

## IMPATIENS ROSTRATA (BALSAMINACEAE), A NEW SPECIES FROM KHAMMOUANE PROVINCE, LAOS, AND NINE NEW RECORDS

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One new species, *Impatiens rostrata* Souvann. & Lanors., is described and illustrated, and nine new records of *Impatiens* for Laos are reported. A lectotype of *Impatiens rubrostriata* Hook.f. is designated, and two new synonyms are made.

**Keywords.** Indochina, Laos, lectotype, limestone flora, new distribution, new species, taxonomy.  
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### Introduction

*Impatiens* L. (Balsaminaceae) was established by Linnaeus (1753) to accommodate *Impatiens chinensis* L. (the lectotype species), a tiny plant collected in China and also common in the Lao People's Democratic Republic (Laos). There are more than 1500 species in the genus worldwide (Suksathan & Triboun, 2009; Cho *et al.*, 2017; Ruchisansakun *et al.*, 2018), but it is difficult at present to give an accurate number of the species found in Laos because there has not been a taxonomic revision of the Balsaminaceae of Laos since Hooker's contribution to Lecomte's *Flore générale de l'Indo-Chine* (1911). Hooker treated only four species that were clearly from Laos and another four from Stung Treng, which was in Laos in the early twentieth century. Species found in Stung Treng, which is now in Cambodia, are likely to occur in Champasak Province, Laos.

In 1944, Tardieu-Blot described a large number of new species of *Impatiens* from Indo-China, including 11 from Laos (Tardieu-Blot, 1944). More recently, *Impatiens pachycaulon* M.F.Newman was described from Khammouane Province (Newman, 2008), *I. gadellae* Souvann. & Suksathan from Louangphabang Province, and *I. nurae* Souvann. & Suksathan from Vientiane Province (Souvannakhoummane & Suksathan, 2015). *Impatiens balsamina* L. and *I. walleriana* Hook.f. have been introduced into Laos for ornamental and medicinal purposes. Thus, about 26 species have been recorded in Laos (Cho *et al.*, 2017). All this information is also summarised in the online *Checklist of the Vascular Plants of Lao PDR* (Royal Botanic Garden Edinburgh, [continuously updated](#)). We report below the discovery of one new species and nine new records in Laos, as a result of our fieldwork and study of specimens.

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## Materials and methods

Surveys and collections of *Impatiens* for taxonomic study have been undertaken since 2011. Protologues and other descriptions of *Impatiens* species known to occur in Asia have been consulted, and specimens have been examined as high-resolution digital images at the following herbaria: AAU, BKF, BM, E, K, P and PE. All measurements and descriptions were made from mature and living plants and spirit material preserved in 70% ethanol. After processing and identification, the sheets were deposited at E, FOF, HNL, QBG and SING, and the living collections and flowers preserved in ethanol were kept at Pha Tad Ke Botanical Garden and the Biology herbarium, Faculty of Natural Science, National University of Laos.

All morphological characters were described using the general terminology of Beentje (2012) and following Suksathan & Triboun (2009) and Ruchisansakun *et al.* (2018). One new species is described and illustrated, and a preliminary IUCN assessment is made. Nine new records are also reported, with photographs; notes on distribution, ecology, phenology and specimens examined; and comparisons with similar species.

