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Abstract: *Impatiens reidii* Hook.f. a rare presumed extinct and Kumaon endemic species only known from its type collection in 1886 is rediscovered from its type locality after a gap of 138 years. The identity of historically ambiguous name *I. tingens* is reinvestigated based on studies of literature, type specimens and recollection of live material from the type locality that confirmed the name *I. tingens* is conspecific with *I. scullyi* and thus latter name is synonymised. *Impatiens inayatii*, another little-known species described by Hooker as endemic to Kali valley, Kumaon currently treated as a synonym of *Impatiens bicornuta* is recollected from near the type locality after 124 years, our recollection confirms its identity as a totally distinct species from section Urticifoliae S.Akiyama & H.Ohba thus reinstating name *I. inayatii*. Augmented description for all three species is provided with information on their botanical history, species etymology, key identification characteristics, distribution, phenology, ecology and first photographic documentation of *I. reidii* and *I. inayatii*. Also, lectotypes are designated for the names *I. reidii* and *I. tingens*.

Keywords: flora of Himalaya; lectotypification; rediscovery; reinstatement; synonymisation.

1. Introduction

Balsaminaceae with more than 1000 species are one of taxonomically problematic plant families [1–3]. According to recent phylogenetic studies [4–6], Balsaminaceae evolved in southeast Asia, most probably in southwest China and subsequently spread to Western Ghats of India, continental Africa and Madagascar, as well as the northern temperate zone in Eurasia and North America. Himalaya was a migration route of balsams towards Central Asia, with the number of taxa diminishing from the east to the north-west [3,7–10]. Eastern and central parts of the range have recent revisions of discussed family [3,8,9]. On the other hand, there are many unresolved taxonomic problems in Indian Western Himalaya; some taxa are known only from old, badly preserved or only type collections. Available state floras are outdated [11–13], "Flora of India" [14] and the treatment of Balsaminaceae in recent floras were made based on the old herbarium specimens and literature rather than fresh collections. Recent papers dealing with Balsaminaceae of Himalayan region resolved some old

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problems and augmented our knowledge [9,15–24], yet errors in balsam identification are common and outdated taxonomic approaches are still repeated in some recently published papers [25,26].

2. Materials and Methods

The present study is based on the extensive seven years of field work in Himalayan union territory Jammu & Kashmir, Himachal Pradesh and Uttarakhand states; as well as Trans-Himalayan union territory Ladakh, India. Examination of protologues, illustrations, herbarium type specimen images and analyzing observations present on various online citizen science portals and efloras. In an attempt to rediscover *I. reidii* and *I. inayatii* a two weeklong expedition was carried out in Garhwal and Kumaon, Uttarakhand in August 2024 which was funded by IAPT research grant to first author (A.S.). To retain the maximum amount of diagnostic characters in herbarium, the dissected floral parts were flattened, pressed and fixed on a white paper with colorless adhesive and later the same sheet was pasted on herbarium sheet with specimen. Type localities of species (*I. inayatii, I. reidii* and *I. tingens*) were visited and extensively explored to rediscover the species and ascertain their true identity; floral parts were dissected and photographed in the field along with habit and habitat documentation using Nikon D5600 and Tamron 90 mm macro lens. The collected plant specimens were processed into mounted herbarium sheets following conventional methods of herbarium technique and are submitted at FRLH and BSS herbarium. With the help of protologues, type specimen images and critical examinations of specimens (K, E, CAL, DD, BSD, FRLH) along with various available literatures, identities of the species were ascertained. Distribution of species was traced from recent field collections along with data available on historical old specimens (including types), confirmed with the original materials and analyzing online available citizen science observations (available on eFloraofIndia and iNaturalist).

3. Results

3.1. Rediscovery of Impatiens reidii Hook.f. a Rare Presumed Extinct Endemic Species from Its Type Locality After a Gap of 138 Years

Impatiens reidii Hook.f. was described by Hooker [27] in Hooker's Icones Plantarum based on a collection made by J.F. Duthie and J.R. Reid from near Sela Darma, Byans, Kali Valley in Kumaon, Uttarakhand. Hooker in his description wrote 'inflorescentia pedunculata, pedunculi pauciflori, pedicelli infra florem solum bracteati (basi ebracteati), floribus parvis, labelli calcare elongato gracile' i.e. inflorescence pedunculate, peduncles pauciflorous, pedicels below the flower only bracteate (basally ebracteate), with small flowers, lower sepal with elongate slender spur. Further, Hooker mentioned this as a very distinctive species but didn't assign it to any particular group. According to our observations *I. reidii* belongs to *I. scabrida* group sensu Akiyama and Ohba [18] having type 7 inflorescence [28] and pubescent bract in the middle of the pedicel.

