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Two New Species of *Impatiens* (Balsaminaceae) from North of Lao PDR

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ABSTRACT: *Impatiens gadellae* Souvann. & Suksathan, *Impatiens nurae* Souvann. & Suksathan, two new species from North Lao PDR, are described and illustrated with conservation statuses propose.

KEY WORDS: *Impatiens*, Balsaminaceae, Taxonomical, Limestone flora, Lao PDR.

INTRODUCTION

The genus *Impatiens* is the annual and perennial herb, rarely sub-shrub. The genus consists of over 1000 species; it is widely distributed in tropical and sub-tropical regions of Asia and Africa. A few number of *Impatiens* extend into Europe and Central America. In Laos, seventeen native Impatiens species have been enumerated in previous works (Hooker 1909, Tardieu 1944, Ho 2003, Newman 2008). A very few number species of Impatiens have been report from Laos, probably many species wait to discovery from Laos. Considering the richness of *Impatiens* species of the neighbouring countries, it seems safe to estimate that more than 40 species could be found in Laos.

In 2010, we had surveyed in north Laos area where we collected plant for the ex-situ conservation at Pha Tad Ke Botanical Garden. It is the first botanical garden of Lao PDR, being planting. We found un-described Impatiens growing on limestone forest at Luang Prabang and Vientiane province. A living collection is planting in Pha Tad Ke Botanical Garden. In this paper we described two new species from north Lao PDR, using the descriptive terminology of Suksathan & Triboun (2009).

TAXONOMIC TREATMENT

Impatiens gadellae Souvann. & Suksathan, ***sp. nov.***
Tien Hin Pha Figs. 1 & 2

Similar to *Impatiens kerriae* Craib, but differs by smaller in habit; without branches at middle stems; lateral united petals flat with yellow at middle point connect; lower sepal broadly bucciniform to subsaccate, with abruptly constricted into a spur recurred at base; seed thinly ellipsoides up to 2 mm long.

Type: **Lao PDR**.: Luang Prabang province, Long Lao village, limestone mountain, deciduous mixed bamboo forest, 19°45′26.31″N, 102°03′56″E, 500 m, 20 June 2012, *K.Souvannakhoummane & K.Phoutthavong KS 470*, (Holotype: NHL!, Isotypes: QBG!, Pha Tad Ke Botanical Garden Herbarium!).

Lithophytic succulent perennial herb, up to 50 cm tall, with swollen caudiform base ca 10 cm in diameter, wholly wart-like shape; **stems** usually one upright, 1-2 cm in diameter at the base, sometime branched rising from points at top of the swollen stem. Leaves spirally arrangement or alternate, crowded on the upper part of stem, petioles 4-10 cm long, when young red-green; lamina ovate to broadly lanceolate, 5–13 × 3–10 cm, coriaceous, apex acuminate, base cuneate to subcordate, sometime oblique, margines serrate, adaxially waxy green, abaxially light green, biglandular at base; lateral nerves 6–9 pairs. **Inflorescence** axilliary, solitary or fascicle 1–2(–3)-flowered at the top of axial; pedicles up to 10–12 cm long, suberect, pendulous at apex, glabrous, red-green, minute bract at base. **Flowers** pink to white, yellow inside; lateral sepals 4, outer one pair broadly ovate to orbicular 2 × 2.5 cm, mucronate at apex, outside pale pink with line dark pink from base to apex, macronate dark green, inside white; inner one pair lanceolate-ovate ca 3 mm long, pink; dorsal petal elliptic 6–10 × 15–18 mm long, dorsal with crested up to 2 mm tall, rostrum at apex up 2.5 mm tall, dark pink; lower sepal broadly bucciniform to subsaccate, 1.5 cm deeply, 2 cm across of mouth, apicular with mucronate up to ca. 5 mm, inside and outside white; spurred curved at base, deeply bifid at apex, 0.8 cm long, pale yellow at base and apex; lateral united petals connate, pink-white, with yellow patch in the middle of the connate lower petal; upper petal semi-orbicular to elliptic, ca 9 × 8 mm; lower petal connate about 1/3 of the length, obovate in outline ca 2.5 × 1.5 cm; androgynocium obtuse at apex; filament connate at base; anthers yellowish-white; ovary clavate, pendulose, curved near the apex, 4-angles, white-green. **Capsule** calvate up to 2.5 cm long. Seed thinly elliptisoid, ca 2 mm, long, brown.