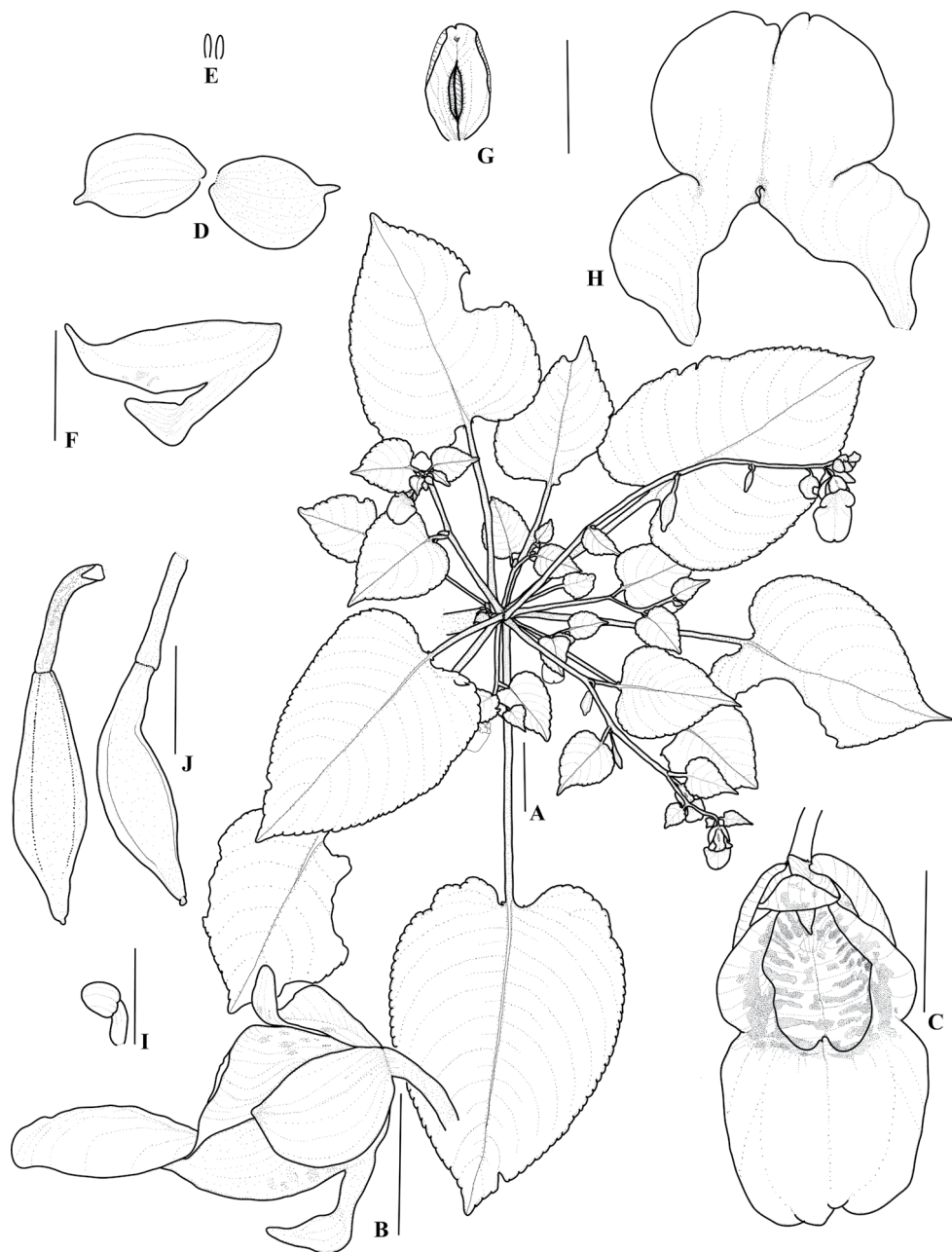
## New species

### *Impatiens rostrata* Souvann. & Lanors., sp. nov.

*Impatiens* sect. *Semeiocardium* (Zoll.) S.X.Yu & Wei Wang, *Cladistics* 32, 2: 191 (2015).

Similar to *Impatiens bonii* Hook.f. in having connate lateral united petals and 4-carpellate ovary, and in overall flower shape, but differs in having leaf bases cordate to cuneate (not rounded), flower yellow with white lobe apex, red spots inside (not red patch inside with violet lobe apex), lateral sepals 4 (not 2), simple spur (not bifid), dorsal petals oblong-elliptic (not obcordate), seeds ovoid-oblong (not globose). – Type: Laos, Khammouane Province, Mahaxay District, Natoung village, Phou Hin Poun National Protected Area, humid deciduous forest on limestone, 17°30'23.4"N 105°10'06.5"E, 200 m, 21 vii 2019, *Lanorsavanh, S., Souvannakhoummane, K. & Xaiyyavong, K.* SL 1782 (holotype HNL; isotypes E, FOF, QBG, Biology herbarium, Faculty of Natural Science, National University of Laos). **Figures 1, 2.**

Annual, glabrous herb, up to 50 cm tall. *Stems* erect, succulent, 20–30 cm long, 0.4–1 cm in diameter, smooth, often becoming decumbent and rooting at the base, branched at top of stem, thin, slender, 3–25(–30) cm tall, with conspicuous leaf scars. *Leaves* spirally arranged, crowded at top of main stem and alternate at branches; petioles red to green, 0.5–9.5 cm long on lower leaves, 0.5–3 cm long on upper leaves, with a pair of glands adjacent to leaf base; lamina broadly ovate to cordate, 4–9.5(–12) × 3.5–6.5 cm, base cordate to cuneate, margin crenate, apex acuminate, adaxial surface dull green, puberulent, abaxial surface light green, verrucose, secondary veins 10–16 pairs. *Inflorescences* axillary, solitary or fascicled, below the leaves; pedicels erect to slightly curved, 4–6 mm, puberulent. *Bracts*



**Figure 1.** *Impatiens rostrata* Souvann. & Lanors., sp. nov. A, Plant with flower from above; B, flower, lateral view; C, flower, front view; D, outer lateral sepals; E, inner lateral sepals; F, lower sepal; G, dorsal petal; H, lateral united petals; I, ovary and stamens; J, fruits. Scale bars: A, 5 cm; B–H and J, 1 cm; I, 5 mm. Drawn from *Lanorsavanh* et al. SL 1782 (A–C, from living plant; D–I, from spirit material) by K. Souvannakhoummane.

