

# *Impatiens fugongensis* (Balsaminaceae), a new species from Yunnan, China

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**ABSTRACT.** A new species of *Impatiens* L., *I. fugongensis* K. M. Liu et Y. Y. Cong, sp. nov., is described and illustrated. The species is restricted to the wet evergreen broad-leaved montane forests of Gaoligong Mountain in Northwestern Yunnan, China. Diagnostic morphological characters and seedcoat micromorphological characters that distinguish the new species from the related species, *I. xanthina* Comber and *I. monticola* Hook. f., are discussed.

**Keywords:** Balsaminaceae; China; *Impatiens*; *Impatiens fugongensis*; Micromorphology; New species; Seedcoat; Yunnan.

## INTRODUCTION

The genus *Impatiens* L. (Balsaminaceae), including about 900 species worldwide (Yuan et al., 2004), mainly occurs in mountains of tropical and subtropical regions from India to southeastern Asia. Most of the species have very restricted distributions (Fischer and Rahelivololona, 2002). About 240 species have been reported from China (Chen, 2001; Jin and Ding, 2002; Huang et al., 2003), and most of them occur in southwestern China.

Since 1999 we have studied the taxonomy and pollination ecology of *Impatiens* (Liu, 1999; Tian et al., 2004). During a recent scientific survey of Gaoligong Mountain National Nature Reserve, northwestern Yunnan, an apparently new species of *Impatiens* was discovered by the authors. After carefully studying the morphology and seedcoat micromorphology of the species and the related species, and consulting the literature (Xiong and Luo, 1988; Chen, 2001; Huang, 2006), we concluded that these plants represent a new species.

## MATERIALS AND METHODS

Seeds used for observations were collected in the field during the autumns of 2005 and 2006. Voucher specimens were deposited in the Herbarium of Hunan Normal University (HNNU; Table 1). For scanning electron microscopy, dried mature seeds were mounted on stubs, using double-sided adhesive tape, and coated with about 2 nm of gold with a JFC-1600 sputter coater. Coated seeds were then examined and photographed with the JEOL JSM-6360LV scanning electron microscope.

