Impatiens rupestris (Balsaminaceae), a New Species from Hunan, China

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ABSTRACT. *Impatiens rupestris* K. M. Liu & X. Z. Cai, a new species of Balsaminaceae from Hunan Province in southern China, is described and illustrated. An identification key to the new species and its relatives is provided. *Impatiens rupestris* differs from *I. polyneura* K. M. Liu in its lamina base widely cuneate or ± rounded, the lateral veins in 11 to 16 pairs, the dorsal petal widely obovate, and the lower lobes of the lateral united petals connate into obovate lamella. It is distinct from *I. obesa* Hooker f. in its lamina elliptic or ovate-oblong, lateral united petals stipitate, upper corolla lobes widely obovate or suborbicular, lower corolla lobes connate into obovate lamella, and seeds with tuberculate testa.

Key words: Balsaminaceae, China, Hunan, *Impatiens*, IUCN Red List.

Impatiens L. (Balsaminaceae) is one of the largest genera in the world and consists of over 900 species mainly distributed in the highlands and mountains of the Old World tropics, and also in parts of temperate Asia and Europe (Grey-Wilson, 1980a, b; Chen, 2001; Fischer, 2004; Stevens, 2004). There are about 240 species recorded in China and most are endemic (Chen, 2001; Jin & Ding, 2002; Huang et al., 2003). The genus is characterized by the unusual androecium partially fused around the ovary, usually having a nectary-tipped spur, the four lateral petals connate in pairs, and the 4- or 5-valved, loculicidal capsule, from which the seeds are often explosively dispersed.

In a recent scientific survey of *Impatiens* in southern Hunan for the *Flora of China*, an interesting species was collected in Jiangyong County. On further visits to the same locality, additional material was gathered to provide a range of specimens with flowers and mature fruits. After comparison with morphologically similar taxa and study of publications for China and neighboring countries (Shimizu, 2000; Chen, 2001; Jin & Ding, 2002; Huang et al., 2003), we conclude that the specimens represent an undescribed species.

Impatiens rupestris K. M. Liu & X. Z. Cai, sp. nov. TYPE: China. Hunan: Jiangyong Co., 350 m, 111°9′59.7″E, 25°6′11.8″N, limestone crevices on S slopes, 22 July 2006, *K. M. Liu & X. Z. Cai 772938* (holotype, HNNU; isotypes, MO, HNNU). Figure 1.

Species *Impatienti polyneurae* K. M. Liu affinis, sed laminis foliorum basi vulgo late cuneatis vel suborbiculatis, nervis lateralibus 11- ad 16-jugis, petalo dorsali late obovato, petalis lateralibus inferioribus connatis facile differt. Ab *I. obesa* Hooker f. laminis foliorum ellipticis vel ovato-oblongis, petalis lateralibus stipitatis, lobis corollae superioribus late obovatis vel suborbiculatis, inferioribus connatis obovatis apice emarginato, seminibus parvi-tuberculatis facile differt.

Succulent herb, 25–60 cm tall, glabrous; stems erect, thick, to 1.2 cm diam., simple or rarely branched from middle, leafless proximally, yellow-green, with purple-red spots and numerous adventitious roots. Leaves alternate, distally crowded; petiole 1–4 cm, with purple-red spots; lamina membranous, elliptic or ovate-oblong, apex acuminate, 6–13.5 × 3–6 cm, margin serrulate, teeth mucronulate, base widely cuneate or ± rounded, with 2 ovoid sessile glands at base, primary lateral veins in 11 to 16 pairs, curved, conspicuous abaxially and adaxially, abaxial midvein purple-red spotted. Flowers solitary, rarely 2-flowered; peduncles very short, ca. 1 mm; pedicels 2–2.5 cm, ca. 1.2 mm diam. when fresh, glabrous, usually purple-red spotted, bracteate at base; bracts lanceolate, ca. 1.5 mm, membranous, persistent. Flower pale purple, 2.5–3 cm; lateral sepals 4, outer 2 obliquely ovate or suborbicular, thick, 8–12 mm, the midvein conspicuous, margin entire, apex mucronulate; inner 2 sepals minute, narrowly lanceolate or linear, ca. 2 mm; lower saccate sepal broadly funnel-shaped, dorsal ventral light green, usually with red-yellow striations along the vascular bundle, sometimes the colors lighten, 20–25 mm from pedicel to base of spur; mouth slightly ascending, ca. 11 mm wide, anterior mucronulate; base abruptly constricted into an incurved, 2-lobed short spur; dorsal petal widely obovate, to 1.5 × 1.2–1.5 cm, base cuneate, apex retuse, abaxial midvein thickened, cristate, apex rostellate; lateral united petals stipitate, 2-lobed, ca. 1.8–2.2 cm; upper lobes widely obovate or suborbicular, ca. 8 mm wide; lower corolla lobes connate into obovate lamella, apex emarginate, sometimes with erose purple spots or absent; abaxial auricle reflexed, triangular, orange; filaments linear, 2–3 mm, upper part dilated; anthers ovoid, joined into a ring