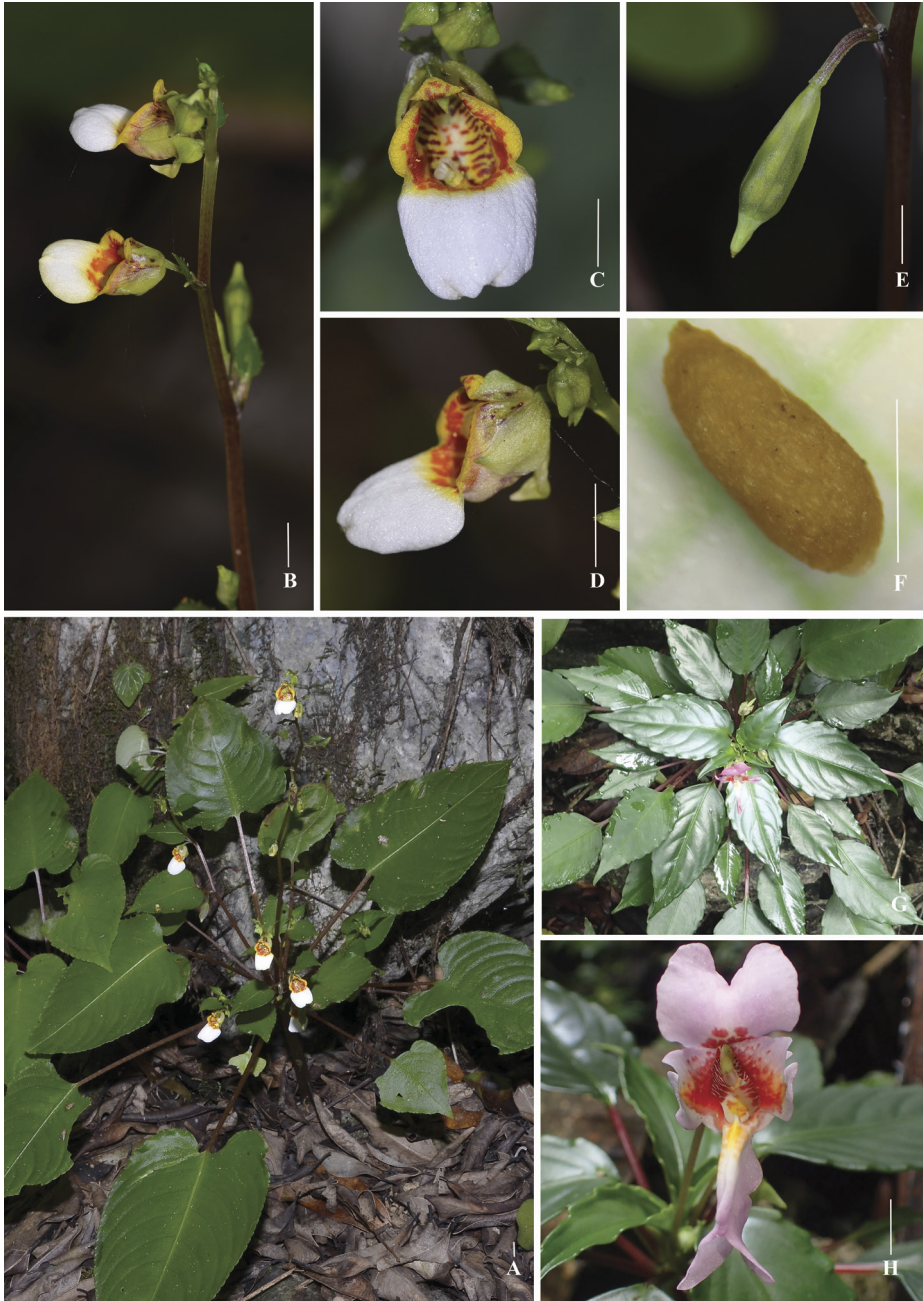


Figure 2. A–F, *Impatiens rostrata* Souvann. & Lanors., sp. nov.: A, plant with flowers; B, flowers at branch apex; C, partial front view of flower; D, lateral view of flower; E, fruit; F, seed. G and H, *Impatiens bonii*: G, plant with flower; H, front view of flower. Scale bars: A–E, G and H, 1 cm; F, 1 mm. Photographs: A–E, S. Lanorsavanh; F, K. Souvannakhoummane; G and H, T. N. Bon.

conspicuous, ovate-linear, 1–2 × 0.5–1.5 mm, verrucose, persistent. *Flowers* white with deep yellow to red-brown cross-stripes inside; lateral sepals 4, yellowish green, outer sepal pair ovate-orbicular, 4–6 × 3.5–4 mm, puberulent, apex with a thick blunt mucro, inner sepal pair narrowly linear, 0.4–0.6 mm long; lower sepal navicular, yellow, with reddish spots inside, 2–4 mm deep, 8–10 mm long, outer verrucose, pale green with brown spot, apex with a thick blunt mucro, incurved with a stout spur, 4–5 mm long, apex narrow-beaked; dorsal petal oblong-elliptic, 5–6 mm long, 2.7–3 mm wide, puberulent, crest thick, prominent at centre with mucro near apex, apex emarginate, yellow outside with green crest, yellow inside with red patch; lateral united petals connate, 12–15 × 8–10 mm; upper petals semi-orbulate, 3–4 × 5–6 mm, yellow with red patch inside; lower petals orbiculate, 7–1 × 10–12 mm, yellowish to white, apex bifid; basal auricles orbiculate, c.1 mm long; filaments and anthers pale cream to yellow, apex rounded. *Ovary* ellipsoid, 4-carpellate, pale green, glabrous, axile placentation, ovules numerous, ovoid, white. *Capsules* clavate, 15–25 mm long, verrucose to puberulent. *Seeds* 4–12(–15), oblongoid, yellowish-brown, c.2 × 1 mm, rugose.

*Distribution.* Central Laos, Khammouane Province, Mahaxay District, Phou Hin Poun National Protected Area.

*Habitat and ecology.* Growing in sandy soil in clefts in rock in deciduous forest, associated with *Calanthe cardioglossa* Schltr. and *Bulbophyllum* sp. (Orchidaceae), *Microchirita* sp. (Gesneriaceae) and *Begonia* sp. (Begoniaceae).

*Phenology.* Flowering during the rainy season, from July to September; fruiting late July to October.

