe 0.1–6 cm downward extended; adaxial surface mostly green, rarely dark red, densely covered by short pubescence; abaxially light green, rarely purple-red, sparsely pubescent along the veins, pubescence more and longer on the main veins; apex acute, rarely blunt; base slightly oblique to rarely near symmetrical, cordate, occasionally near blunt; margin unequally triangularly serrated, with cilia up to 1 mm long; venation palmate, veins 7 or 8, abaxial veins slightly impressed, abaxially obviously raised; **Inflorescence** 1, occasionally 2, dichasial cyme, 3–15 cm long, branched 0–3 times, 1–35 flowers per inflorescence; peduncle 2.2–9.5 cm long, 0.6–3 mm thick, red or pink, glabrous. **Bract** red or green, membranous, glabrous, narrowly triangular, small, 1–3 × 0.4–2 mm; apex acuminate. **Staminate flower:** 10–21 ×

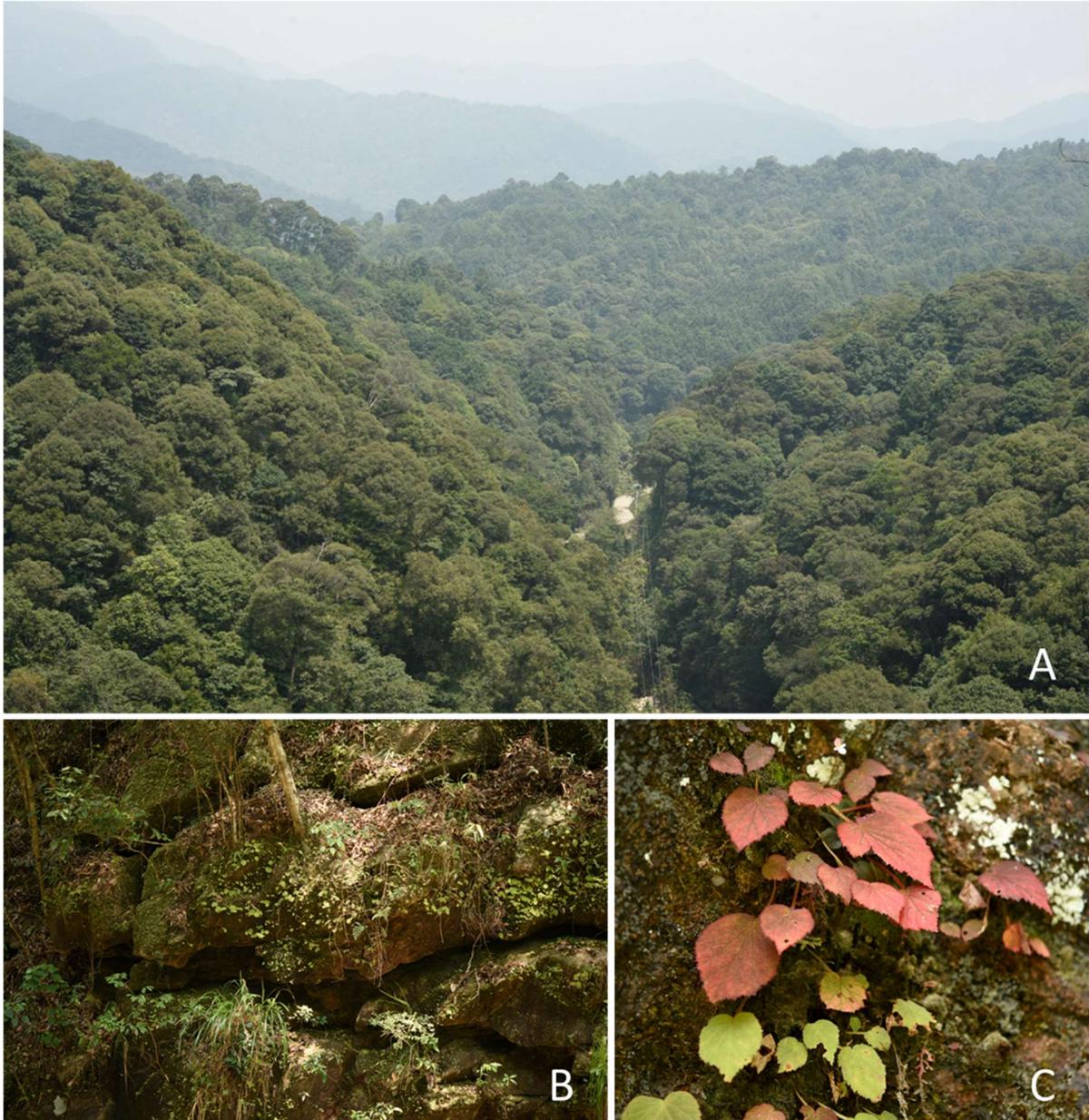


Fig. 1. Habitat and habit of *Begonia ruchengensis* **A.** Habitat; **B.** Habit; **C.** Plants growing on rock surface and rock crevices. (Photos by Daike Tian)