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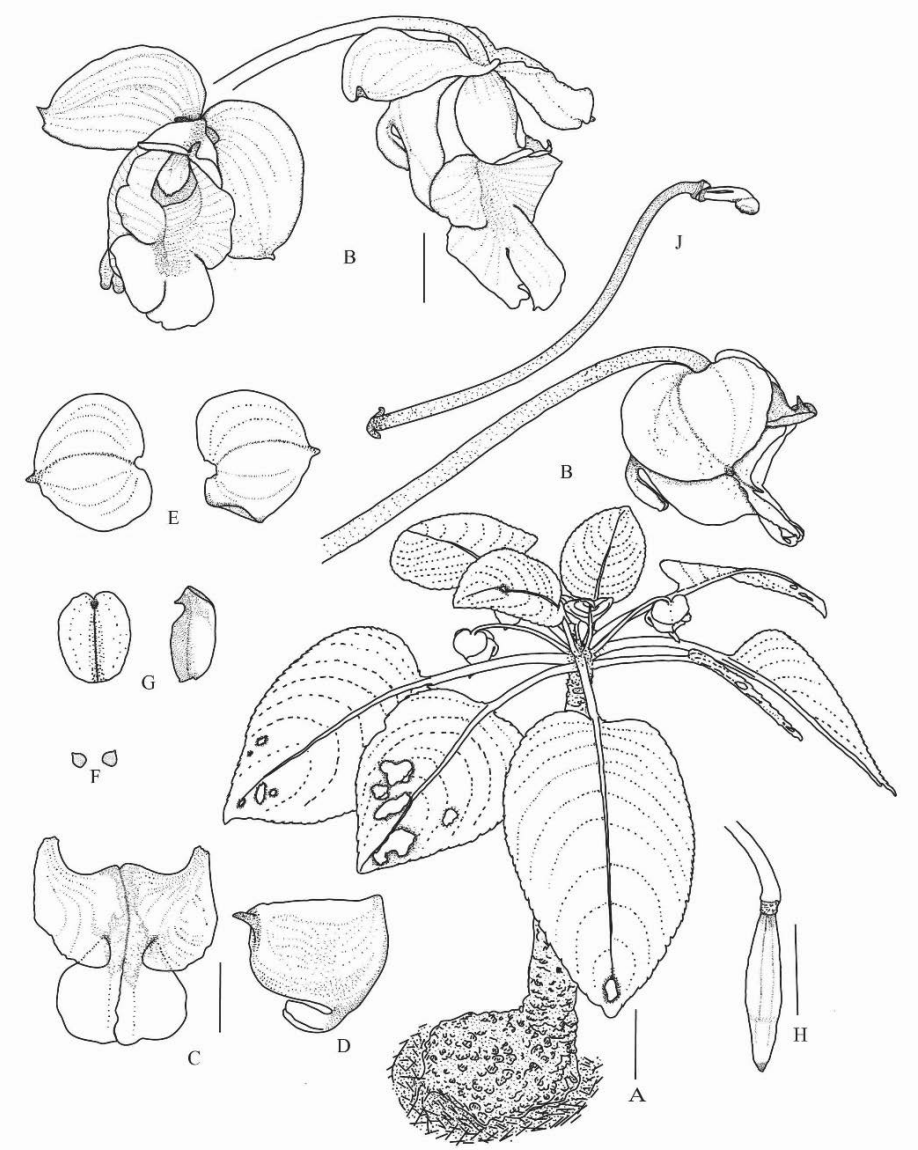


Fig 1: *Impatiens gadellae* Souvann. & Suksathan, A. Habit; B. Flower lateral view and front view; C. Lateral united petals; D. Lower sepal with spur; E Outer lateral sepals; F. Inner lateral sepals; G. Upper petal; H. Capsule; J. Androgynoecium. (Scale bar, A=5 cm, B, C, D.E, F, G, H, J=1 cm) [Draw line by: K.Souvannakhoummane].

Phenology: Flowering during the rainy season between June to October; fruiting August to November.

Distribution and habitat: Endemic to northern Laos (Luang Prabang). Growing on shaded limestone crevices along cliffs in deciduous mixed bamboo forest, growing with *Adiantum* sp., *Argostema* sp., *Amorphophallus* ssp. and *Curcuma* sp., ca 300–1500 m altitude.

