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Impatiens parvisepala (Balsaminaceae), a new species from Guangxi, China

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Impatiens parvisepala S.X. Yu & Y.T. Hou *sp. nova* (Balsaminaceae), from Guangxi, China, is described and illustrated. It is closely related to *I. claviger* in having a raceme, yellow flowers and four lateral sepals, but differs by the sessile or subsessile leaves aggregated or subverticillate on the upper part of the stem, obovate or obovate-lanceolate leaf blades, lanceolate or subulate bracts, smaller outer lateral sepals, funnel-shaped lower sepal with a nearly straight spur and reddish patches, and the lateral united petals clawed. Pollen morphology and leaf epidermal characters also support recognition of *I. parvisepala*.

The Balsaminaceae include only two genera, the monotypic *Hydrocera* and the prolific *Impatiens*. The latter genus contains about 850 species (Grey-Wilson 1980, Fischer 2004). It is primarily an Old World genus, distributed throughout tropical Africa, India, southwest Asia, southern China and Japan; a few species also extend into the temperate zones of Europe, Russia, China and North America (Grey-Wilson 1980).

About 240 species are known in China (Chen 2001, Chen *et al*. 2008), the majority restricted to Yunnan, Sichuan, Guizhou, Xizang (Tibet) and Guangxi.

During exploration in Guangxi in 2004 we collected an *Impatiens* that was readily distinguished from other taxa, which we describe here as new.

Impatiens parvisepala S.X. Yu & Y.T. Hou, *sp. nova* (Figs. 1–4)

Affinis I. clavigri, *sed foliis superioribus subverticillatis sessilis vel subsessilis*, *laminis obovatis vel obovato-lanceolatis*, *bracteis lanceolatis vel subulatis*, *sepalis lateralibus exterioribus minutis et eis infernis infundibularibus*, *punctis rubellis*, *base in calcaria subrecta angustatis*, *petalis lateralibus unitis unguibus bene differt*.

Type: China. Guangxi, Jingxi Xian, Hurun Town, Tongling Canyon, in valley near river, alt. 503 m, 23°01´20.4´´N, 106°39´03.4´´E, 16.X.2005 *Sheng-xiang Yu 3754* (holotype PE; isotype IBK). — Paratype: China. Ningming Xian, Shangshixiang town, Fubo Shan, alt. 460 m, 23.X.1958 *Zhao-qian Zhang 13060* (SCIB).