10–20 mm; tepals 4, pink, glabrous; outer 2, ovate to oval, 5–11 × 5–10 mm, apex blunt, longitudinal veins clear; inner 2 slightly lighter in color than outer ones, oblanceolate, 5–10 × 2–3 mm, apex rounded, base wedged; androecium capitate, 1.5–2.5 × 2 mm; stamens 10–30; filament ca. 0.3 mm long, base-fused column 0.5–1 mm long; anther yellow, obovate-cuneate, ca. 0.5 mm long, apex blunt; pedicel pink, glabrous, 8–14 mm long, 0.5–0.8 mm thick. **Pistillate flower:** 10–15 × 10–12 mm; tepals 3, pink, glabrous; outer 2 broadly ovoid to nearly oblate, 5–7.5 × 6–8 mm; inner 1, obovate-lanceolate, 5–7 × 2–3 mm, base wedged; ovary green or pink, glabrous, 3-loculed; placentae axile, thick unilamellate; styles 3,

free, ca. 1–2 mm long; stigma 3–5 mm in diameter, spiraled nearly in 2 turns; pedicel pink, glabrous, 12–22 mm long, ca. 0.8 mm thick. **Fruit:** stalk pink, glabrous, 12–23 mm long, 0.6–1 mm thick; capsule pink or greenish pink, glabrous, ellipsoid, ca. 7–9 × 5–8 mm, unequally 3-winged, wings pink, larger one asymmetrically triangular, 6–12 × 10–15 mm, smaller 2 narrowly lunar, 1–5 × 9–13 mm.

Etymology: The epithet “*ruchengensis*” is derived from Rucheng, a county name of Hunan province, where the type of the new species is collected.

Phenology: The plants bloom from June to October, the fruits ripen from July to November.