Taxonomic treatment

Impatiens reidii Hook.f. in Hooker's Icon. Pl. [ser. 4, 10] 30: t. 2901. 1910; Vivek. & al. in Hajra &e al., Fl. India 4: 204. 1997; Uniyal & al., Flow. PL. Uttarakhand Checkl.: 91. 2007. Flora of Uttarakhand – 1 875. 2018. Figures 1 and 2

Lectotype (designated here):— INDIA, Uttarakhand, Kumaon, Kali Valley, Byans, near Sela Darma, 6-7000ft., 16.07.1886, J.R. Reid 2549 (K000694744!)

Description:— Annual erect herb, 75 cm long, pubescent, most of the plant parts covered with trichomes, stem green, erect, swollen at lower nodes. Leaves alternate; petiole 1-4 cm long with a pair of round glands (extrafloral nectaries) at the base of petiole; lamina elliptic or obovate, 5-18 × 2-5.5 cm, base gradually attenuate, margins crenate-cuspidate with terminal cusp, apex acuminate, pubescent, main lateral veins 11-14 pairs. Inflorescence pubescent, covered with trichomes, 3-6 flowered, axillary, pedunculate racemes; bracts linear, pubescent with prominent trichomes, 4-6 mm long; peduncles slender, 3-5 cm long, pubescent or puberulous, elongated, stiff in fruiting: pedicels bracteate, 6-10 mm long; bracteole linear-setaceous, 3-5 mm long. Flowers yellow. Lateral sepals 2,

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obliquely ovate, 6-8 mm long, as broad, acute to acuminate, membranous, pubescent along margins and on slightly raised prominent midrib. Lower sepal shallowly navicular or funnel-shaped, 2-2.5 cm long; 12-14 mm deep; with oblique mouth, spur gradually constricted, filiform, curved, 1.2-1.5 cm long. Upper petal oblong or oblate, 12-14 mm across, back/dorsally green with pubescent crest on midvein. Lateral united petals 15-20 mm long; basal lobes more or less rounded, distal lobes elongated-dolabriform with rounded auricle and obtusely elongated-apiculate lower lobe, brown spotted. Capsules linear, 2.5-4 cm long, erect; seeds oblong, brown, 3-4 mm long, tuberculate.

Flowering & Fruiting:— July to October.

Distribution:— Uttarakhand, Kumaon (Kali valley) in temperate forests; 2000-2300 m.

Associated species:— Achyranthes bidentata Blume, Aster verticillatus (Reinw.) Brouillet, Carpesium abrotanoides L., Clinopodium umbrosum (M.Bieb.) K.Koch, Geranium nepalense Sweet, Girardinia diversifolia (Link) Friis, Persicaria nepalensis (Meisn.) H.Gross, Pilea umbrosa Wedd. ex Blume, Rubia cordifolia L., Selaginella sp. and Urtica parviflora Roxb.

Species etymology:— Specific epithet '*reidii*' is an eponymy named after collector Mr. James Robert Reid (J.R. Reid) (Chief secretary, CIE to the government of the North West Provinces and Oudh) who collected this species in 1886.

Specimens examined:— INDIA, Kumaon: Kali Valley, Byans, near Sela Darma, 6-7000ft., 16.07.1886, J.R. Reid 2549 (K000694744!); Uttarakhand, Kumaon: Kali Valley, Uttarakhand, Kumaon division, Pithoragarh district, near Birthi waterfall, 30°01'9.63"N 80°10'35.32"E, 2055 m, 27.08.2024, Ashutosh Sharma, 12614 (FRLH!); Kumaon: Kali Valley, Uttarakhand, Kumaon division, Pithoragarh district, near Birthi waterfall, 30°01'9.63"N 80°10'35.32"E, 2055 m, 27.08.2024, Ashutosh Sharma, 12615 (BSS!)

Discussion:— *Impatiens reidii* is apparently related to *I. tricornis* and *I. scabrida*, due to annual habit, yellow flowers, plant pubescence and presence of dark, round glands at the base of petiole. It is however different from both these species in shape of lower sepal and spur. *I. scabrida* is characterized by big flower size, wide lateral united petals, big navicular lower sepal tapering into a long (upto 20 mm) straight downwardly curved spur and pubescent capsules while *I. reidii* is having smaller flower size, narrow lateral united petals, smaller lower sepal with short spur not exceeding 15 mm and glabrous capsules. Type specimen of *I. calycina* Wall. (= *I. scabrida* DC.), only known material of this species, comes from Nepal [18]. *Impatiens tricornis* is rather common and highly variable in Western Himalaya, having bucciniform lower sepal abruptly constricted into the spur, its flower color varies from creamy white in lower elevation to dark yellow at higher elevations, plant height upto 4 feet in lower elevations to 15 cm in sub-alpine rocky habitats and puberulent in subtropical habitat to pubescent in subalpine region. *Impatiens reidii* could be mistaken with *I. tricornis* and *I. scabrida* in herbarium material lacking flowers. In Flora of Kullu District, Himachal Pradesh [25] misidentified *I. tricornis* as *I. reidii*, we examined the specimens identified as *I. reidii* from Beas, Kullu deposited at PUN herbarium and confirmed their identity as *I. tricornis*, a common species in Kullu district. *I. reidii* is endemic to Kali valley, Eastern Kumaon and probably adjoining western Nepal? Hooker [27] working with more than twenty years old herbarium specimens, described flower colour of *I. reidii* as white as flower color fades in *Impatiens* specimens with time, moreover there are no notes by collectors on color of *I. reidii* flowers on type sheet.