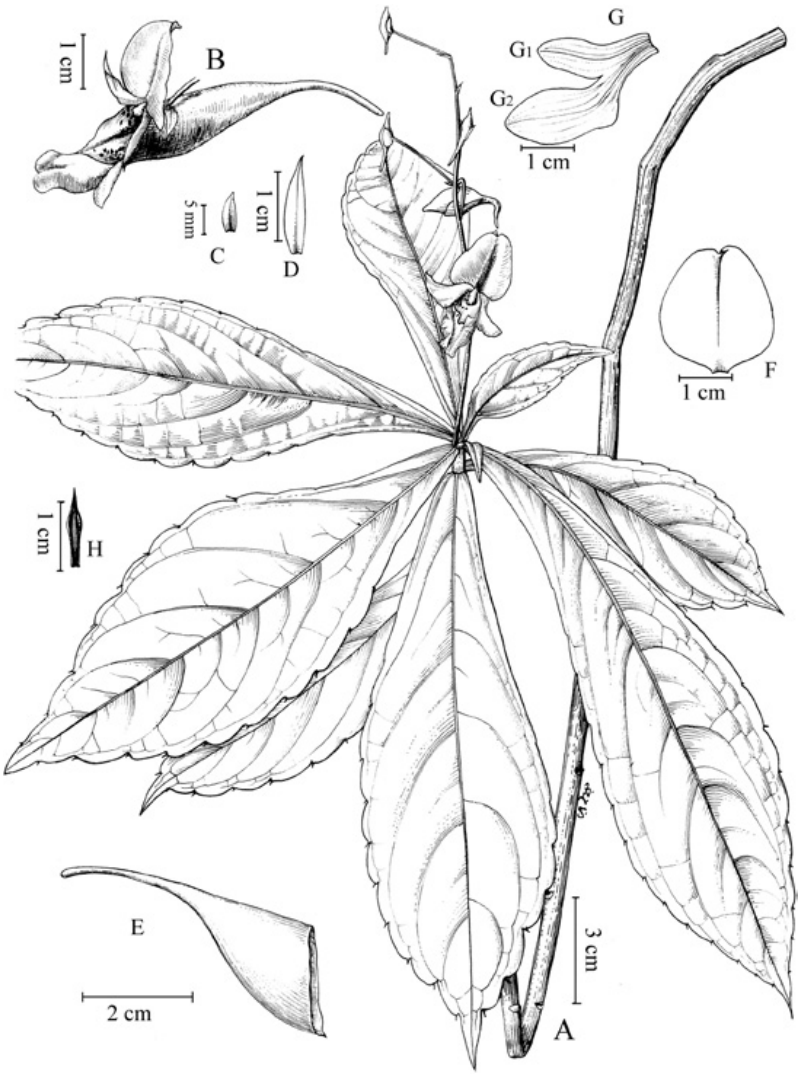

Fig. 1. *Impatiens parvisepala* (from the holotype, drawn by Y. B. Sun). — **A**: Habit. — **B**: Flower in lateral view. — **C**: Outer lateral sepal. — **D**: Inner lateral sepal. — **E**: Lower sepal. — **F**: Dorsal petal. — **G**: Lateral united petals. — G_1: Upper petal. — G_2: Lower petal. — **H**: Ovary.

Plants perennial, glabrous, 40–60 cm tall, shrub-like. Stems erect, simple, lower nodes swollen. Leaves simple, alternate, sessile or subsessile, aggregated or subverticillate on upper part of stem; blade 15–20 cm long, 4–6 cm wide, abaxially pale green, adaxially dark green, obovate or obovate-lanceolate, base attenuate, margin roughly crenate towards base, apex acuminate; abaxial midvein prominent, lateral veins 4–6 on each side, arcuate. Inflorescences a raceme from upper leaf axils, 6–8-flowered; bracts 1 per flower, 3 mm long, membranous, lanceolate or subulate, apex acuminate, persistent. Peduncles 15–17 cm long, glabrous, erect. Pedicels 2.5–3 cm long, slender. Flowers yellow. Lateral sepals 4 (in 2 pairs), outer pair ca. 5 mm long, 1–2 mm wide, obovate; inner pair 1.3–1.5 cm long, 2.5–3 mm wide, curved, lanceolate, inequilateral, apex acuminate. Lower sepal 1.8–2 cm wide, 2.5–3 cm deep excluding spur, obliquely infundibuliform, base gradually constricted to spur; spur 2–2.5 cm long, straight or slightly incurved, apex rostellate. Dorsal petal 1.8–2.2 cm long, 1.5–2 cm wide, obovate, base truncate, without a dorsal crest, apex slightly retuse. Lateral united petals 2.8–3 cm long; 2-lobed, upper petal 2.8–3 cm long, 0.8–1 cm wide, ovate-oblate; lower petal 2–2.3 cm long,