Additional specimens examined: **Lao PDR**., Luang Prabang province, Nan district, Pha youak village, limestone forest, 18 July 2014, *Maknoi, C., Pongamornkul, W., Souvannakhoummane, K., L3-021* (QBG!, NHL!, Pha Tad Ke Botanical Garden Herbarium!); 16 June 2015, *K.Photthavong, Nura Abdul Karim & K. Souvannakhoummane LP-148* (NHL, SING, Pha Tad Ke Botanical Garden Herbarium!).

Etymology: The specific epithet is named in honour of Mr. Rik Gadella, the general director of Pha Tad Ke Botanical garden, who kindly launched of the botanical garden in Lao PDR.

Proposed IUCN status: VU. This species has a very small extent of occurrence of 1400 km2, now known only in Luang Prabang province as the limestone mountain near the top of Kwuang Si waterfall and Pha Youak Mountain in Nan district; the both places seem like valleys. The species is therefore listed as vulnerable.

Note: This species has been placed in Semeiocardium group with *I. kerriae* Craib and *I. parishii* Hook.f. but, can be recognized by stem short, leaves broadly lanceolate-ovate, lower sepals broadly bucciniform to subsaccate.

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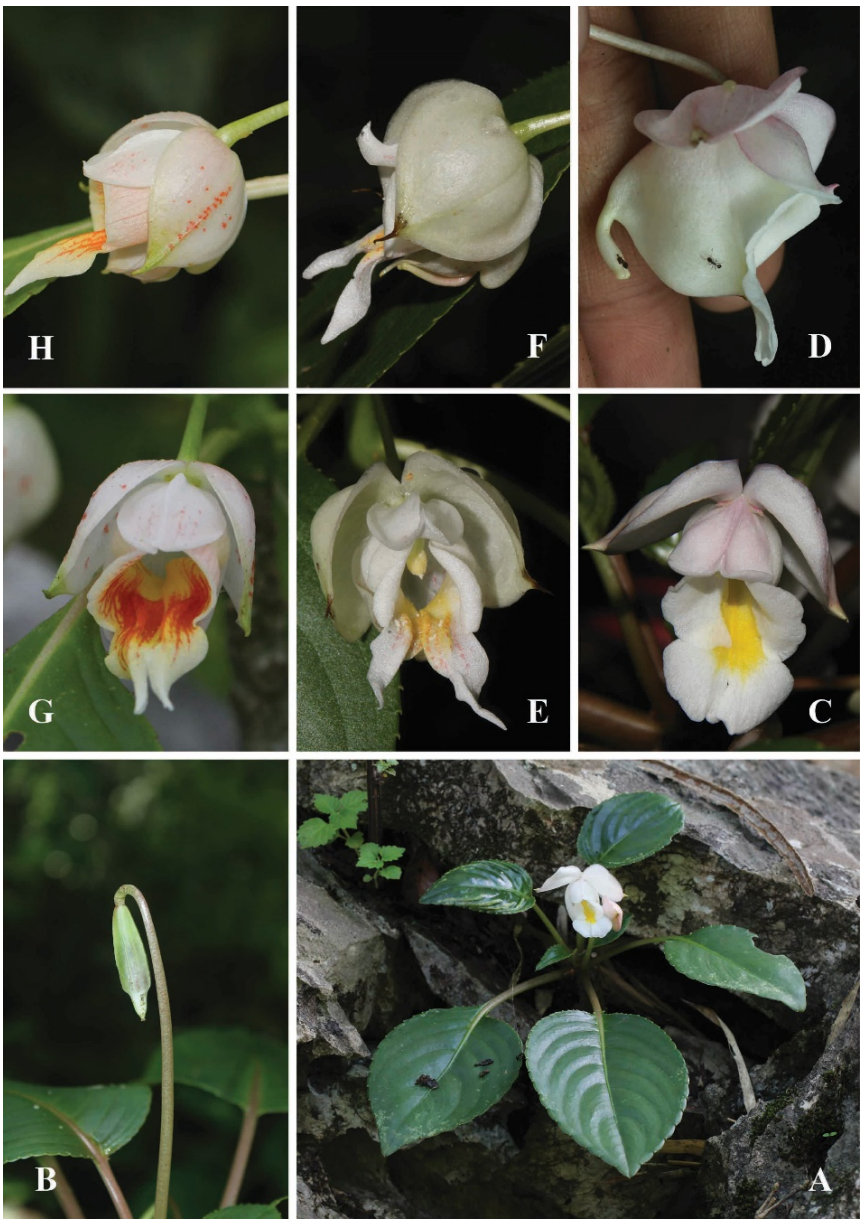