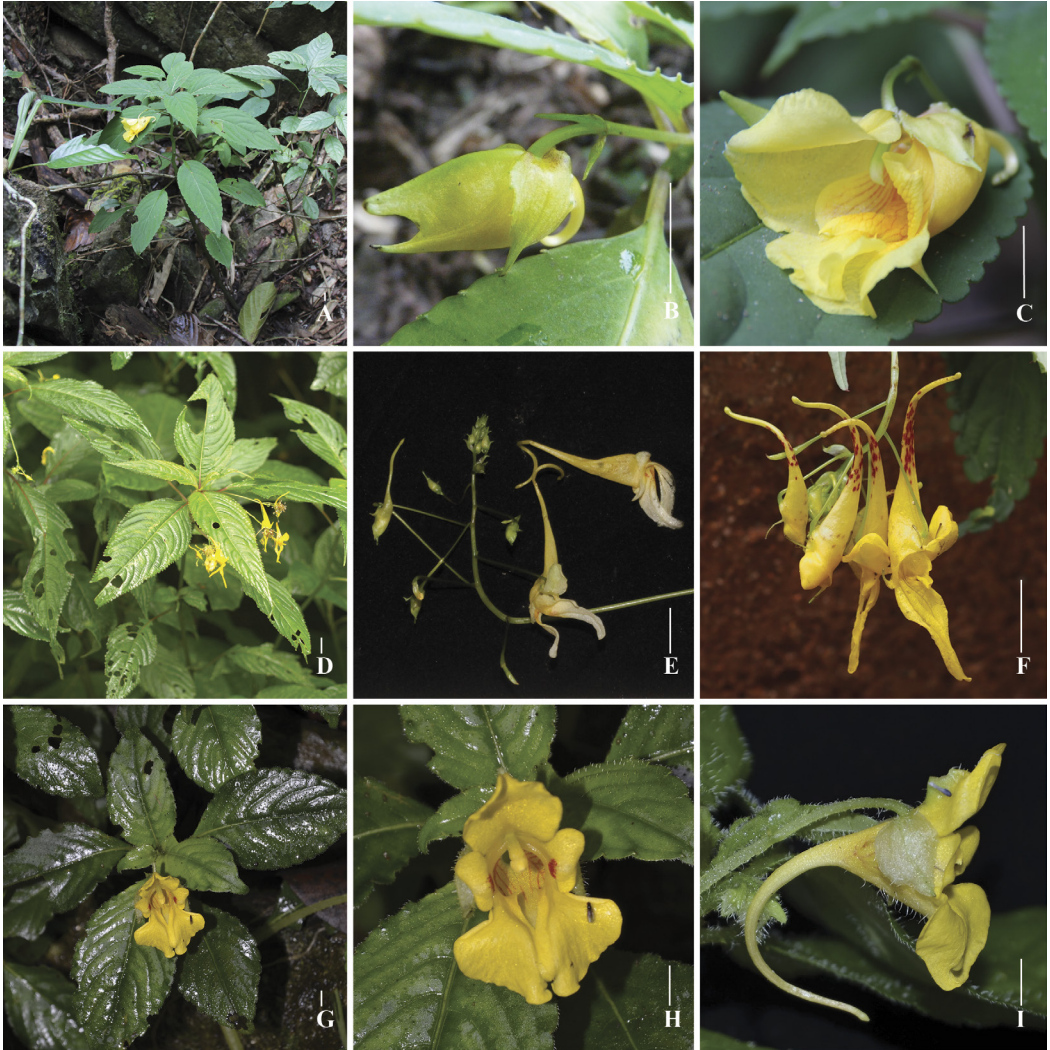
*Etymology.* The epithet is from the Latin, *rostratus*, meaning 'beaked', referring to the beak-shaped spur.

*Proposed IUCN category.* Least Concern (LC). *Impatiens rostrata* is currently known only from the type locality within Phou Hin Poun National Protected Area, restricted to a single locality where the population comprises c.30 individuals. Phou Hin Poun National Protected Area measures 1690 km<sup>2</sup>, and this can be taken as the extent of occurrence. The area of occupancy is 4 km<sup>2</sup>, but this is likely to be an underestimate. Because the whole distribution of *Impatiens rostrata* is within a National Protected Area, it must be assessed as LC at present. It should be noted, however, that this is a limestone area and mining for cement manufacture may be tolerated, even if it is not strictly legal. For this reason, the locality should be frequently monitored for damage.

The new species belongs to *Impatiens* sect. *Semeiocardium*, a large group that includes c.70 species in Southeast Asia (Yu et al., 2015), all with connate lateral united petals.

## New records

*Impatiens damrongii* Shimizu, Acta Phytotax. Geobot. 24: 38 (1969); S. E. Asian Stud. 8, 2: 215 (1970). – Type: Thailand, Phitsanulok Province, Phu Miang mountain, Shimizu, T. 11634 (holotype KYO!, isotype BKF!). [Figure 3A–C](#).



**Figure 3.** A–C, *Impatiens damrongii*: A, plant with flower; B, lateral view of bud; C, partial front view of flower. D–F, *Impatiens drepanophora*: D, plant with flowers; E, raceme and lateral view of flowers; F, oblique view of flowers. G–I, *Impatiens kamtilongensis*: G, plant with flower; H, front view of flower; I, lateral view of flower. Scale bars: 1 cm. Photographs: A–C, K. Phoutthavong; D–F, K. Souvannakhoummane; G–I, S. Lanorsavanh.

*Impatiens wenshanensis* S.H.Huang, Acta Bot. Yunnan. 25, 3: 267–268, pl. 3, f. 1–7 (2003), **syn. nov.** – Type: China, Yunnan Province, Wenshan, Laojunshan, 1820 m, 23 ix 1992, Y.M. Shui 0254 (holotype YUKU n.v.).

*Distribution.* This species occurs in Louangphabang Province, close to the type locality in Phitsanulok, Thailand, and in Yunnan Province, China, where it was originally described under *Impatiens wenshanensis* (Huang, 2003).

*Habitat and ecology.* *Impatiens damrongii* was found growing in shaded and mixed bamboo to deciduous forest in limestone areas, 300–500 m altitude, associated with *Amorphophallus* sp. (Araceae), *Curcuma corniculata* Škorničk. (Zingiberaceae), *Argostemma* sp. (Rubiaceae) and *Dendrocalamus* sp. (Poaceae).