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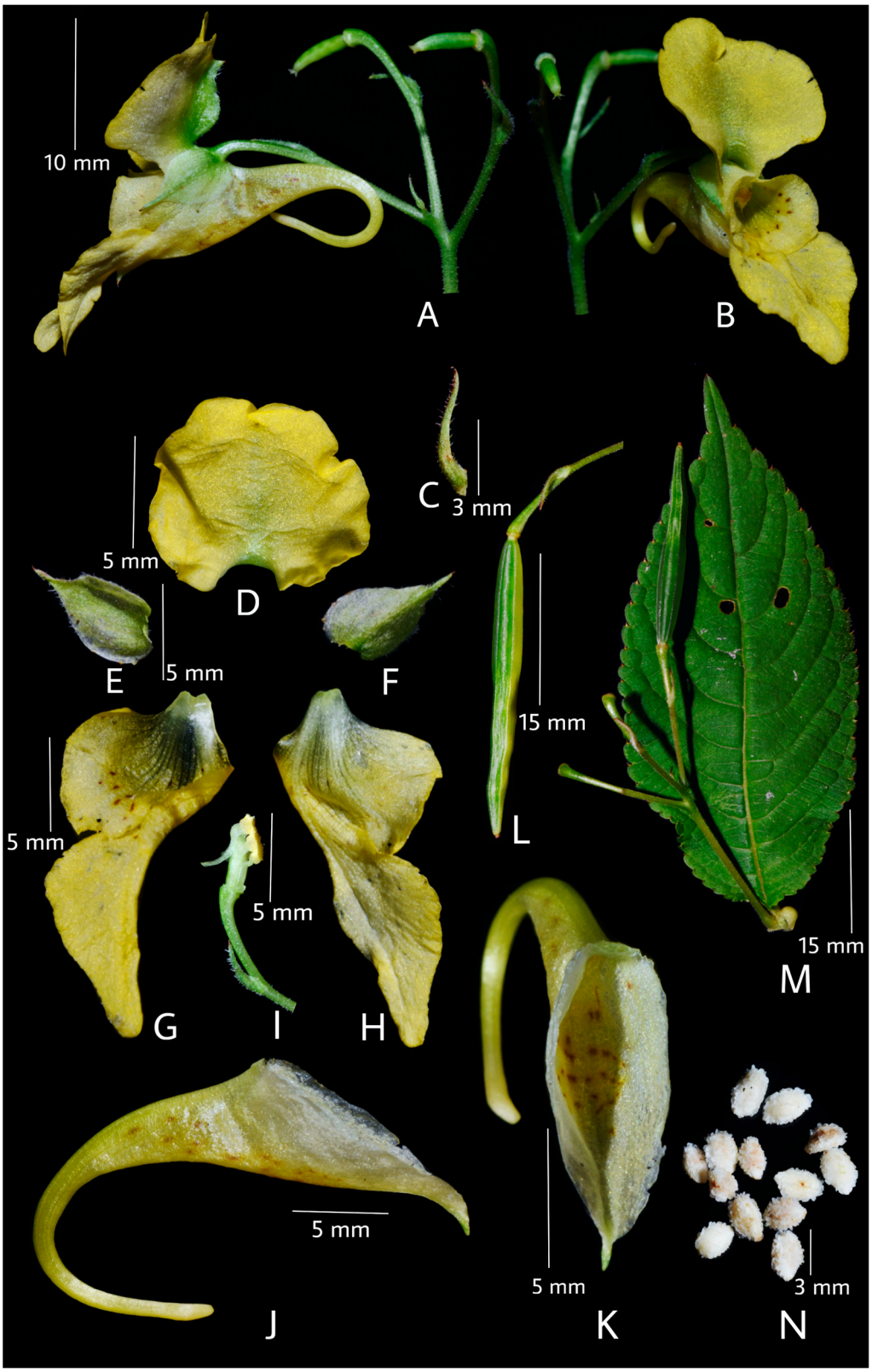

Figure 1. ***Impatiens reidii*** Hook.f. A – inflorescence showing side view of flower and position of bracts , B – inflorescence with front view of flower, C – bract, D – dorsal petal (adaxial), E – lateral sepal (adaxial), F – mature flower lateral sepal (abaxial), G – lateral united petals (adaxial), H – lateral united petals (abaxial), I – stamens and ovary, J – side view of lower sepal, K – inside view of lower sepal, L – capsule with pedicel and bract at middle, M – leaf adaxial surface and inflorescence with a capsule, N – tuberculate seeds. All photographs by Ashutosh Sharma.