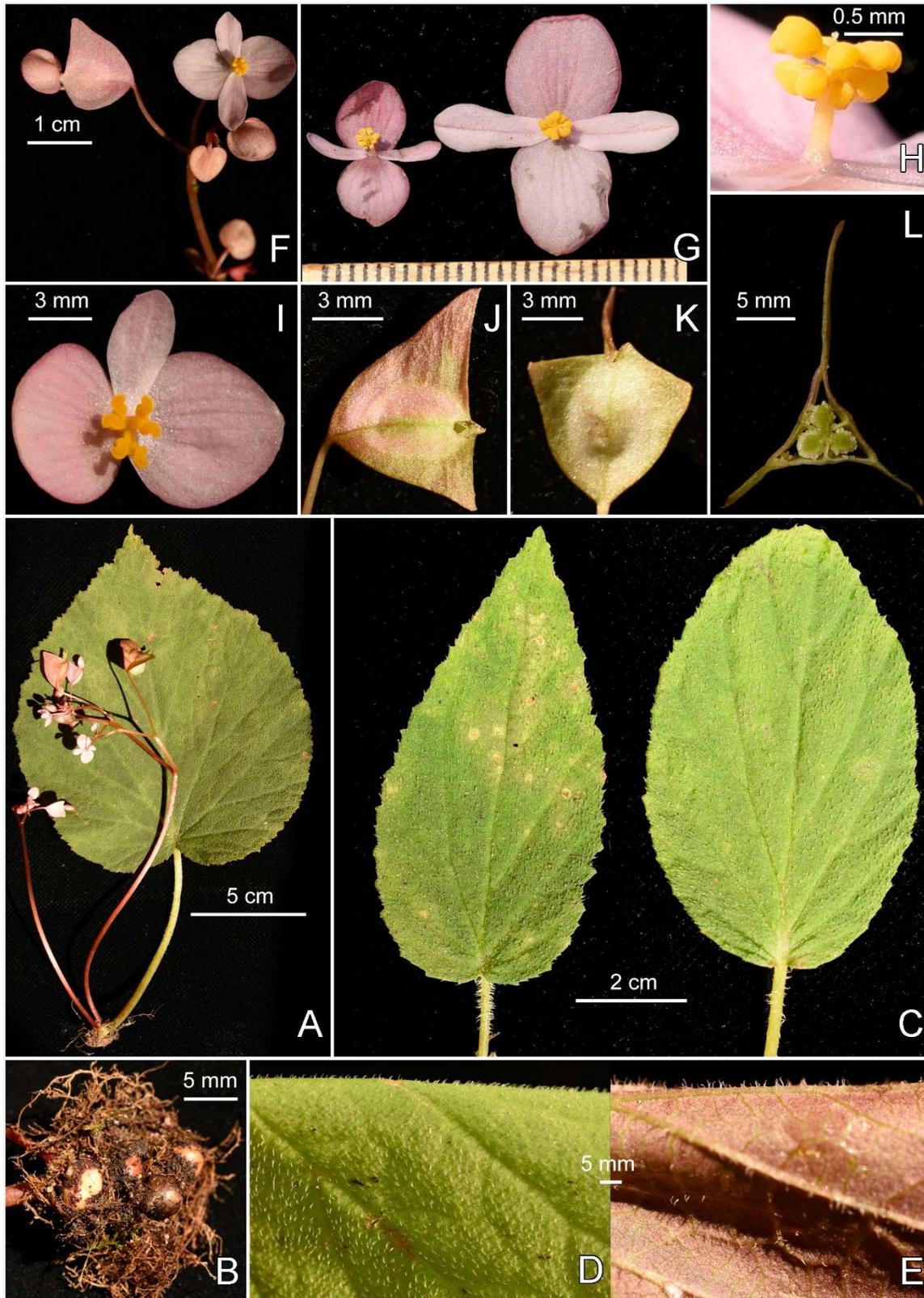


Fig. 2 Morphology of *Begonia ruchengensis* **A.** Mature flowering plant; **B.** Underground tubers; **C.** Leaf shape and texture; **D, E.** Indumentum of adaxial and abaxial leaf surface; **F.** Branch of inflorescence; **G** Front view of staminate flowers showing color and size variation; **H.** Side view of androecium with few stamens; **I.** Front view of pistillate flower; **J, K.** Side and adaxial views of fruit; **L.** Dissected ovary showing thickly unilamellate placentae and unequal wings. (Photos by Daike Tian)