*Phenology.* Flowering from October to November, fruiting from November to December.

*Specimen examined.* LAOS. Louangphabang Province: Long Lao Mai village, 19°45'18.4"N, 102°02'59.8"E, 900 m altitude, 5 xi 2012, Souvannakhoummane, K. & Phouthavong, K. KS492 (HNL, QBG, spirit collection at Pha Tad Ke Botanical Garden).

Vegetatively, this species is close to *Impatiens clavigera* Hook.f. but differs in having dentate-glandulate outer lateral sepal margins and a large thick crest in the dorsal petal. The type drawing and original description of *Impatiens wenshanensis* match the protologue of *I. damrongii* well.

*Impatiens drepanophora* Hook.f., Rec. Bot. Surv. India 4: 17 (1905); Toppin, Bull.

Misc. Inform. Kew 10: 364 (1920); Chen, Akiyama & Ohba, Fl. China 12: 69 (2007); Ruchisansakun et al., Blumea 63: 228 (2018). – Type: India, Khasia Hills, 6 vi 1850, altitude 6000 ft, Hooker & Thomson 56 (lectotype K [K000694682]; isolectotypes K [K000694683, K000694684, K000694685, K000694686, K000694687], L n.v [L0388881], designated by Ruchisansakun et al., 2018). **Figure 3D–F.**

*Distribution.* This species occurs in Xiengkhouang and Houaphane Provinces in northern Laos. It was originally described from the Khasia Hills in Northeast India and has also been reported from Nepal, South China and Myanmar (Ruchisansakun et al., 2018).

*Habitat and ecology.* *Impatiens drepanophora* was found growing in evergreen montane forest in moist soil near streams, 900–1800 m altitude, associated with ferns.

*Phenology.* Flowering from June to November, fruiting December.

*Specimens examined.* LAOS. Houaphane Province: Viengthong District, Nam Et-Phou Louey National Protected Area, along the road from Ban Phou Vieng to Vieng Thong, 5 vi 2013, Leong-Škorničková et al. JLS2332 (E [E00808193], HNL, P, QBG, SING, spirit collection at Pha Tad Ke Botanical Garden); Phou Kaew Lom, 21 x 2002, Homsombath & Newman 1418 (E [E00171894, E00171894]). Xiengkhouang Province: Khoun District, Phou Sam Soum, valley of primary evergreen forest, 9 ix 2016, K. Souvannakhoummane et al. KS–Bio 0038 (FOF, HNL).

From the coloration of the spur, some specimens of *Impatiens drepanophora* in Laos look very similar to *I. longiloba* Craib, a Thai endemic species, but it is easily distinguished by having aristate-glandulate tips at the apices of the lateral and lower sepals (versus none). It is also very close to *Impatiens ruiliensis* S.Akiyama & H.Ohba of China, or even conspecific. More studies are needed to confirm their identities.

***Impatiens kamtilongensis*** Toppin, Bull. Misc. Inform. Kew 1920: 356 (1920); Akiyama, Ohba & Wu, Bull. Natl. Sci. Mus. Tokyo, B 22: 135 (1996); Chen, Akiyama & Ohba, Fl. China 12: 50 (2007); Chinh, Huong, Quang & Suksathan, Tạp Chí Sinh Học 37: 332 (2015); Ruchisansakun *et al.*, Blumea 63: 253 (2018). – Type: Myanmar, Kamti Long Hills, Kumtat; Sinar at 650 m, xii 1911, *Toppin* 4275 (lectotype K [K000694653]; isolectotypes K [K000694654], K [K000694655] designated by Ruchisansakun *et al.*, 2018). **Figure 3G–I.** *Impatiens finetii* Tardieu, Notul. Syst. (Paris) 11: 183 (1944); Fl. Indo-Chine Suppl. 1, 4–5: 588 (1945), **syn. nov.** – Type: Vietnam, Thanh hao, Dat Kiet, 13 ix 1920, *Poilane*, E. 1842 (lectotype P! [P00780719], designated here; isolectotypes P! [P00780720, P00780721]).

**Distribution.** This species has been found at Phou Chom Voy, Khamkeut District, Bolikhamxai Province, Laos. It was originally described from central Myanmar (Toppin, 1920) and has also been reported from China and Vietnam (Chen *et al.*, 2007; Chinh *et al.*, 2015).

**Habitat and ecology.** Growing near streams, sandy soil in wet areas, in evergreen forest, associated with *Begonia* sp. (Begoniaceae), *Odontochilus elwesii* C.B. Clarke ex Hook.f. (Orchidaceae) and Araceae.

**Phenology.** Flowering from June to December, fruiting in December and January.

**Specimens examined.** LAOS. **Bolikhamxai Province:** Khamkeut District, Naheung village, Phou Chom Voy, 1200–1400 m altitude, 19 vi 2018, *Lanorsavanh, Lamxay, Souvannakhoummane & Bounphanmy* SL 1282 (Biology herbarium, Faculty of Natural Science, National University of Laos, FOF, HNL); *ibid.*, 12 xii 2017, *Lamxay s.n* (Biology herbarium, Faculty of Natural Science, National University of Laos).