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Figure 2. ***Impatiens reidii*** Hook.f. A – Flowering plant habit; B – Stem showing swollen nodes and glands/extrafloral nectaries at base of petiole; C – Dehisced capsule and glands/ extrafloral nectaries at the base of petiole; D – Inflorescence showing mature flowers side view, bracts and buds. All photographs by Ashutosh Sharma.

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3.2. Reinstating Impatiens inayatii Hook.f. and Augmented Description Based on Recollection from Type Locality in Kali Valley, Kumaon, Uttarakhand

Impatiens inayatii Hook.f. was described by J.D. Hooker [29] based on a specimen collected by Inayat Khan in 1900 in Sosa Forest, Kali Valley in nowadays Kumaon, eastern Uttarakhand, close to the border with Nepal. Hooker's description is very short: "A remarkable large leaved and flowered species, only once found", giving no clues about its affinities. Recently Singh et al. [30] incorrectly synonymised *I. inayatii* with distantly related *I. bicornuta* without studying live plant material. Our recollection from near type locality confirms the distinct identity and resurrection of this species from *I. bicornuta* complex [31,32]. Also, on detailed search across different herbaria we came across a recent collection of this species from Seti zone of Doti District in far West Nepal housed at Royal Botanic Garden Edinburgh herbarium (E) and this forms a new record for the Flora of Nepal.

Taxonomic treatment

Impatiens inayatii Hook.f. in Rec. Bot. Surv. India 4: 10. 1904; Vivek. & al. in Hajra & al., Fl. India 4: 157. 1997; Uniyal & al., Flow. Pl. Uttarakhand Checkl.: 91. 2007. Figures 3 and 4 Lectotype: India, Uttarakhand, Kumaon, Kali valley, Sosa forest, 8000-9000 ft., 17September 1900, Inayat 23987 (K000694900!); Isolectotype DD!

Annual erect herb, 40 – 130 cm tall; glabrous. Stem glabrous, green to dark purple, slightly swollen at nodes, upto 2 cm wide at the base and hollow inside. Leaves thick coriaceous, glabrous, alternate; petioles 0.5-6 cm long; lamina ovate-elliptic to ovate-lanceolate or elliptic-oblong, 15-25 x 5-8 cm, base attenuate, margins crenate to deeply crenate with glandular cusps, apex acuminate; main lateral veins 7-10 pairs. Few to many small filiform glands at the base of petiole and mostly on the apical branches, 1-2.5 mm long. Inflorescences pendulous racemose, upto 15 cm long, ascending at tip, 2 - 8 flowered. Flowers large, upto 3 cm long, white and yellow with dark red rusty spots inside, pedunculate; bract at the base of pedicel, glabrous, persistent, ovate-lanceolate, 7-8 × 3 mm; peduncle slender, 5-14 cm long, glabrous; pedicels opposite, arcuate when fruiting. Lateral sepals one pair, green turning to translucent white with small red spots in mature flowers, ovate, 8 × 6 mm; appendaged at apex. Lower sepal bucciniform, 2.5 × 3 cm; with oblique mouth, mouth with short beak, basal part yellow inside with red-brown spots, spur gradually constricted and curved inside such that it reaches depression formed at the base of lower sepal, 5 mm long. Dorsal petal white with small red spots on dorsal side, 11× 15 mm, suborbicular-obcordate; crested, crest upto 2 mm, lateral united petals 8-10 × 32-35 mm with yellow splash and dark spots on sinus of basal and distal lobes; basal lobes broadly triangular; distal lobes narrowly ovate, narrowed just above the middle, shortly apiculate. Auricle inconspicuous. Capsules linear, acute, 3-4 cm long. Seeds 3-5, ovoid to oblong, 4-5 mm long, surface smooth and glabrous, brown at maturity.

Flowering & Fruiting:— July to October.

Distribution:— Kumaon (Sosa, Kali valley) and far West Nepal, in temperate to sub-alpine forests; 2600-3730 m.

Associated species:— Ainsliaea aptera DC., Aster verticillatus (Reinw.) Brouillet, Semple & Y.L.Chen, Bistorta amplexicaulis (D.Don) Greene, Geranium wallichianum D.Don ex Sweet, Halenia elliptica D.Don, Impatiens amphorata Edgew., Impatiens laxiflora Edgew., Quercus semecarpifolia Sm., Rhododendron campanulatum D.Don and Rubus nepalensis (Hook.f.) Kuntze.