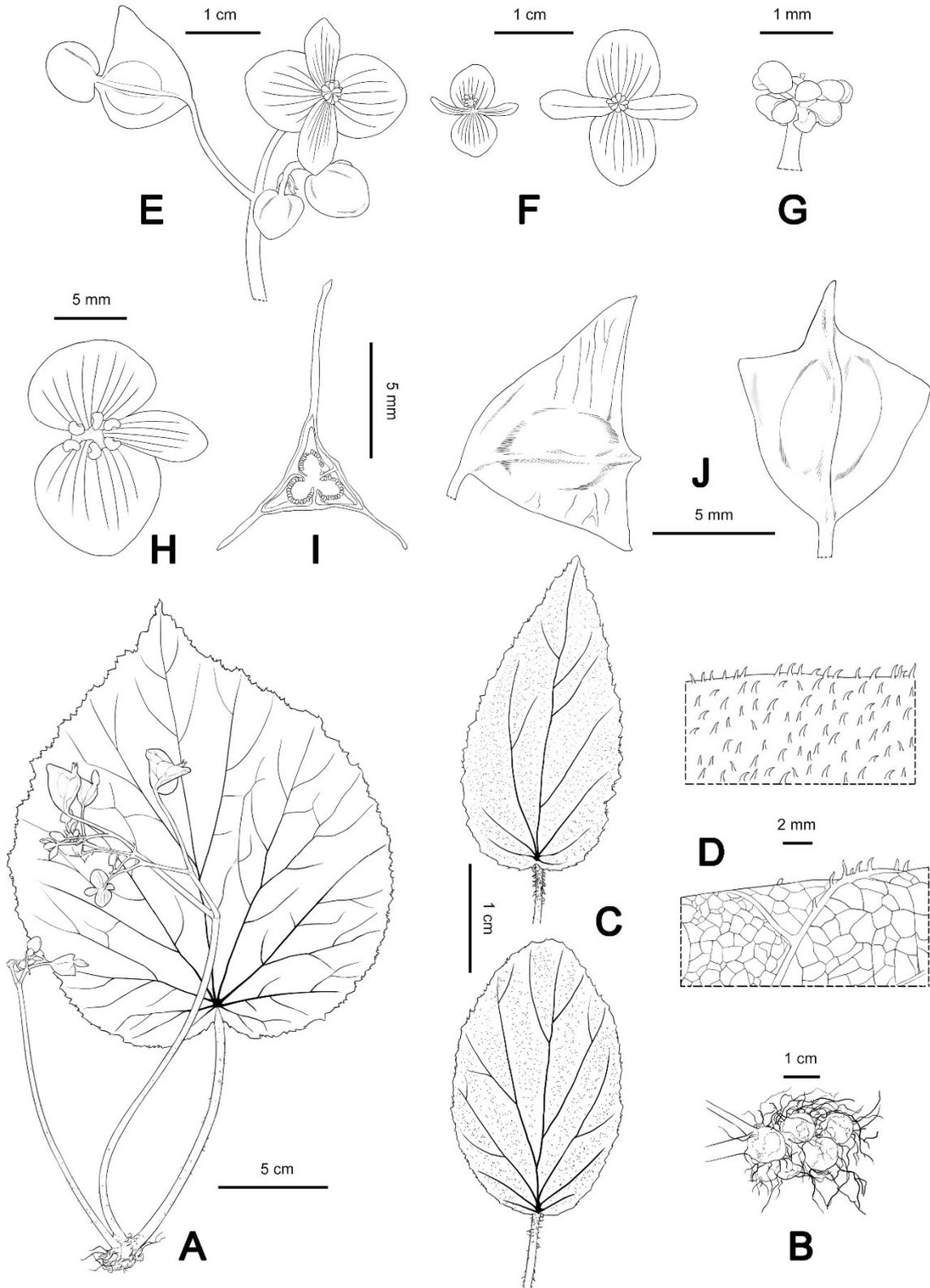


Fig. 3. Line drawing of *Begonia ruchengensis* **A.** Mature flowering plant; **B.** Underground tubers; **C.** Leaf shapes; **D.** Indumentum of adaxial (upper) and abaxial (lower) leaf surface; **E.** Inflorescence; **F.** Front view of staminate flowers showing size variation; **G.** Androecium with few stamens; **H.** Front view of pistillate flower; **I.** Dissected ovary showing unilamellate placentae; **J.** Side and adaxial views of fruit with unequal wings. (Drawn by Olivia Iris Tian)



Distribution and ecology: Currently the new species is only known from Jiulongjiang Forest Park belonging to Rucheng county of Hunan province, China. However, new populations may exist in other places of this county or its nearby regions. This new species grows on the rock surface usually with moss or in the rock crevices of Danxia landscape under the secondary forests at altitude of 280–600 m.

Conservation status: Critically Endangered (CR) (B1B2b(i to v)c(ii,iv)). Although the new species has nearly several thousands of individuals distributed in about 20 minor populations, it is restrictedly distributed in a very small area (extent of occurrence < 80 km², area of occupancy < 10 km²) of Jiulongjiang Forest Park of Rucheng county of Hunan. Therefore, it should be considered as one population without geographical isolation. The habitat of the new species is very unique and fragile (only growing on mossy rock surface or rock crevices in shady or half shady places), and accordingly the population size is easily influenced by climate change, especially by draught (IUCN, 2022).

Note: This new species was firstly discovered by Dr. Daike Tian, along with Mr. Lizhi Tian, during a plant survey in Jiulongjiang Forest Park of Rucheng county of Hunan province on May 10, 2014. Originally, he treated it as a variety of *B. fimbristipula* or a potential new species because these two species have nearly the same leaf morphology, but the new species had no inflorescences at that time while *B. fimbristipula* was already in late flowering in other places. On July 19, 2022, Mr. Cunzhong Huang conducted a survey in the same park at the request of Dr. Daike Tian. He collected the plants with female flowers, and mailed them to Dr. Daike Tian. After observation of the dissected ovary, Dr. Daike Tian confirmed it as a new species. On July 27, 2022 Dr. Daike Tian, together with Dr. Lei Wu, Mr. Cunzhong Huang and Mr. Xiaojun Sun, made a further survey on its distribution patterns, population size and morphological characteristics. Later, Mr. Xiaojun Sun made several surveys on its population size, detailed distribution, and phenology. *Begonia ruchengensis* belongs to *B.* sect. *Reichenheimia* based on its tuberous habit and unilamellate placentae of ovary. It is very difficult to differentiate it from *B. fimbristipula* without the examination of the ovary placentae. Therefore, they possibly have the closest relationship, which need to be investigated by molecular analysis.

Other specimens examined: CHINA. Hunan province, Rucheng county, Jiulongjiang Forest Park, 25°26'17.07"N, 113°48'10.58"E, elev. 430 m, July 27, 2022, *Daike Tian, Lei Wu, Cunzhong Huang & Xiaojun Sun* TDK4970 (CSH!); the same park, 25°27'17.17"N, 113°47'30.13"E, elev. 480 m, the same date, *the same collectors* TDK4972 (CSH!); the same park, 25°25'34.77"N, 113°47'54.68"E, elev. 315 m, the same date, *the same collectors* TDK4973 (CSH!); the same park, 25°27'N, 113°48'E, elev. 510 m, May 10, 2014, *Daike Tian & Lizhi Tian* TDK1750 (CSH!); the same park, 25°25'34.77"N, 113°47'54.68"E, elev. 315 m, July 19, 2022, *Cunzhong Huang* TDK4968 (CSH!).