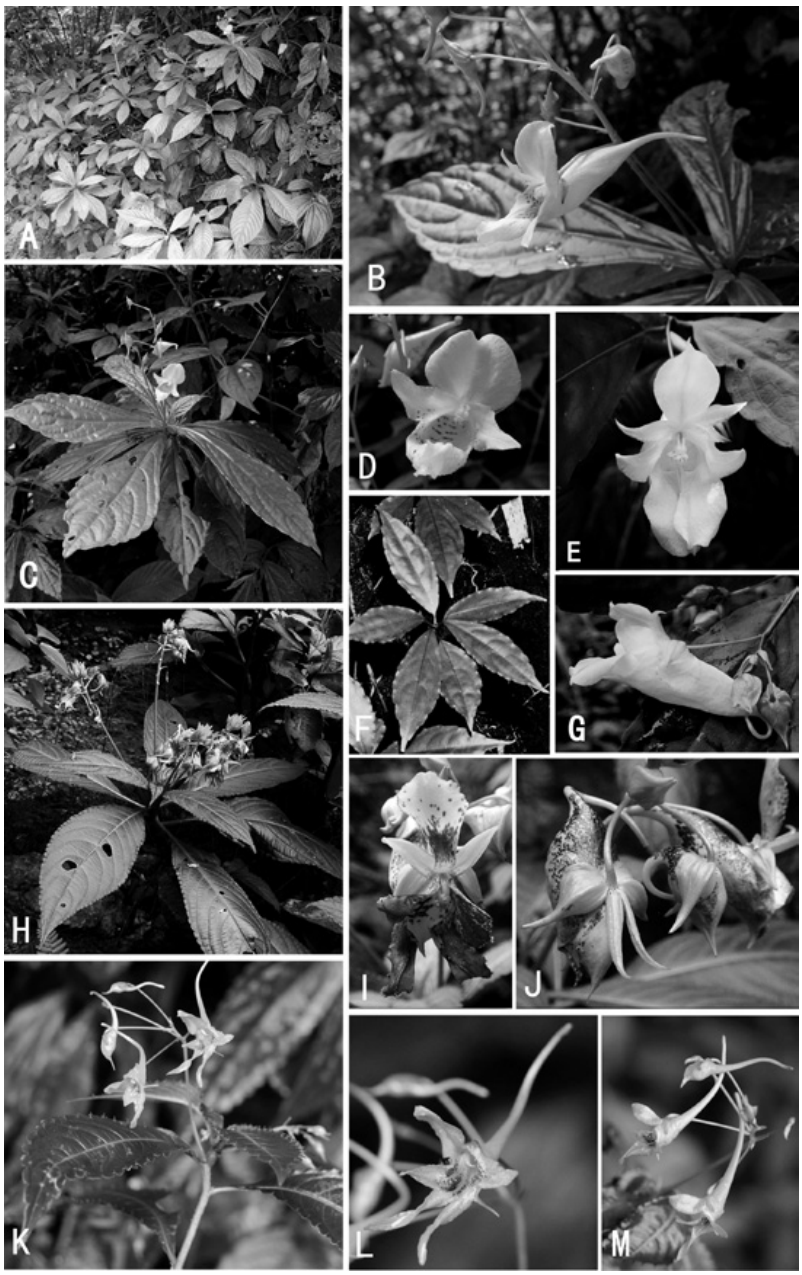

Fig. 2. — **A**–**D**: *Impatiens parvisepala*. — **A**: Habitat. — **B**: Flower in lateral view. — **C**: Whole plant. — **D**: Flower in front view. — **E**–**G**: *I. claviger*. — **E**: Flower in front view. — **F**: Leaves. — **G**: Flower in lateral view and raceme. — **H**–**J**: *I. apalophylla* — **H**: Whole plant. — **I**: Flower in front view. — **J**: Flower in lateral view. — **K**–**M**: *I. siculifer*. — **K**: Flowering branch. — **L**: Flower in front view. — **M**: Raceme. (Photos by S. X. Yu in Guangxi).

5–7 mm wide, oblong, apex acuminate. Stamens 5, filaments linear, 3–4 cm long, anther obtuse. Ovary fusiform. Capsule (immature) clavate. Pollen grains: size (P × E), 20.57(19.70–21.63) × 28.84(27.98–30.17) μm, 3-colpate, colpi long, thin, exine with reticulate ornamentation, granules in lumina (Fig. 4A–C). Seeds quadrate-ellipsoid, surface with reticulate ornamentation. Flowering September to October; fruiting October to November.

Habitat ecology. *Impatiens parvisepala* grows in valleys near rivers at ca. 500 m elevation with various herbs and shrubs, such as *Diplopterygium*, *Begonia*, *Elatostema* and *Elymus*.

Distribution. Southern and southwestern Guangxi, China (Fig. 3).

Fig. 3. Distribution of *Impatiens parvisepala* (■).