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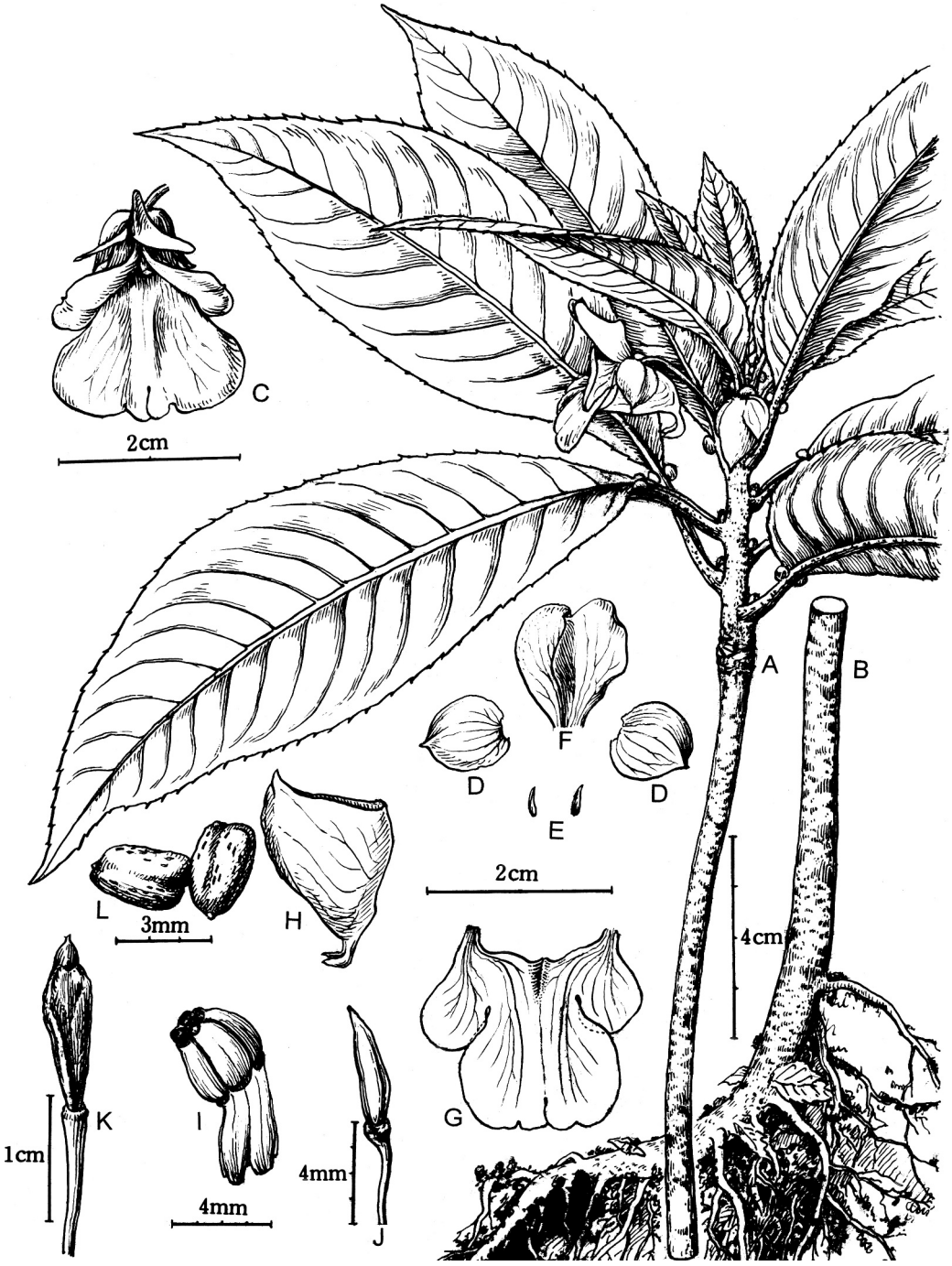

Figure 1. *Impatiens rupestris* K. M. Liu & X. Z. Cai. —A. Upper portion of flowering stem. —B. Lower part of the stem and adventitious roots. —C. Flower, front view. —D. Outer two lateral sepals. —E. Inner two lateral sepals. —F. Dorsal petal. —G. Lateral united petals, dorsal view. —H. Lower sepal. —I. Androecium, showing poricidal dehiscence. —J. Ovary. —K. Fruit. —L. Seeds. Drawn by L. H. Liu from the holotype, *K. M. Liu & X. Z. Cai 772938* (HNNU).

surrounding the ovary apex, apex obtuse, with poricidal dehiscence; ovary fusiform, 4-carpellate, apex curved-rostellate, ca. 4 mm. Capsule rhombic-fusiform, 10–13 mm, 4-angled, rostellate; seeds 4 or 5, oblong, ca. 3 × 2 mm, brown, testa tuberculate.