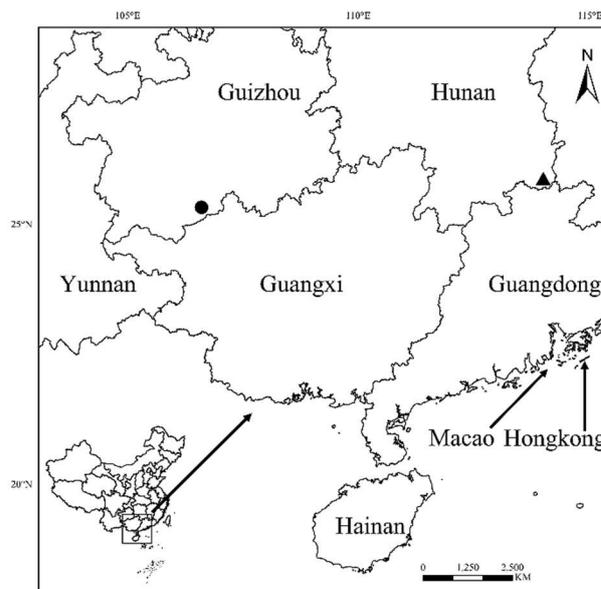


Fig. 4. Distributions of *Begonia ruchengensis* (triangle) and *B. auritalata* (dot)

Begonia auritalata D.K.Tian & H.J.Wei, *sp. nov.*
(sect. *Platycentrum*)

耳翅秋海棠 (ěr chì qiū hǎi táng) Figs. 5–7

Type: CHINA. Guizhou province, Luodian county, Luokun town, Guoshizhai, 25°19'03.01"N, 106°32'53.53"E, elev. 640 m (Fig. 4), growing on rock surface or steep slope under forest near the waterfall, January 9, 2016, *Daike Tian, Zhilin Chen & Junjie Zhang* TDK2858 (holotype: CSH0149920, CSH!; isotype: CSH!)

Diagnosis: The new species is mostly similar to *B. villifolia* Irmsch. in hairy leaves, flowers and fruits, but is easily differentiated by its 3 (vs. 2) incomplete-locular ovary, concaved (vs. flat) abaxial wing, shorter (to 60 vs. to 100 cm) plant, usually multicolored (vs. pure green) leaf, early (Feb. to Mar. vs. May to Jul.) flowering time. It is also morphologically close to *B. khaophanomensis* Phutthai & M.Hughes (Phutthai and Hughes, 2016) native to Thailand in the same section, but differs mainly by the latter's leaf lobed (vs. unlobed), and abaxial wing larger (4 cm vs. ca. 1 cm long), and wing shape (oblong or obliquely triangular vs. auricular).

Description: **Herb** evergreen, 30–60 cm tall; rhizome creeping or nearly so, 1–4 cm long, 3–10 mm thick; aerial stems erect or suberect, green, few branched, internodes 1–11 cm long, 5–12 mm thick, densely white or pink pilose, hairs 5–7 mm long, nodes slightly dilated. **Stipule** persistent, pale green, papery, obliquely triangular, 7–12 × 5–8 mm, abaxially covered with densely whitish pilosity less than 3 mm long; margin hairy; apex acuminate, abaxially ridged; arista 5–7 mm long, densely fimbriate; hairs to 4 mm long. **Leaves:** 4–10; petiole green, 4–22 cm long, 2–5 mm thick, adaxially grooved, unspotted, densely greyish-white or pink villous, 6 mm



Fig. 5. Habitat, habit and morphology of *Begonia auritalata* **A.** Habitat near waterfall; **B.** Habit; **C.** Densely hairy petiole; **D.** Flowering plant with short inflorescence; **E.** Stems growing along rock surface; **F.** Unevenly green leaf; **G.** Indumentum on adaxial leaf surface. (Photos by Daike Tian)