## SPECIES DESCRIPTION

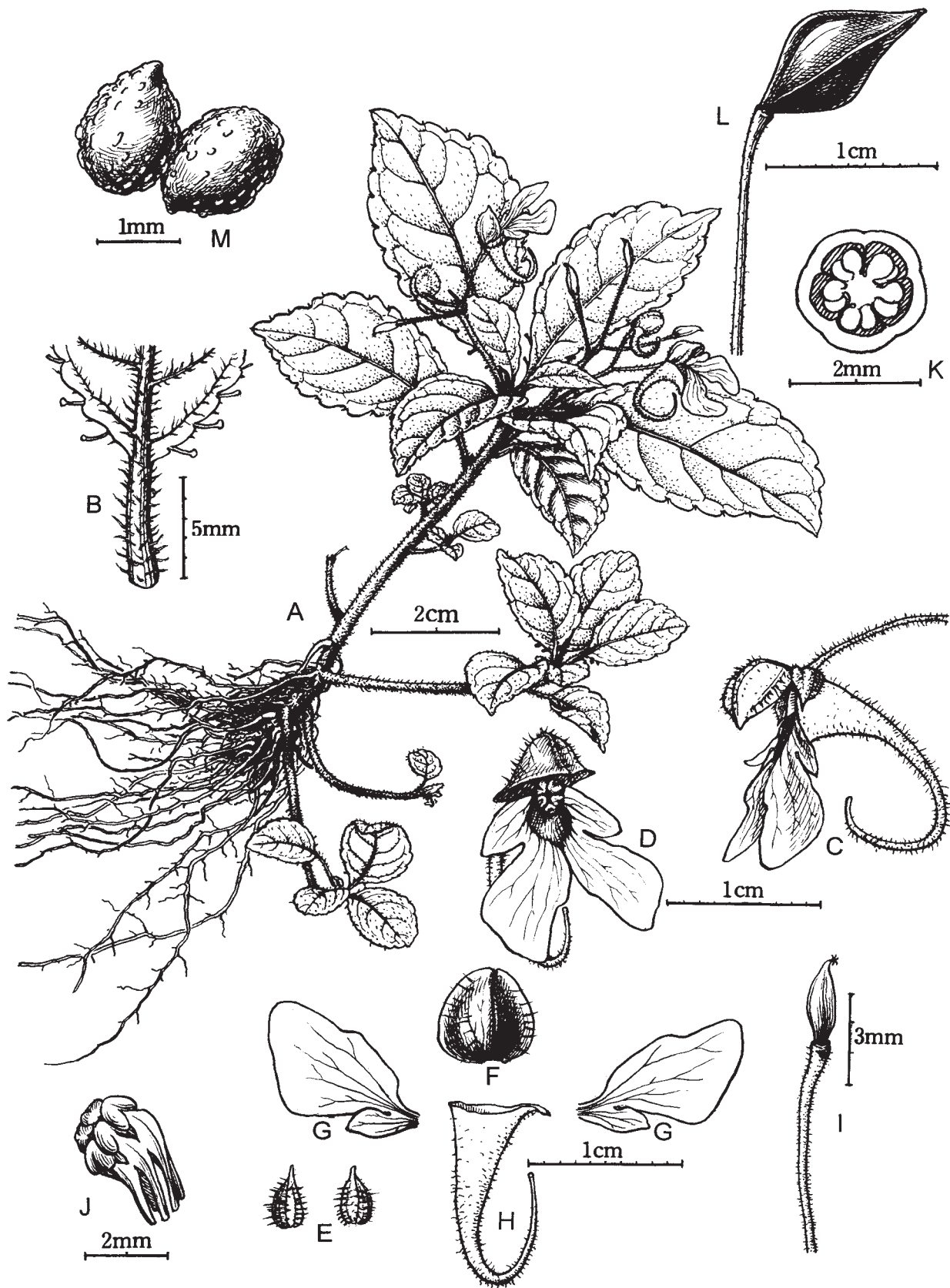
***Impatiens fugongensis*** K. M. Liu et Y. Y. Cong, sp. nov.—TYPE: CHINA. Northwestern Yunnan Province: Fugong County, Gaoligong Mountain, alt. 2,200 m, on the damp cliff, 12 Oct 2006, Liu Ke-Ming & Cong Yi-Yan 791378 (holotype: HNNU; isotypes KUN, HNNU).

Figure 1

Species haec *I. xanthinae* Comber similis, sed foliis ellipticis vel suborbicularibus, apice obtuso-acutis vel obtuso-rotundatis, nervis lateralibus 5-7-jugis, bracteis caducis, sepalis inferioribus cornutis, pubescentibus, lobis superioribus petalorum lateralium longe ellipticis facile differt. A *I. monticola* Hook. f. caulibus 5.5-9 cm altis, foliis ellipticis vel suborbicularibus, bracteis caducis, floribus 14-17 mm longis, pubescentibus, sepalis inferioribus cornutis, lobis superioribus petalorum lateralium longe ellipticis diversa.

Annual herb, 5.5-9 cm tall. Stem erect, often purple-red, base slightly prostrate, densely white hairy (brown when dry), 1-3 branched from base, simple above. Leaves alternate, crowded at upper part, petiolate; petiole 6-10 mm, densely white hairy; lamina elliptic to suborbicular, 2.6-4 × 1.1-2.2 cm, adaxially white hairy, abaxially along veins white hairy, lateral veins 5-7 pairs, base broadly cuneate, with 2 or 3 pairs of glandular hairs, margin coarsely crenate-denticulate, setose in between marginal teeth, apex obtuse-acute or obtuse-rounded. Inflorescences in upper leaf axils, racemose, 2-3-flowered; peduncles erect, 15-20 mm, densely white hairy. Pedicels 7-10 mm, densely white hairy, bracteate at base; bracts lanceolate, caduceous, abaxially white hairy. Flower golden-yellow, smaller, 14-17 mm long. Lateral sepals 2, green, ovate-elliptic, 2.8-3.1 × 1.7-1.9 mm, 3-veined, apex shortly acuminate, abaxially long white hairy. Lower sepal