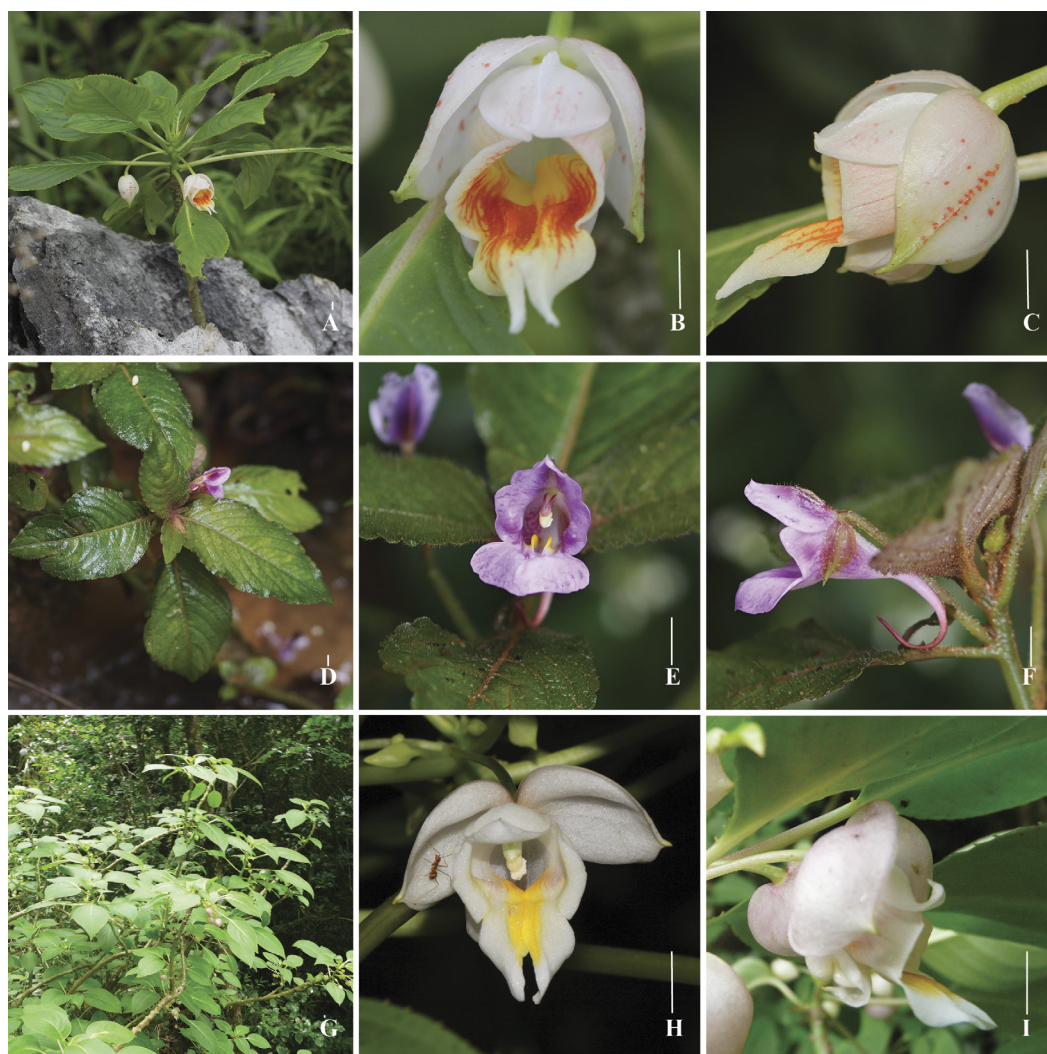
*Impatiens kamtilongensis* is very closely related to *I. porrecta* Wall. ex Hook.f. & Thomson and *I. khasiana* Hook.f. by its spurred dorsal petal (versus cristate). This species was said by Ruchisansakun *et al.* (2018) to have pink flowers because of the very pale pink petals in the type specimen, which differs from the colour indicated in the protologue (yellowish white). We feel that the colour described in the text of the protologue is more reliable than what we have seen on a 100-year-old specimen. Our material varies from the type specimens by having yellow flowers (not yellowish white). This concept is also adopted in the *Flora of China* (Chen *et al.*, 2007).

*Impatiens kamtilongensis* also resembles *I. wuchengyihii* S.Akiyama, H.Ohba & S.K.Wu from South China morphologically but differs by the shape of the lateral sepals (ovate-lanceolate versus linear). It also differs from *Impatiens phahompokensis* T.Shimizu & Suksathan from Thailand by its inflorescences with 1 or 2 flowers versus solitary flowers, and its lateral sepals, which are ovate, not suborbicular.



*Impatiens kerriae* Craib, Bull. Misc. Inform. Kew 1926, 4: 161 (1926); Ruchisansakun et al., Blumea 63: 214 (2018). – Type: Thailand, Chiang Mai, Doi Chiangdao, 1800 m in altitude, 3 xi 1922, Kerr 6544 (lectotype ABD n.v.; isolectotypes BK n.v [BK257749], BM! [BM000797447], K! [K000675564], designated by Ruchisansakun et al., 2018).

Figure 4A–C.



**Figure 4.** A–C, *Impatiens kerriae*: A, plant with flower; B, front view of flower; C, lateral view of flower. D–F, *Impatiens napoensis*: D, plant with flower; E, front view of flower; F, lateral view of flower. G–I, *Impatiens parishii*: G, plant; H, front view of flower; I, lateral view of flower. Scale bars: 1 cm. Photographs: A–C, K and L, K. Phouthavong; D–J, K. Souvannakhoummane.

*Distribution.* This species has now been discovered in Louangphabang Province, northern Laos. It was originally described from Thailand by Craib (1926) and has also been reported from Myanmar (Ruchisansakun et al., 2018).

*Habitat and ecology.* *Impatiens kerriae* was found growing in an open area on the summit of a limestone mountain, about 1100–1800 m a.s.l., associated with *Polygala* sp. (Polygalaceae), *Hedychium villosum* Wall. (Zingiberaceae), *Hoya* sp. (Apocynaceae) and Gesneriaceae.