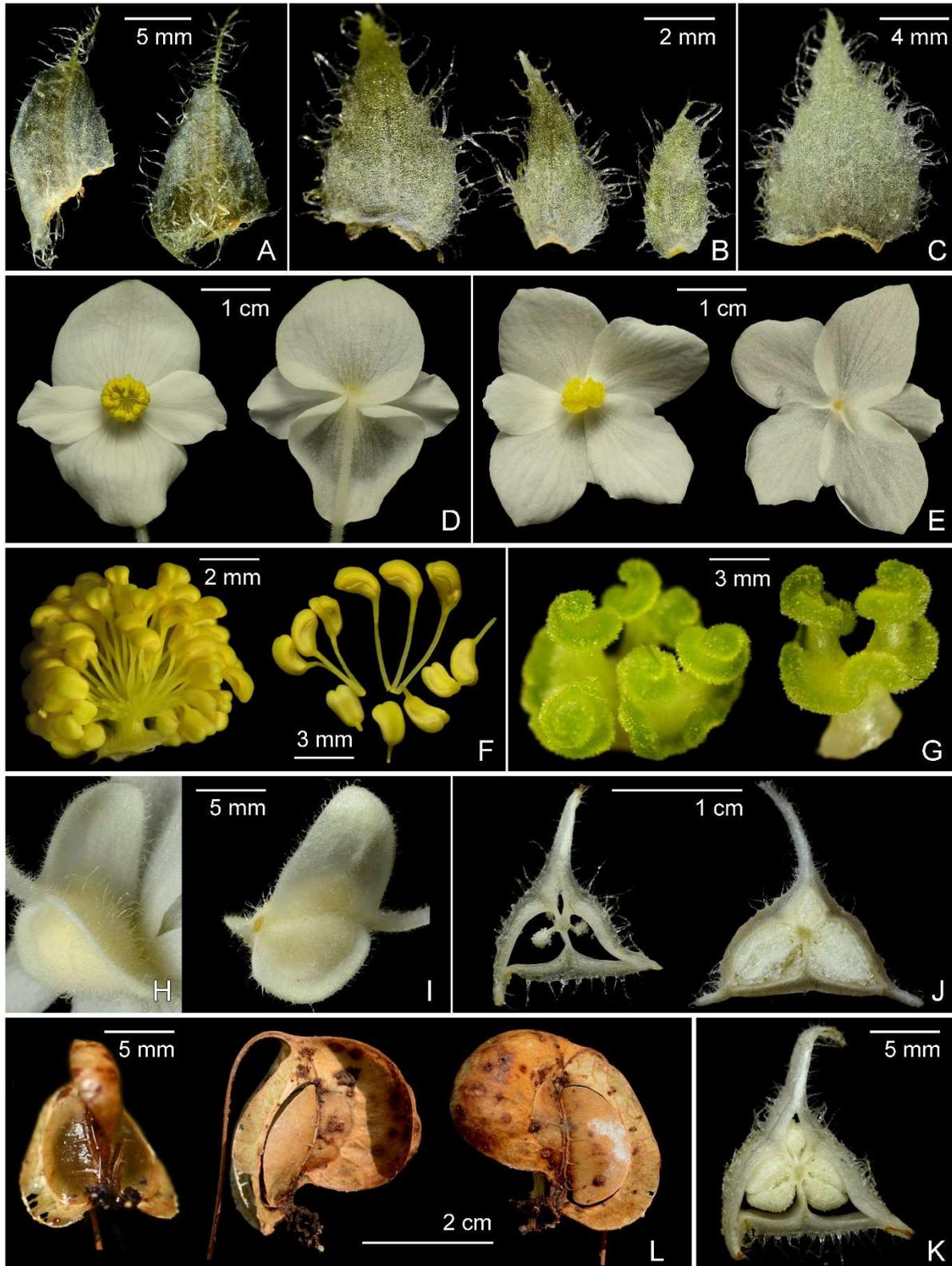


Fig. 6. Detailed morphology of *Begonia auritalata* **A.** Stipules showing shape, hairy margin and back-ridge with long arista; **B.** Bracts showing size variation and hairs; **C.** Involucral bract showing shape and abaxial surface; **D.** Adaxial and abaxial views of staminate flower; **E.** Adaxial and abaxial views of pistillate flower; **F.** Androecium and stamens; **G.** Styles and stigmas; **H, I.** Ovary in different views; **J, K.** Dissected ovary showing three loculi with one degenerated and placentae; **L.** Dried mature unequally-winged fruits with abaxially concave wing. (Photos by Daike Tian)