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**Figure 1.** Illustration of *Impatiens fugongensis* K. M. Liu & Y. Y. Cong (drawn by Li-Han Liu from the holotype). A, Habit; B, Basal portion of abaxial leaf surface; C, Flower, lateral view; D, Flower, anterior view; E, Lateral sepals; F, Dorsal petal; G, Lateral united petals; H, Lower sepal; I, Gynoecium; J, Androecium; K, Transverse section of fruit; L, Fruit; M, Seeds.

**Table 1.** Source of materials.

Species	Locality	Voucher
<i>Impatiens fugongensis</i> K. M. Liu et Y. Y. Cong	Yunnan, China	<i>K. M. Liu &amp; Y. Y. Cong 791378</i> (HNNU)
<i>Impatiens xanthina</i> Comber	Yunnan, China	<i>K. M. Liu &amp; Y. Y. Cong 791366</i> (HNNU)
<i>Impatiens monticola</i> Hook. f.	Sichuan, China	<i>K. M. Liu &amp; Y. Y. Cong 791448</i> (HNNU)

cornute, depth of lower sepal from pedicel to base of spur 18-21 mm, sparsely pubescent outside, mouth ca. 4.5 mm wide, anterior acute, base gradually narrowed into an incurved spur 15-18 mm. Dorsal petal galeiform, orbicular, 5.8-6 × 4-4.2 mm, base broadly cuneate, apex obtuse-rounded, abaxial midvein slightly thickened, sparsely white hairy. Lateral united petals sessile, 12-14 mm long, 2-lobed, upper lobes narrowly elliptic, ca. 2 mm wide, apex obtuse-acute; lower lobes dolabriform-triangular, 8-10 × 5-7 mm, apically retuse, abaxial auricle absent. Stamens 5, ca. 2 mm long, filaments linear, free for about 1/2 their length; anthers ovoid, joined into a ring surrounding the ovary apex, apex obtuse. Ovary superior, 5-carpellate, placentation axile, fusiform, ca. 3 mm long, erect, style 1. Capsule green, broadly fusiform, 5-angled, ca. 10 × ca. 4 mm, apex acute, rostellate, 5-valved, fleshy; seeds elliptic, 1.5-1.9 × 0.7-1.1 mm, yellow-brown.

*Paratype.* CHINA. Northwestern Yunnan Province: Fugong County, Gaoligong Mountain, alt. 2,200 m, on the damp cliff, 13 Oct 2006, *Liu Ke-Ming & Cong Yi-Yan 791412* (HNNU).

*Phenology.* Flowering from August to October; fruiting from September to November. Flower visitors (insects of Hymenoptera) were seen in the field.

*Ecology.* On moist limestone rocks in wet evergreen broad-leaved montane forests, at 2,100-2,500 m elevation.

*Distribution.* Fugong County, Northwestern Yunnan Province, China; known only from the type locality.

**DISCUSSION**

*Impatiens fugongensis* K. M. Liu et Y. Y. Cong resembles *I. xanthina* Comber in having leaves crowded at the upper part of stem and branches, a galeiform standard, and a broadly fusiform capsule. However, it differs in having elliptic to suborbicular lamina with apex obtuse-acute or obtuse-rounded, lateral veins (5-7 pairs), caduceous bracts, a cornute lower sepal, outside hair, narrowly elliptic upper lobes of lateral united petals with no purple-tinged flecks at base, and dolabriform-triangular lower lobes. *I. fugongensis* K. M. Liu et Y. Y. Cong is also