*Phenology.* Flowering from June to October, fruiting from September to December.

*Specimen examined.* LAOS. Louangphabang Province: Nan District, Namueng village, 19°30'11.5"N, 102°03'39.9"E, 1200 m altitude, 18 vi 2015, Phouthavong, K., Nura Abdul Karim & Souvannakhoumane, K. s.n. (SING, flowers in spirit at Pha Tad Ke Botanical Garden).

Vegetatively, this species is close to *Impatiens parishii* Hook.f. but differs in having the pedicel as long as or longer than the petiole (versus much shorter than petiole); the lateral united petals are grooved with orange to red mixed with yellow (versus flat and only with a yellow patch at the middle). It usually grows at high elevation in open limestone areas, whereas *Impatiens parishii* grows at low elevation, 300–500 m.

***Impatiens lobbiana*** Turcz., Bull. Soc. Imp. Naturalistes Moscou 32, 1: 270 (1859); Ruchisansakun et al., Blumea 63: 216 (2018). – Type: Myanmar, Moulmein, 1846, Lobb 384 (lectotype KW [KW001000647]; isolectotype K [K000694801], designated by Ruchisansakun et al., 2018). **Figure 5D–F.**

*Distribution.* This species has been found on karst limestone in Vangvieng, Vientiane Province, central Laos. The original description was based on material collected in Myanmar (Ruchisansakun et al., 2018).

*Habitat and ecology.* *Impatiens lobbiana* was found growing at the foot of a limestone hill near a stream in the mountains. It was growing in wet soil in primary evergreen valley forest at altitude c.300 m.

*Phenology.* Flowering from June to August, fruiting from July to October.

*Specimens examined.* LAOS. Vientiane Province: Vangvieng District, base of limestone hill near stream, 26 vi 2012, Souvannakhoumane, K. & Phouthavong, K. KS 479 (QBG, spirit collection at Pha Tad Ke Botanical Garden); Kasi District, Pha Ngern Mountain, 18°54'59.8"N, 102°24'45.6"E, 450 m altitude, 16 viii 2019, Lanorsavanh & Lamxay SL 1731 (FOF, NHL).

*Impatiens lobbiana* is very similar to *I. spectabilis* Triboun & Suksathan but differs in having the upper lateral petals obcordate (versus emarginate to obtuse) and dorsal petals obcordate (versus obovate). Our material differs from the type specimens by its larger, ovate lower petal that is broader than the upper petal, whereas the type has oblong to obovate lower petals that are narrower than the upper petals. However, more molecular studies are needed to reveal their true relationship.



Figure 5. A–C, *Impatiens rubrostriata*: A, plant with flowers; B, front view of flower; C, lateral view of flower. D–F, *Impatiens lobbiana*: D, plant with flower; E, front view of flower; F, lateral view of flower. G–I, *Impatiens tigrina*, red form: G, plant with flower; H, front view of flower; I, lateral view of flower. J, *Impatiens tigrina*, red-purple form, front view of flower. K and L, *Impatiens tigrina*, yellow form: K, front view of flower; L, lateral view of flower. Scale bars: 1 cm. Photographs: A–F, K. Souvannakhoumane; G–J, S. Lanorsavanh; K and L, K. Phouthavong.

***Impatiens napoensis*** Y.L.Chen, Acta Phytotax. Sin. 38, 6: 557, f. 1 (2000); Chen, Akiyama & Ohba, Fl. China 12: 84 (2007); Nguyen, Tong & Xia, J. Trop. Subtrop. Bot. 26, 5: 546 (2018). – Type: China, Guangxi, Napo, Depu Regio Conservation Nature, 1300 m altitude, 3 xi 1998, *H. N. Qin* et al. 1939 (lectotype PE! [PE01879289]; isolectotype PE! [PE01879290], designated by Nguyen *et al.*, 2018). [Figure 4D–F](#).

*Distribution.* This species has been found in Xiengkhouang Province, northern Laos. The original description was based on type material collected in Guangxi, China (Chen, 2000), and the species has also been reported from Vietnam (Nguyen *et al.*, 2018).

*Habitat and ecology.* *Impatiens napoensis* was found growing in moist soil in primary evergreen forest, on a mountain slope in a valley at 1800 m altitude on Phou Sam Soum near the border between Khoun and Mok Districts.

*Phenology.* Flowering is from August to November.

*Specimen examined.* LAOS. **Xiengkhouang Province:** Khoun District, Phou Sam Soum, valley of primary evergreen forest, 9 ix 2016, *K. Souvannakhoummane* et al. KS–Bio 0040 (FOF, HNL).

*Impatiens napoensis* is similar to *I. purpurata* Tardieu but differs in forming larger plants; the laminae are ovate-lanceolate, 5–10 × 3–5 cm (versus ovate to orbiculate, 2 × 2 cm), and the lateral sepals are lanceolate to ovate, 8–12 × 4–6 mm, with 5–7 veins (versus ovate to orbiculate, 10 × 5 mm, with 3–5 veins).

***Impatiens parishii*** Hook.f., Fl. Brit. India 1: 456 (1875); Shimizu, S. E. Asian Stud. 8, 2: 209 (1970); Ruchisansakun *et al.*, Blumea 63: 212 (2018). – Type: Myanmar, Tenasserim near Moulmein, on limestone rocks, *Parish s.n.* (lectotype K [K000694782], designated by Ruchisansakun *et al.*, 2018). [Figure 4G–I](#).