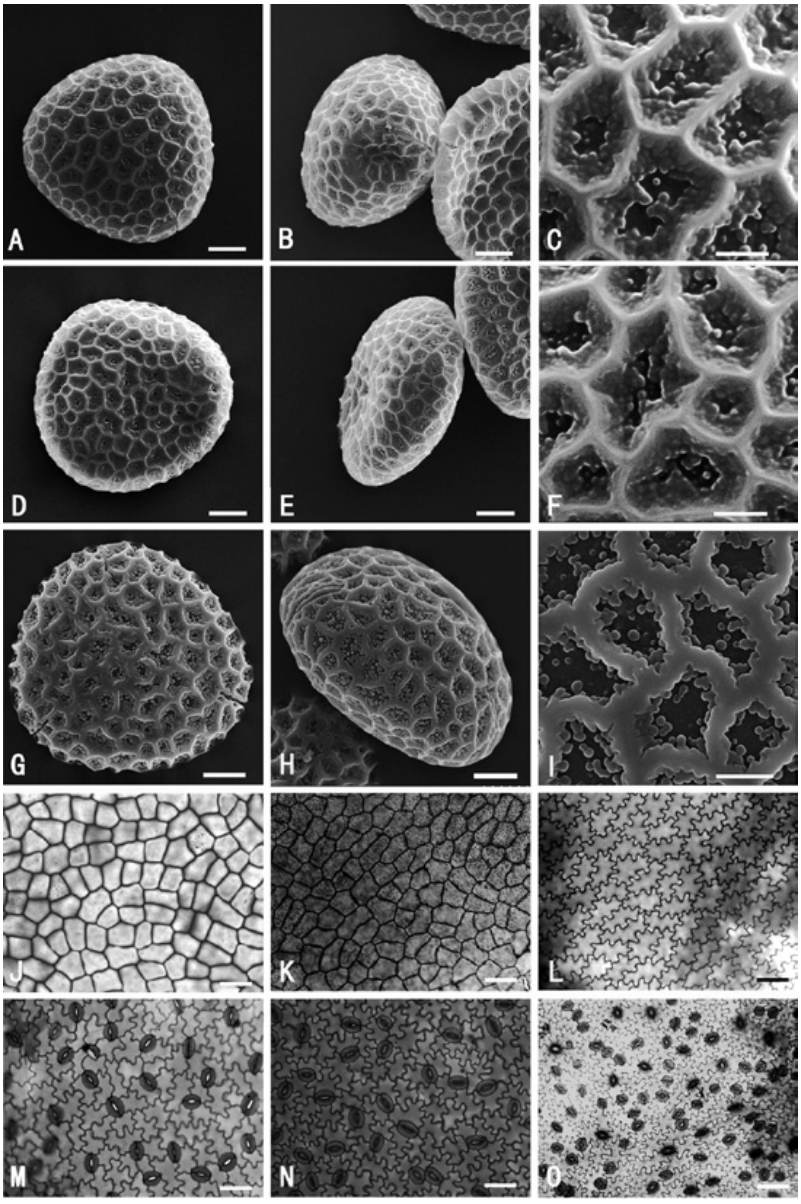

Fig. 4. — **A**–**I**: Pollen morphology under SEM. — **A**–**C**: *Impatiens parvisepala*. — **A**: Polar view. — **B**: Equatorial view. — **C**: Surface. — **D**–**F**: *I. claviger*. — **D**: Polar view. — **E**: Equatorial view. — **F**: Surface. — **G**–**I**: *I. apalophylla*. — **G**: Polar view. — **H**: Equatorial view. — **I**: Surface. Scale bar **A**, **B**, **D**, **E**, **G**, **H** = 5 μm; **C**, **F**, **I** = 2 μm. — **J**–**O**: Light photomicrographs of leaf epidermal micromorphology. — **J** and **M**: *I. parvisepala*. — **J**: Adaxial epidermis. — **M**: Abaxial epidermis. — **K** and **N**: *I. claviger*. — **K**: Adaxial epidermis. — **N**: Abaxial epidermis. — **L** and **O**: *I. apalophylla*. — **L**: Adaxial epidermis. — **O**: Abaxial epidermis (scale bar = 100 μm). Voucher specimens: *I. parvisepala*: *S. X. Yu 3754*; *I. claviger*: S. *X. Yu 3717*; *I. apalophylla*: *S. X. Yu 4042*; all deposited in PE.

Table 1. Comparison among *Impatiens parvisepala*, *I. claviger*, *I. apalophylla* and *I. siculifer*.