Species etymology:— Specific epithet '*inayatii*' is an eponymy named after collector Inayat Khan (Head plant collector of the Botanical Department of N. India) who collected this species in 1900.

Specimens examined:— INDIA, Kumaon: Kali valley, Shosa forest, 8000-9000 ft., 17.09.1900, Inayat 23987 (K000694900!); Kumaon: Kali valley, Shosa forest, 17.09.1900, Inayat 23987 (CAL0000005156!); Uttarakhand, Kumaon division, Pithoragarh district, on way to Khaliya top, 30°3'51" N 80°12'28" E, 3275 m, 23.08.2024, Ashutosh Sharma, 12605 (FRLH!); Uttarakhand, Kumaon division, Pithoragarh district, on way to Khaliya top, 30°3'42"N 80°12'54"E, 2900 m, 23.08.2024, Ashutosh Sharma, 12604 (FRLH!)

NEPAL, Far Western Development Region, Seti Zone, Doti District, Khaptad National Park. Trail from Jhigrana to Bichpani, 29°20'37"N 81°3'25"E, 2668m, 01.07.2009, Nepal Bajhang Expedition

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2009 H. Ikeda et al. 20911026 (E00623967!); Far Western Development Region, Seti Zone, Bajhang District, above Surma village, 29°39'24''N 81°5'36''E, 3386m, 08.07.2009, Nepal Bajhang Expedition 2009 H. Ikeda et al. 20911089 (E00509740!); Far Western Development Region, Seti Zone, Bajhang District, on trail between Dhahidunga Kharka and Manane Lekh, 29°37'27''N 81°0'29''E, 3730m, 13.07.2009, Nepal Bajhang Expedition 2009 H. Ikeda et al. 20911119 (E00509971!)

Discussion:— Akiyama [9] nor Raskoti & Ale [21] do not include *I. inayatii* for Nepal. Based on morphological evidence (inflorescences pendulous, racemose, with few to many flowers (type 2a and 2b inflorescences: [28] and leaves thick coriaceous) we include *I. inayatii* to section Urticifoliae S.Akiyama & H.Ohba [17]. Members of this section were not reported earlier from Western Himalaya.

Raskoti & Ale [21] recently described morphologically closely resembling species, *I. nimspurjae*, with white and yellow flowers from western Nepal. *Impatiens nimspurjae* has however smaller flowers (1.5–2 cm long), sessile leaves and shorter inflorescences (2–3-flowered and peduncle 1.5–6 cm) but authors didn't compare the newly described species with *I. inayatii* to which it seems to be more closely allied morphologically. Further integrated morpho-molecular studies are necessary to resolve species delimitation and relation between these taxa.

Recently *I. inayatii* was synonymized with *I. bicornuta* by [30]. This paper was however heavily criticised [33], as illustrations of *I. bicornuta* sensu [30] include also members of *I. urticifolia* group sensu [17]. *I. bicornuta* complex is characterised by multiflowered interrupted and erect raceme inflorescences, with pseudowhorls of flowers in lower part of inflorescence (*I. bicornuta*) while in *I. urticifolia* group (incl. *I. inayatii*) inflorescences are drooping, ascending [Type 2a and 2b inflorescences [28] and thick, coriaceous leaves. Separation of *I. bicornuta* group and *I. urticifolia* group was confirmed in phylogenetic study by [5]. However, according to molecular study of [21], *I. nimspurjae* is more closely related to *I. radiata* and *I. racemosa* than to *I. urticifolia*.