*Distribution.* This species has been discovered in Louangphabang Province, northern Laos. The original description was based on material from Myanmar, and it has also been reported from Thailand (Ruchisansakun *et al.*, 2018).

*Habitat and ecology.* *Impatiens parishii* was found growing on a limestone hill in humid mixed deciduous forest at an altitude of 500 m. In the dry season, only stems are present, and leaves develop in the rainy season. This species is very attractive and grows on limestone rock with *Draceana* sp. (Asparagaceae).

*Phenology.* Flowering from May to October, fruiting from September to November.

*Specimens examined.* LAOS. **Louangphabang Province:** Louangphabang District, Pha Nam Yat hill near Mekong river, 24 v 2011, *K. Souvannakhoummane* & *K. Phouthavong* KS134 (HNL, spirit collection at Pha Tad Ke Botanical Garden); *ibid.*, 22 vi 2012, *K. Souvannakhoummane* & *K. Phouthavong* KS481 (HNL); Pak Ou District, 12 vii 2015, *K. Phouthavong* & *T. Song* L–040 (living collection kept at Pha Tad Ke Botanical Garden).

*Impatiens parishii* is very close to *I. kerriae* Craib but differs in having the pedicel shorter than the petioles (versus pedicel longer than petioles), lateral sepals pinkish to white, without spot (versus orange spot at midvein or nearby), and lateral united petals flat with yellow patch (versus grooved with orange-yellow to red patch). *Impatiens parishii* grows at low altitude near the Mekong river in Laos, whereas *I. kerriae* grows near the summits of limestone mountains in open areas.

***Impatiens rubrostriata*** Hook.f., Hooker's Icon. Pl. 30: pl. 2954 (1911); Chen, Akiyama & Ohba, Fl. China 12: 65 (2007). – Type: China, Yunnan, forests of Tchoung-chan, 16 viii 1909, Ducloux 3606 (lectotype P [P00492336], designated here; isolectotypes P [P00492337, P00492338]). **Figure 5A–C.**

**Distribution.** This species has been found on Phou San in Xiengkhouang Province, northern Laos. The original description was based on material from Guangxi, China (Hooker, 1911).

**Habitat and ecology.** *Impatiens rubrostriata* was found growing by streams in moist sandy soil in primary evergreen forest, in mountain valleys at 1800–2200 m altitude on Phou San and Phou Sam Soum.

**Phenology.** Flowering from August to November, fruiting estimated to take place from October to December.

**Specimens examined.** LAOS. **Xiengkhouang Province:** Pek District, O-An village, Phou San, in primary evergreen forest, 7 vii 2016, Souvannakhoummane et al. KS–Bio 0029 (FOF, HNL); Khoun District, Phou Sam Soum, valley in primary evergreen forest, 9 ix 2016, Souvannakhoummane et al. KS–Bio 0036 (FOF, HNL); Champasak Province, Paksong District, Dong Hua Sao National Protected Area, 11 xii 2018, Tagane, S., Nagahama, A., Souladeth, P., Pisuttimarn, P. L2100 (FOF); Bolikhamxai Province, Khamkeut District, Phou Chom Voy Provincial Protected Area, 6 x 2020, Lanorsavanh, S., Lamxay, V. SL 2009 (Biology herbarium, Faculty of Natural Science, National University of Laos).

*Impatiens rubrostriata* is similar to *I. duclouxii* Hook.f. but differs in having white flowers with red stripes on the lateral united petals (versus entirely yellow flowers), and the lateral sepals being larger and white with a red spot or entirely red (versus lateral sepals smaller and greenish to yellow).

***Impatiens tigrina*** Suksathan & Triboun, Gard. Bull. Singapore 61, 1: 177 (2009). – Type: Thailand, Udon Thani Province, Ban Phue District, shaded sandstone table, c.300 m altitude, 8 vii 2008, P. Suksathan, M. Wongnak, H. Boonnuang & K. Keeratikiat 4567 (holotype QBG; isotypes BK, SING). **Figure 5G–I (red form), J (red-purple form), K,L (yellow form).**

**Distribution.** This species has been found in Phou Khao Khouay National Protected Area, Vientiane Capital and Bolikhamxai Province, Laos. The original description was based on material from Udon Thani Province, Thailand (Suksathan & Triboun, 2009).

*Habitat and ecology.* Growing in humid, sandy soil in shade by bamboo forest and in wet table-rock areas at c.300 m altitude.

*Phenology.* Flowering from June to September, fruiting from August to November.

*Specimens examined.* LAOS. **Vientiane Province:** Xaythani District, Ban Na Khaiy, near Wat Pha Bat Eow Khan, 27 ix 2012, *Souvannakhoummane & Xayachak* KS419 (HNL, QBG, spirit collection at Pha Tad Ke Botanical Garden); *ibid.*, 19 vii 2013, *Phouthavong & Souvannakhoummane* KP413 (HNL, spirit collection at Pha Tad Ke Botanical Garden); Bolikhamxai Province, Thaphabath District, 22 vii 2019, *Lanorsavanh, Souvannakhoummane & Xaiyavong* SL1734 (FOF, HNL).

*Impatiens tigrina* was originally described from Thailand by Suksathan and Triboun (2009) as resembling *I. charanii* T.Shimizu, but it differs in its outer lateral sepals not connected (versus the outer lateral sepals connected), and the simple spur (versus bifid). Around the foothills of Phou Khao Khouay in Laos, this species has three variants with yellow, red and red-purple flowers. A different colour form, pinkish red, was later observed in Thailand (Piyakaset Suksathan, Queen Sirikit Botanical Garden, Chiang Mai, personal communication).

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