Characters	*I. parvisepala*	*I. claviger*	*I. apalophylla*	*I. siculifer*
Leaf base	obovate or obovate-lanceolate	obovate or oblong-elliptic	oblong or oblong-lanceolate	ovate-lanceolate, oblong-lanceolate
Petiole	sessile or subsessile	petiolate	petiolate	petiolate
Leaf arrangement	subverticillate	alternate	alternate	alternate
Outer lateral sepals	lanceolate, inequilateral, ca. 5 mm, subcoriaceous	ovate, equilateral, 8–12 mm, membranous	ovate-lanceolate, inequilateral, 10–15 mm, subcoriaceous	lanceolate, or narrow oblong, ca. 5 mm, subcoriaceous
Inner lateral sepal	lanceolate, inequilateral	lanceolate, inequilateral	lanceolate, inequilateral	lacking
Lower sepal	slightly narrowly funnel-shaped, with reddish patches	narrowly funnel-shaped, without reddish patches	narrowly funnel-shaped, with reddish patches	narrowly funnel-shaped, without reddish patches
Spur shape	sub-straight, 20–25 mm	incurved, ca. 5 mm	incurved, 20–25 mm	sub-straight or incurved, 15–20 mm
Number of carpels	4	4	4	5
Seed morphology	quadrate- ellipsoid, with reticulate ornaments on the surface	oblong-ellipsoid, with reticulate ornaments on the surface	oblong, with reticulate ornaments on the surface	oblong, with digitiform protrusion on the surface
Pollen in polar view	triangular	triangular	triangular	oblong

Although *Impatiens parvisepala* is common in humid forests in valleys near rivers in Guangxi, it has long been misidentified as *I. claviger*. *Impatiens parvisepala* is morphologically similar to *I. claviger* and its allies because of the subshrubby habit, stalked raceme, four lateral sepals, 4-carpellate ovary, one seed per valve and 3-colpate pollen grains. Among the similar species, *I. parvisepala* is similar to *I. claviger* and *I. apalophylla* in having a raceme, yellow flowers and four lateral sepals, but differs in that the sessile or subsessile leaves are aggregated or subverticillate on the upper part of the stem, the bracts are lanceolate or subulate, the outer lateral sepals are smaller, the lower sepal is funnel-shaped with a nearly straight spur, and the lateral united petals have a short claw. The reproductive and vegetative characters of *I. parvisepala*, *I. claviger*, *I. apalophylla* and *I. siculifer* are compared in Table 1.

The pollen characters of *Impatiens parvisepala*, *I. claviger* and *I. apalophylla* are similar (Fig. 4A–I) in the 3-colpate pollen grains, long colpi, thin, exine with reticulate ornamentation, and granules in the lumina, triangular in polar view but the length of the polar axis is quite different. However, the pollen grains of *I. siculifer* are quite different from the other species, because of its 4-colpate and in polar view oblong pollen grains. The polar axis in *I. parvisepala* is much longer than in *I. claviger*, *I. apalophylla* and *I. siculifer*.

The stomatal apparatus of these three species (Fig. 4J–O) is irregular, with stomates only on the abaxial surface of the leaf. The stomates are anomocytic and the outlines of the guard cells are suborbiculate in all of the three species. The anticlinal walls on the abaxial and adaxial surface of *I. parvisepala* and *I. claviger* are also very similar. The anticlinal walls of the cells of *I. apalophylla* are readily distinguished on both the abaxial and adaxial surfaces. In *I. parvisepala and I. claviger*, the anticlinal walls of the adaxial surface are straight, while those of the abaxial surface are sinuate. In *I. apalophylla* the cells on both surfaces are sinuate and the density of the stomates is higher than in the other two species.

The borderland between China and Vietnam is a well known biodiversity hotspot, especially the limestone karst region. A number of botanical

novelties have been reported from these remarkably extensive limestone habitats in recent years, especially in *Begonia* (Ku *et al*. 2008, Peng *et al*. 2008a, 2008b), Gesneriaceae (Chen *et al*. 2008, Xu *et al*. 2008), *Aspidistra* (Tillich & Averyanov 2008), *Impatiens* (Yu *et al*. 2008, 2009), and Acanthaceae (Chen *et al*. 2009). More than 20 new species of *Impatiens* have been discovered since 2003 in this hotspot. Many members of *Impatiens* occur in forests, some of them remote and difficult to reach.

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