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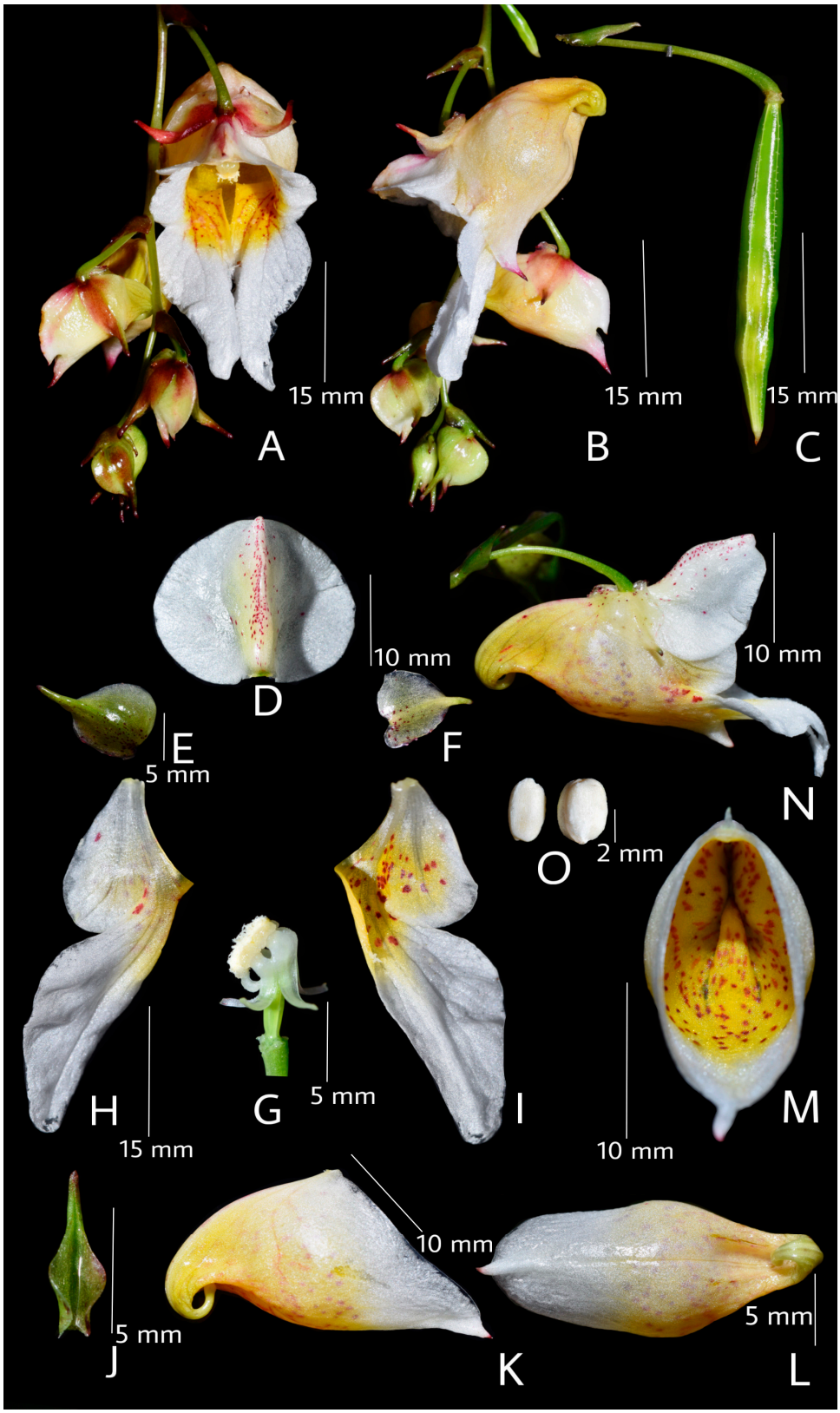

Figure 3. ***Impatiens inayatii*** Hook.f. A – inflorescence with frontal view of flower, B –inflorescence with side view of flower, C – capsule with pedicel and bract at base, D –dorsal petal (abaxial), E – flower bud lateral sepal (abaxial), F – mature flower lateral sepal (abaxial), G – stamens and ovary, H – lateral united petal (abaxial), I – lateral united petal (adaxial), J – bract, K – side view of lower sepal, L – lower sepal from below, M – inside view of lower sepal, N – side view of flower, O – seeds. All photographs by Ashutosh Sharma.

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Figure 4. ***Impatiens inayatii*** Hook.f. A & B – Flowering plant habit showing pendulous racemose inflorescences, swollen nodes and thick coriaceous leaves; C – Small filiform glands at the base of petiole on apical branches; D – Fresh dissected floral parts processing in field showing floral parts fixed on a white paper with colorless adhesive. All photographs by Ashutosh Sharma.

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3.3. Synonymizing Impatiens scullyi Hook.f. with Impatiens tingens Edgew. – Insight into Botanical History and Identity Confusion of Names Impatiens tingens Edgew. with Impatiens racemosa DC. and Impatiens laxiflora Edgew

Recently authors (A.S. & W.A.) reported *Impatiens scullyi* Hook. f. as a new record for India [22]. The species was first collected by J. Scully from Nepal and was mentioned by Sir J.D. Hooker in "An epitome of the British Indian Species of *Impatiens*" [29] from central Nepal. It was described in detail later by [34] from central and eastern Nepal. Western Himalayan floras [12,13] report *I. tingens*, originally described by [35]. Further studies of literature [29,34,35], type specimens of both taxa (Fig. 1 a, b), pictures, live material and recollection of *I. tingens* by first author (A.S.) from type locality (Fig. 5) confirms that *I. tingens* and *I. scullyi* share one rare feature: long auricle from base of lateral united petals inserted into spur [36]. This feature is known to occur only in a dozen or so species from continental Africa, Western Ghats and China [1,37,38]. Further examination of type specimens of both species revealed that there are no consistent differences between the taxa (Fig. 6). Hence, following the principle of priority (Article 23 ICN) we synonymise later published names viz. *I. scullyi* under *I. tingens*.

Taxonomic Treatment:

Impatiens tingens Edgew. Trans. Linn. Soc. London 20(1): 41 (1846).