**Table 2.** Comparison between *Impatiens fugongensis*, *I. monticola*, and *I. xanthina*.

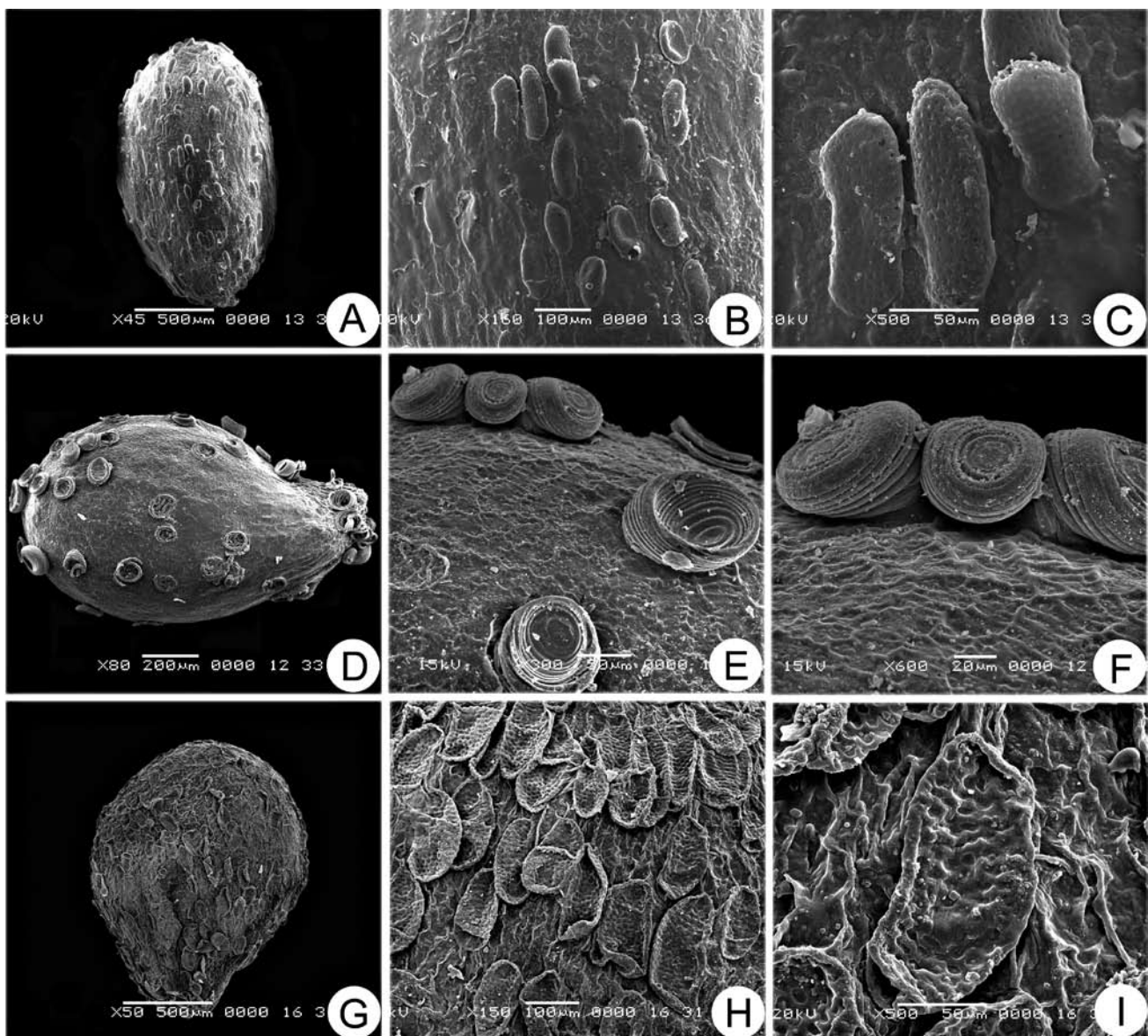
Characters	<i>Impatiens fugongensis</i>	<i>Impatiens monticola</i>	<i>Impatiens xanthina</i>
Plant height	5.5-9 cm	30-60 cm	6-20 cm
Lamina	Elliptic to suborbicular, 2.6-4 × 1.1-2.2 cm, apex obtuse-acute or obtuse-rounded, lateral veins 5-7 pairs	Ovate-elliptic or obovate, 3-13 × 3-4.5 cm, apex acuminate, lateral veins 5-7 pairs	Lanceolate, elliptic-lanceolate, or oblong-spatulate, 4.5-7 × 1.5-2 cm, apex acute or acuminate, lateral veins 7-9 pairs
Bracts	Caducous	Persistent	Persistent
Inflorescences	2-3-flowered in a raceme	2-flowered in a raceme	1-2-flowered in a raceme
Flower length	14-17 mm	ca. 35 mm	20-25 mm
Lateral sepals	Ovate-elliptic, 2.8-3.1 × 1.7-1.9 mm, abaxially long white hairy	Ovate or orbicular, 6-10 × 6-8 mm, glabrous	Triangular-ovate, ca. 9 mm, glabrous
Lower sepal	Cornute, sparsely pubescent, base gradually narrowed into an incurved spur 15-18 mm	Navicular, glabrous, base gradually narrowed into an incurved spur 23-36 mm	Narrowly infundibular, glabrous, base gradually narrowed into an involute spur 22-25 mm
Dorsal petal	5.8-6 mm long, not purple-tinged flecks at base	13-15 mm long, not purple-tinged flecks at base	6-17 mm long, purple-tinged flecks at base
Lateral united petals	12-14 mm long, upper lobes narrowly elliptic, not purple-tinged flecks at base; lower lobes dolabriform-triangular	20-25 mm long, upper lobes suborbicular, not purple-tinged flecks at base; lower lobes dolabriform	15-16 mm long, upper lobes orbicular, purple-tinged flecks at base; lower lobes dolabriform or ovate-dolabriform