Fig 2: *Impatiens gadellae* Souvann. & Suksathan, A. plant; B. Capsule fruits; C. flower front view; D. flower lateral view; E-F: *Impatiens parishii* Hook.f, E. flower front view; F. flower lateral view; G-H: *Impatiens kerriae* Craib, G. flower front view & H. flower lateral view. Photo by K. Souvannakhoummane, A-F, Photo by K. Phoutthavong, G & H.

Impatiens nurae Souvann. & Suksathan, ***sp. nov.***
Tien Nang Si, Figs 3 & 4

Similar to *Impatiens calcicola* Craib, but differs by dark purple on leaves lower surface; flower smaller size; outer lateral sepals separate red dot line with green; lateral united petals white; lower sepal spur short with green; similar to *Impatiens macrosepala* Hook.f., but differs by outer lateral sepals not connected, pubescence and lightly green, dorsal petal crest behind dark red.

Type: Lao PDR: Vientiane province, Vang Vieng district, 23 Jun. 2012, *K.Souvannakhoummane & K.Phoutthavong KS 477* (Holotype: NHL!, Isotypes: QBG!, Pha Tad Ke Botanical Garden Hebarium!)

Lithophytic annual herb, complete glabrous, with green erect cylindrical main stem up to 100 cm tall, ca 2 cm in diameter at base, adventitious rooting at below, richly branches at the top; branches of stem up to 20 cm long, a little zigzag, purplish red or purplish brown, rather thin. Leaves alternate, ovate to broadly lanceolate, apex acuminate, base cuneate to round, sometimes oblique, margin crenate to serrate, with two distinct, short stalked, fusiform glands at the base beneath, lateral veins 12 pairs of 15–20 pairs to midrib; radial leaves ones larger, spirally arranged; petiole 4-7 cm

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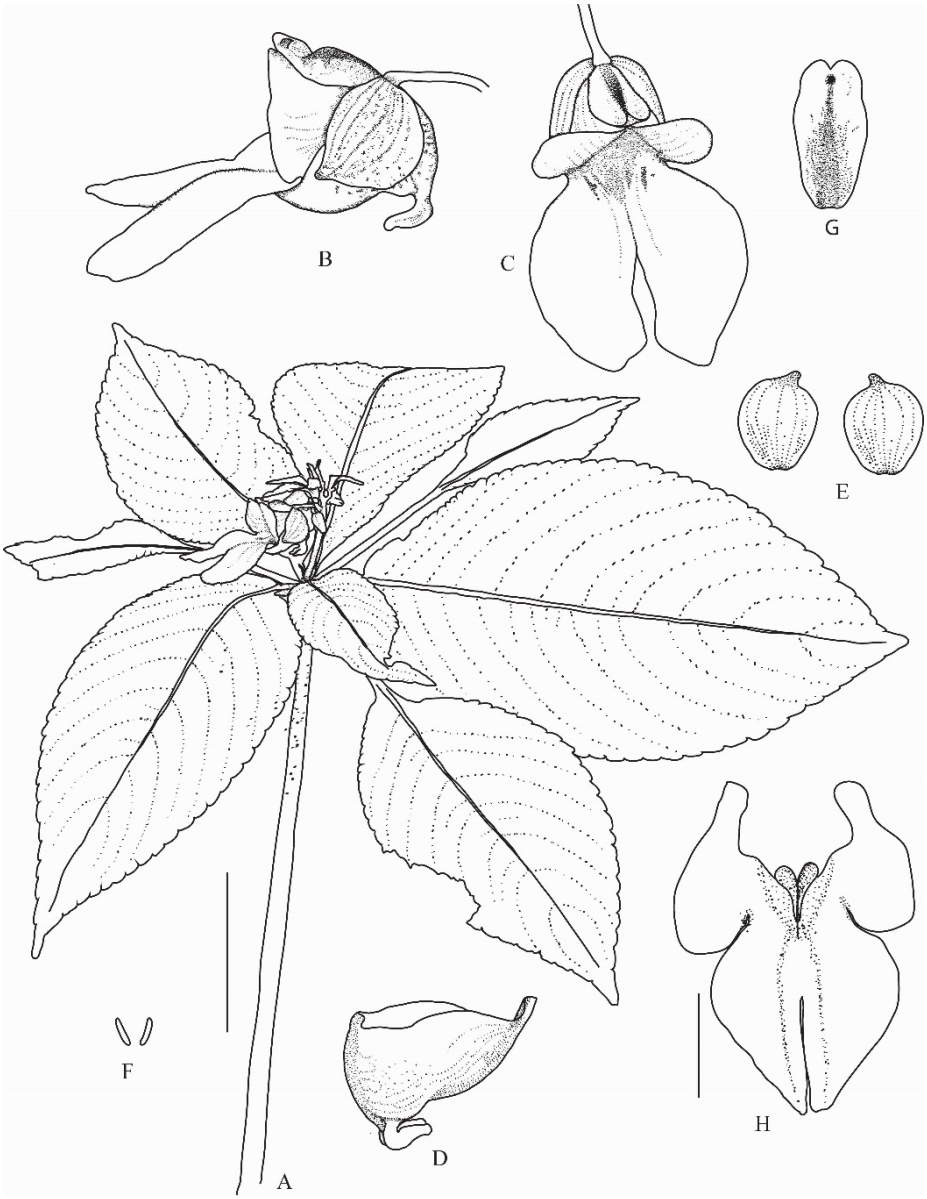