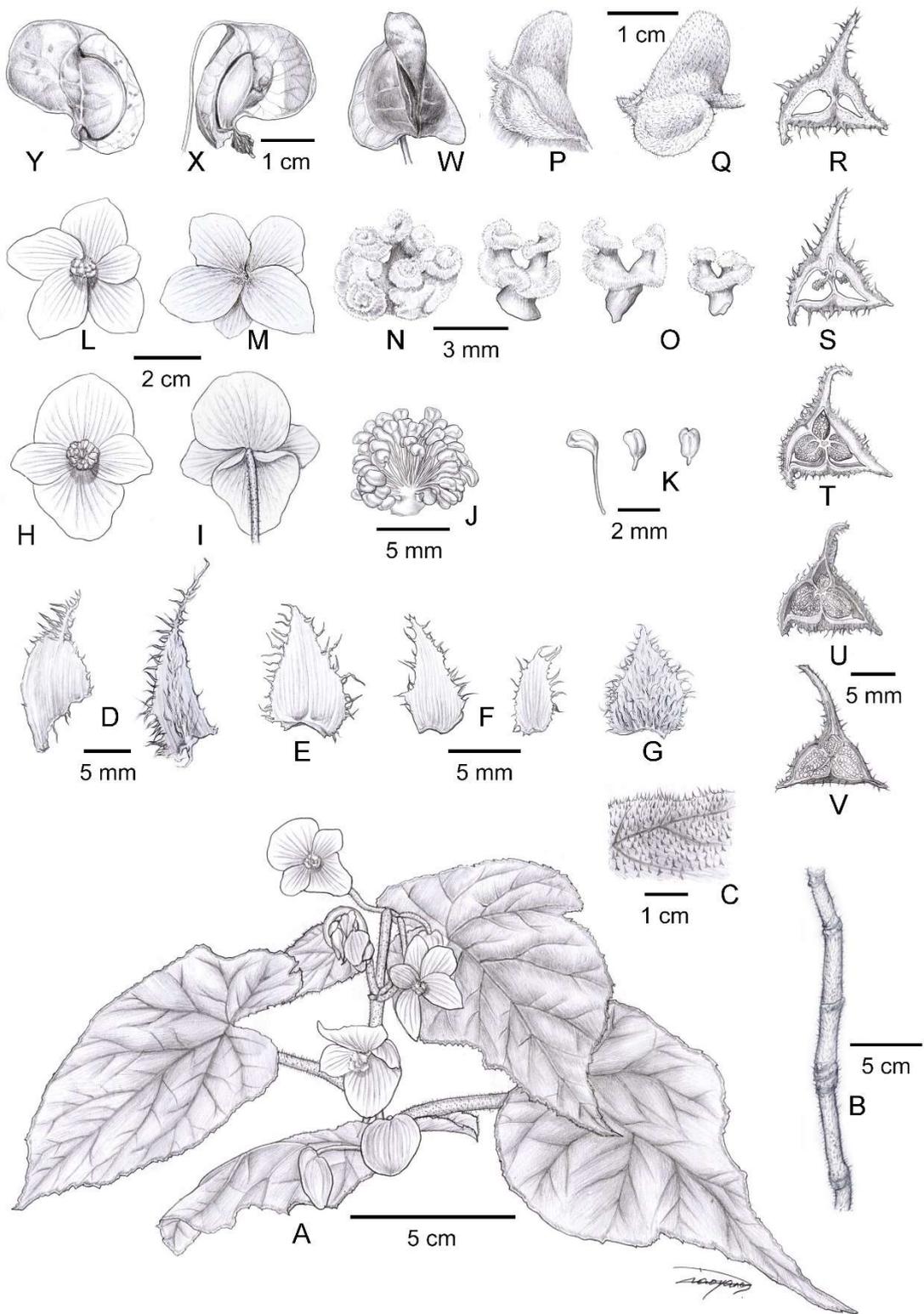


Fig. 7. Line drawing of *Begonia auritalata* **A.** Part of mature flowering plant with inflorescence; **B.** Hairy stem section; **C.** Hairy adaxial leaf section; **D.** Bracts showing two surfaces; **E, F.** Adaxial surface of involucre bract (**E**) and bractlets (**F**); **G.** Abaxial surface of involucre bract showing dense hairs; **H, I.** Front and back view of staminate flower; **J.** Androecium; **K.** Stamens and anthers with retuse apex; **L, M.** Front and back view of pistillate flower; **N, O.** Styles and stigmas; **P, Q.** Different views of ovary with unequal wings; **R–V.** Ovary dissections from upper to lower positions; **W–Y.** Different views of mature fruits with concave and auricular abaxial wing. (Drawn by Yanxin Piao)