Type: India, Western Himalaya, Simla, below Nagkanda, 8000–9,000 ft., M.P. Edgeworth 339 (Lectotype designated here: K [K000694912!]). Figures 5 and 6

Impatiens scullyi Hook. f. in Rec. Bot. Surv. Ind. 4: 15 & 21 (1905) syn. nov.; *Impatiens scullyi* Hara in Hara & Williams, Enum. Flow. Pl. Nepal 2: 80 (1979); *Impatiens scullyi* Akiyama et al. Bull. Univ. Tokyo No. 34 (1991); *Impatiens scullyi* Yu Balsaminaceae of China: 140 (2012).

I. laxiflora var. *stracheyi*, FI, Brit. Znd. 1. c. 480.

Annual herbs, 30–90 cm tall, stem succulent, swollen at nodes, often rooting from lower nodes, leaves alternate, aggregated at the apical part of stem, petiole 10–20 mm long, lamina broadly lanceolate to oblong-ovate, 8–14 cm long, 4–6 cm wide, glabrous with crenate margin. Inflorescence racemose, 6–13 cm long, axillary, with six to ten flowers, flowers congested on top of peduncle. Pedicel 1.5–2 cm long, slender, glabrous, with a bract at base. Bracts 3–4 mm long, narrowly ovate, acute at apex. Flowers 1.4–2 cm long, 1.2–2.8 cm deep. Lateral sepals two, ovate, 3–4 mm long. Lower sepal greenish, white or rosa, 4–7 mm long, 12–20 mm deep, tubular; spur inconspicuous. Dorsal petal white, rosa or pale purple, 4–6 mm long and 6 mm wide when flattened, cucullate, with thickened greenish midrib, ending in a short horn or appendage. Lateral united petals white, rosa or rarely purple colored with yellow spot at the base of lower lobe, 11–14 mm long; the upper lobe ovate, ca. 3 mm long and ca. 2 mm wide; the lower lobe with two rounded lobes, 9–11 mm long and 5–6 mm wide, with a very characteristic long appendage (9–13 mm long) elongating into the tubular lower sepal. Stamens five, anthers without appendage. Capsule 1.5–3 cm long, unevenly linear, green with pale yellowish stripes, enclosing 2–6 seeds. Seeds 3-4 mm long (Figure 5).

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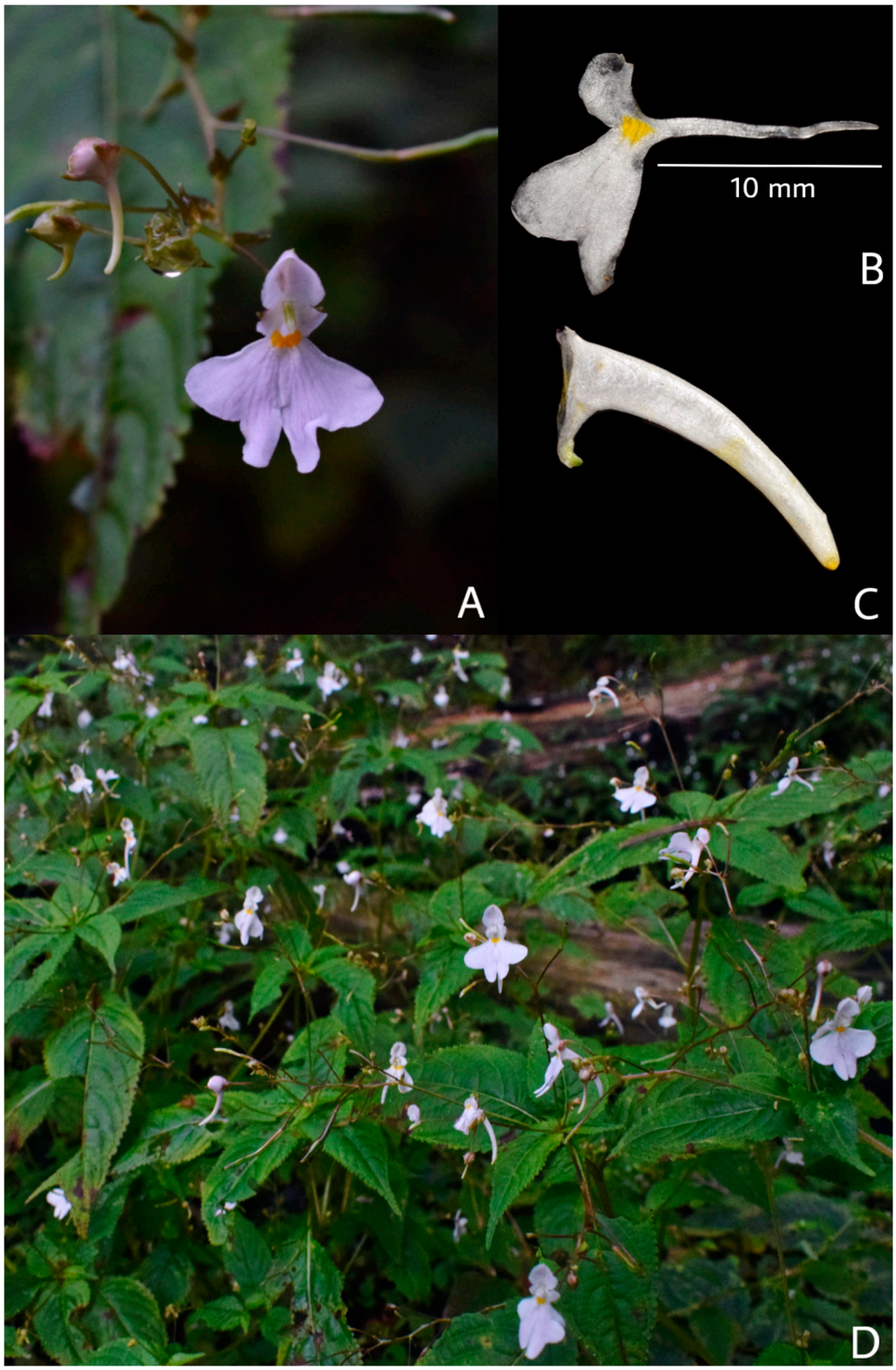