similar to *I. monticola* Hook. f. by its lateral veins (5-7 pairs), 2-3 flowers in a raceme, dolabriform-triangular lower lobes of lateral united petals, and a broadly fusiform capsule, but differs in having stems 5.5-9 cm tall, elliptic to suborbicular lamina, caduceous bracts, hairy flowers 14-17 cm long, ovate-elliptic lateral sepals, cornute lower sepal, and narrowly elliptic upper lobes of lateral united petals. More detailed morphological comparisons of these three species are given in Table 2.

In addition, seedcoat micromorphological characters also differentiate *Impatiens fugongensis* from *I. xanthina* and *I. monticola*. In *I. fugongensis*, seeds are elliptic (Figure 2A), and some of the epidermal cells of the seedcoat protrude significantly to form squamulate

projections that are oblong and have conspicuous pits (Figure 2B, C); while in *I. xanthina*, seeds are ovate (Figure 2D), and some of the epidermal cells of the seedcoat protrude significantly to form cristate protrusions which are spirally thickened (Figure 2E, F). Seedcoat of *I. monticola* is similar to that of *I. fugongensis*, but differs in having elliptic, squamulate projections with margins rolled inward (Figure 2G, H) and more pits on the squamulate, which are sometimes connected with each other by grooves (Figure 2I).

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**Figure 2.** SEM micrographs of seedcoat of *Impatiens fugongensis*, *I. xanthina*, and *I. monticola*. A-C, *I. fugongensis*. A, Entire seed; B, Detail seedcoat; C, Squamulate projections under high magnification. D-F, *I. xanthina*. D, Entire seed; E, Detail seedcoat; F, Cristate projections under high magnification. G-I, *I. monticola*. G, Entire seed; H, Detail seedcoat; I, Squamulate projections under high magnification.

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## 中國雲南產鳳仙花科一新種：福貢鳳仙花

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本文記述並描繪鳳仙花科 (Balsaminaceae) 鳳仙花屬之新種，福貢鳳仙花 (*Impatiens fugongensis* K. M. Liu et Y. Y. Cong)，此種特產且局限分佈于雲南西北部高黎貢山常綠闊葉林中。本文討論了與新種近緣種，山地鳳仙花 (*I. monticola* Hook. f.) 和金黃鳳仙花 (*I. xanthina* Comber) 與新種在形態上和種皮微形態上的區別。

**關鍵詞：**鳳仙花科；鳳仙花屬；福貢鳳仙花（新種）；微形態；種皮；中國；雲南。