long; blade obliquely ovate, 7–27 × 4–17 cm; adaxial surface densely pink or greyish-white and base-enlarged pilose, interveinal area light green, veinal area dark green; abaxial surface green and purplish red, densely red or greyish-white pilose, hairs 1–3 mm long and longer on main veins; venation palmate–pinnate, veins 6 (7), adaxially impressed, abaxially raised; apex acuminate to short caudate; margins serrate and ciliate, occasionally coarsely toothed; base obliquely cordate; acutely angled to nearly overlapped. **Inflorescence** terminal or axillary, 6–12 cm long, peduncle hairy, 4.5–7 cm long, 2.5–3.5 mm thick; flowers 5–7, rarely 3 per inflorescence. **Bract** persistent, acutely triangular, light green, papery when dried, 10–12 × 4–6 mm; bracteoles 4–10 × 2–6 mm, covered with greyish-white pilosity (3 mm long), margin ciliate, apex often acuminate. **Staminate flower**: 4.7–5.3 × 3.7–4.2 cm; tepals 4; outer 2, large, white, ovate to cordate, 2.4–2.9 × 2.4–3 cm, center thicker and adaxially slightly concave, bilateral bases decurrent ca. 5 mm, apex obtuse, longitudinal veins clear; abaxially sparsely greyish-white pilose, hairs ca. 2.5 mm long; inner 2, smaller, white, nearly obovate-lanceolate, 1.7–2 × 1–1.6 cm, margin slightly turnover, central part abaxially sparsely greyish-white pilose, apex obtuse, margin sparsely white ciliate, cilia ca. 1 mm long; androecium nearly capitate, symmetric, 6–8 × 8–10 mm, apically loosely arranged, stamens (67–)84–182; filament ca. 1 mm long, base slightly connate; anther yellow, nearly short cuneate, 0.8–1.5 mm long, up to 1 mm wide, apex clearly retuse; pedicel white, 3.5–4.5 cm long, 2–3 mm thick, densely covered with greyish-white pilosity (ca. 2 mm long). **Pistillate flower**: occasionally open prior to staminate flower, subsquare or oblong in shape, 4–5 × 3–4.4 cm; tepals 5, white; outer 4, larger, outside-in gradually smaller, ovate or ovate–cordate, 1.9–2.6 × 1.7–2.1 cm, apex obtuse or acute; abaxially greyish white pilose, hairs more in middle part, ca. 3 mm long; adaxially longitudinal veins relatively obvious, dark; inner 1, significantly smaller, obovate or obovate-lanceolate, 1.5–1.8 × 1–1.2 cm, glabrous, apex obtuse or acute; styles + stigmas 4–5 mm long; stigmas 2, rarely 3, well developed, 7 × 5 mm in diameter, U-shaped, twisted nearly 3 turns; ovary white, densely covered with greyish white pilosity (3 mm long), incomplete 3-locular, upper 1 (broadest-winged side) smaller or degenerated; placentation axile, bilamellate; pedicel white, 2–2.1 cm long, 1.2–1.8 mm thick, with greyish white pilosity. **Fruit** capsule, suborbicular, ca. 10 × 10 mm, unequally 3-winged; abaxial wing large, auricular, concave, ca. 10 × 10 mm; lateral wings smaller, falcate, 2–3 × ca. 10 mm.

Etymology: The epithet “*auritalata*” is derived from its auricular and concave abaxial wing of fruit.

Phenology: The plants bloom January to March, the fruits ripen March to May in the wild, and the cultivated plants in greenhouse start to bloom as early as middle December.

Distribution and ecology: *Begonia auritalata* is endemic to Guizhou province of China, and currently known only from the type locality and its nearby regions in Luokun town and Fengting town of Luodian county. The species grows on soil land or rock surface of shady place under forest near the waterfalls.

Conservation status: Critically Endangered (CR, B1+2ab(i,ii,iii,iv,v)) (IUCN, 2022). Distribution of the new species is restricted to Luokun town and Fengting town of Luodian county of Guizhou province, with three small populations, each with less than 200 mature individuals. By estimation, based on incomplete investigation, the extent of occurrence is < 50 km² and area of occupancy is < 10 km², and the total number of mature individuals is < 100. The population size is predicted to continue decline in the future as it is highly relied to waterfall environment which is not stable.

Note: The species was originally collected by Mr. Hongjin Wei on October 29, 2014 during a plant survey in Luokun town of Luodian county of Guizhou, and it was identified as new to science by Dr. Daike Tian based on photos and the introduced plants without flowers. The cultivated plants in Shanghai Chenshan Botanical Garden bloomed for the first time in December 2015. Dr. Daike Tian took photos and collected morphological data, and then made a survey in the type locality, along with Dr. Zhilin Chen and Mr. Junjie Zhang, a graduate student, on January 9, 2016. Mr. Zhiyou Guo and Ms. Qingmei Gao found the second population in Fengting town on March 6, 2023 and collected living plants for Dr. Daike Tian. Later, Mr. Zhiyou Guo and his colleagues found the third population near waterfall in Xiaoyangli of Hexi village, Luokun town (25°20'16.11"N, 106°35'5.84"E, elev. 547 m). With the help of local residents, more populations have been found nearby. However, based on the current data, all the populations are narrowly distributed in the contiguous areas of two neighbouring towns. This species usually has two styles and stigmas but three-locular ovary in which two locules are normally developed and the third one is degenerated. It should be placed in *B.* sect. *Platycentrum* based on the overall morphology. The new species could be an ideal material for studying the evolution of three locules to two locules of ovary in *Begonia*.

Other specimens examined: CHINA. Shanghai, Shanghai Chenshan Botanical Garden, cultivated plants introduced from type locality, *Daike Tian*, TDK2894 (CSH!); Luodian County, Fengting town, Chuangjing village, 25°19'54.34"N, 106°34'19.23"E, elev. 508 m, near waterfall, March 6, 2023, *Zhiyou Guo & Qingmei Gao* TDK5290 (CSH!).

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