Fig 3: *Impatiens nurae* Souvann. & Suksathan, A. plant; B. flower lateral view; C. flower top view; D. lower sepal: E. outer lateral sepals; F. inner lateral sepals; G. dorsal petal; H. Lateral united petals . (Scale bar, A=5 cm, B, C, D, E, F, G, H=1 cm) [Draw line by: K.Souvannakhoummane].

long, dark red to brown; lamina up to 15–20 by 7–10 cm, abaxial, glabrous pale purple to light green, adaxial dark green with hairy; the upper leaves congested on the top of the branches, smaller, alternately arranged along branches, petiole 0.4–0.9 cm long and lamina 1 by 3 cm. Flowers white, axillary, solitary or 2–3-fascicled, pendulous under the leaves, ca 3 cm long; pedicel ca 0.5–1 cm long; minutely bracteates at base; lateral sepals 4, the outer pair yellowish, pale red striped veins on the outside surface, ca 10 by 6 mm, obliquely ovate, mucronate at apex, dark red to brown; the inner pairs strongly reduced into narrowly lanceolate, ca 3 mm long scales; lower sepal 2 cm long across the mouth, 1 cm deep, broadly navicular to small bucciniform, yellowish to pale green with red striped veins on outer surface, yellowish-orange on the inner surface, abruptly constricted into a 0.5 cm long, short straight spur, deeply bifid, nipple-like, incurved at bifid point, green; dorsal petal green-white or pale red, ca 1.5 by 1 cm, elliptic to oblong, retuse, with a thick, dark red blunt crest on the lower half, apex obcordate, with sub-apical mucro; lateral united petals connate entirely white; upper petal ca 7 mm, semicircular, apex round; lower petals connate for about half the length, suborbicular in outline, ca 2 cm long, with a prominent basally bilobed keel, yellow with orange to dark brown patch, apex bifid. Ovary glabrous 4-carpellate. Fruits fusiform ca 2 cm long; seeds ellipsoid, ca 2 mm.