Distribution and habitat. *Impatiens rupestris* is known only from Jiangyong County, Hunan, China, in stony crevices on slopes of limestone areas. Here it grows at an altitude of 350 m, in association with *Paliurus hemsleyanus* Rehder, *Zanthoxylum echinocarpum* Hemsley, *Pterolobium punctatum* Hemsley, *Glochidion puberum* (L.) Hutchinson, *Alyxia sinensis* Champion ex Bentham, *Urena lobata* L., *Belamcanda chinensis* (L.) DC., and *Ophiopogon japonicus* (L. f.) Ker Gawler.

IUCN Red List category. *Impatiens rupestris* is currently known only from Jiangyong County, Hunan, and the overall plant population there is small, consisting of about 1200 individuals. The number of mature individuals is about 800. As such, it should be considered Vulnerable (VU) according to IUCN Red List criteria (IUCN, 2001). Additional ecological and biological study should be taken toward effective conservation measures.

Phenology. The plants flower from July to September and fruit from August to October.

Taxonomic remarks. Y. L. Chen (2001) considered short peduncles, pedicels bracteate at the base, and lower lobes of lateral united petals connate or adnate into broad lamella as original characters in *Impatiens*, such as *I. obesa*, *I. morsei* Hooker f., *I. hainanensis* Y. L. Chen, *I. polyneura*, and *I. musyana* Hooker f. Compared with species of *Impatiens* with four lateral sepals, *I. rupestris* closely resembles *I. polyneura* in its stipitate lateral united petals, emarginate apex, and tuberculate seed testa. It differs from *I. polyneura* by its widely cuneate or ± rounded lamina base, the lateral veins in 11 to 16 pairs, the widely obovate dorsal petal, and the lower corolla lobes connate into obovate lamella. Although *I. rupestris* is similar to *I. obesa* in the pedicels that are bracteate at the base and persistent, and the minute inner two sepals (ca. 2 mm), *I. obesa* differs mainly in its ovate or oblanceolate leaves, cuneate lamina base, sessile lateral united petals, pyriform upper corolla lobes, dolabriform lower corolla lobes, and glabrous seeds. The new species and similar species of *Impatiens* in China may be distinguished through the following key.

Key to *Impatiens rupestris* and Similar Species with Four Lateral Sepals in China

1a. Inflorescences without peduncles; pedicels without bracts . . . . . *I. musyana*

1b. Inflorescences with short peduncles; pedicels with bracts at base, bracts persistent.
  2a. Lateral united petals sessile, lower corolla lobes dolabriform, apex rounded-obtuse; seeds glabrous . . . . . *I. obesa*
  2b. Lateral united petals stipitate, lower corolla lobes connate into orbicular or obovate lamella, apex emarginate; seed testa tuberculate.
    3a. Lamina base cuneate; primary lateral veins in 16 to 21 pairs; dorsal petal obovate-oblong; lower corolla lobes connate into orbicular lamella . . . . *I. polyneura*
    3b. Lamina base widely cuneate or ± rounded; primary lateral veins in 11 to 16 pairs; dorsal petal widely obovate; lower corolla lobes connate into obovate lamella. . . . . *I. rupestris*

Paratype. CHINA. **Hunan Prov.:** Jiangyong, *K. M. Liu & X. Z. Cai 777488* (HNNU).

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Literature Cited

Chen, Y. L. 2001. Balsaminaceae. Pp. 4–38 *in* Y. L. Chen (editor), Flora Reipublicae Popularis Sinicae, Vol. 47(2). Science Press, Beijing.

Fischer, E. 2004. Balsaminaceae. Pp. 20–25 *in* K. Kubitzki (editor), The Families and Genera of Vascular Plants, Vol. 6. Flowering Plants: Dicotyledons. Celastrales, Oxalidales, Rosales, Cornales, Ericales. Springer, Berlin.

Grey-Wilson, C. 1980a. *Impatiens* in Papuasia, Studies in Balsaminaceae: I. Kew Bull. 34: 661–688.

———. 1980b. *Impatiens* of Africa. Morphology, Pollination and Pollinators, Ecology, Phytogeography, Hybridisation, Keys and a Systematic Treatment of all African Species, with a Note on Collecting and Cultivation. A. A. Balkema, Rotterdam.

Huang, S. H., Y. M. Shui & W. H. Chen. 2003. New taxa of *Impatiens* from Yunnan. Acta Bot. Yunnan 25(3): 261–280.

IUCN. 2001. IUCN Red List Categories and Criteria Version 3.1. Prepared by the IUCN Species Survival Commission, Gland, Switzerland, and Cambridge, United Kingdom.

Jin, X. F. & B. Y. Ding. 2002. A new species of *Impatiens* from eastern Zhejiang, China. Acta Phytotax. Sin. 40(2): 167–169.

Shimizu, T. 2000. New species of the Thai *Impatiens* (Balsaminaceae): 2. Bull. Natl. Sci. Mus., Tokyo, B 26: 35–42.

Stevens, P. E. 2004. Angiosperm Phylogeny website [version 5, May 2004], <http://www.mobot.org/MOBOT/research/APweb/>, accessed May 2004.