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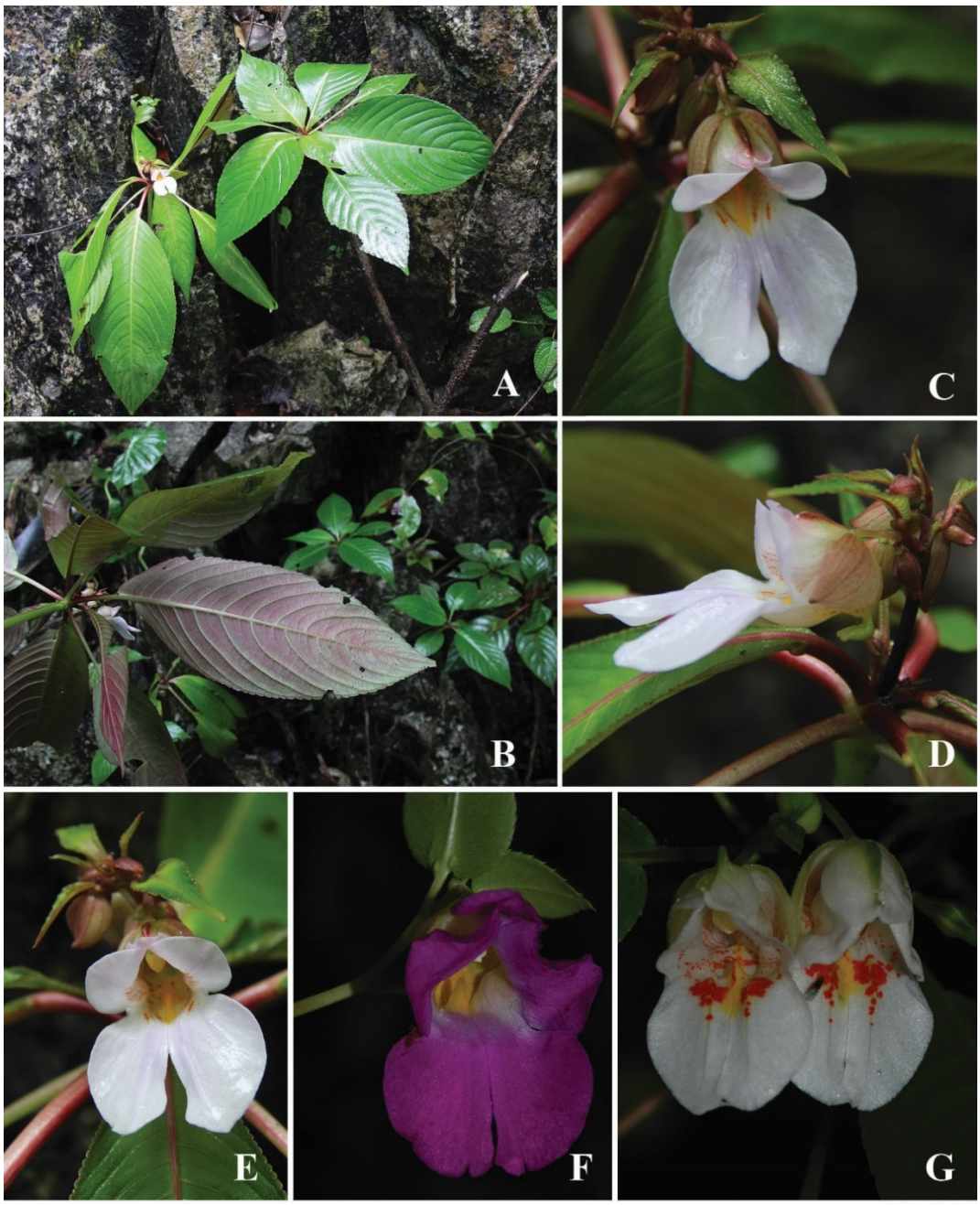


Fig 4: *Impatiens nurae* Souvann. & Suksathan, A. habit; B. show purple on lower surface leave; C. flower top view; D. flower lateral view. E. flower front view; F. flower front view of *Impatiens calcicola* Craib; G. flower front view of *Impatiens macrosepala* Hook.f. Photo by K. Souvannakhoummane; F-G by Dr. Pramote Triboun from Thai species.

Phenology: Flowering during the rainy season between June to October; fruiting August to November.

Distribution: Endemic to Laos

Additional specimens examined: Lao PDR: Vientiane province, Vang Vieng district, Bouamanivong, S VV 101 (NHL!)

Ecology: Growing in open limestone scrub vegetation, summit of Limestone Mountain and humid wet in evergreen forest. ca 200–800 m alt.

Etymology: The specific epithet is named in honour of Dr. Nura Abdul Karim (Director of horticulture department, Singapore Botanical Garden), who kindly teach about system of living collection managements with Iris BG software for Pha Tad Ke Botanical Garden staff.

Proposed IUCN status: NT. This species current known only from type specimen and the known locality are without protected areas, near the mining area for make cement and there are no known threats. Therefore listed as Near Threatened.

Notes: This species very closely with *Impatiens calcicola*, but differs by small flower white and red

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strip on outer surface of lateral sepals; purple on lower surface leave; similar with *Impatiens macrosepala*, but different by lateral outer sepals are not connate and pubescence

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