Figure 5. ***Impatiens tingens*** Edgew. A – Flower front view and buds showing lower sepal and spur, B – Lateral united petals showing with long appendage, C – Lower sepal and spur, D – Flowering plants habitat at the type locality (Narkanda, Shimla). All photographs by Ashutosh Sharma.

Synonymisation. Some sources treat the name *I. tingens* as a synonym of *I. laxiflora* [39]. *I. tingens* was previously also confused with *I. racemosa* due to much similarity in flower shape and size as from the frontal side both species may look much similar however still one can easily differentiate both based on its flower color and shape of spur. More importantly *Impatiens racemosa* has inconspicuous auricle (Fig. 5) and this way could not be synonymous with *I. tingens* (compare [29], p. 6). There was

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a lot of misunderstanding around *I. tingens*: Hooker & Thomson [40] described it as yellow flowered, but from description it looks as an aggregate of more than one taxon. In Flora Simlensis [41] described *I. tingens* as *I. racemosa* where he mentioned unique appendage of lateral united petals as 'wings (lateral united petals) produced in a long, linear tail descending into the spur' not found in any other Western Himalayan balsam. Basu & Uniyal [12] also describe *I. tingens* as yellow flowered, but [13] describe it as white flowered. On the other hand, neither [12] and [13] mention long auricle in their descriptions. Edgeworth [35], Hooker [29], and Akiyama et al. [34] described *I. tingens* as variable in flower color, size and shape of spur. Hooker [29] describes auricle in *I. tingens* as filiform; in *I. scullyi* as linear. However, comparison of type specimens and sketches by J.D. Hooker (Fig 6) shows clear similarity in long auricle arising from the base of lateral united petals entering lower sepal/spur.

Geographical distribution. *Impatiens scullyi* was regarded as confined to Nepal in the newest list of endemic plants of this country [42,43], however, [44] reported it from southern Tibet (Xizang). Impatiens tingens was described from Nagkanda (nowadays Narkanda, Shimla district, Himachal Pradesh) and Dhobri [35], and reported from Western Himalaya [12,13] from Himachal Pradesh to Uttarakhand. Hooker [29] reported *I. tingens* also from Nepal, but newer literature confirms only *I. scullyi* [9,21,34,43,45] from this country. Thus *I. tingens* is distributed from Himachal Pradesh and Uttarakhand in India to Central Nepal and southern Tibet.

Impatiens tingens Edgew. was first described by M.P. Edgeworth [35] in Transactions of the Linnean Society of London based on his own collection from below Nagkanda (Narkanda), Shimla, Himachal Pradesh. Stewart [46] in his book Punjab Plants mentioned '*This species, so named by Edgeworth from its coloring his herbarium paper yellow, is a common weed in Lahoul, where Aitchison states that an oil is expressed from the seeds, only to be used, however, for polishing the cups made by the inhabitants from the knots of chiefly Acer perhaps imported from further down, as on the Satluj*'.

Impatiens racemosa was first described by De Candolle [47] in Prodromus Systematis Naturalis Regni Vegetabilis. Hooker and Thomson [40] mentioned that "*I. racemosa* in Wallich's Herbarium there are at least three plants, viz., *I. leptoceras* and the two others, which appear to differ chiefly in the racemes of one being interrupted whorled, and of the other continuous: as Mr. Edgeworth has described the latter under the name of I. tingens, I have retained Wallich's name for the former. The *I. tingens*, Edgeworth, appears to differ in no respect from this and from specimens marked *I. racemosa* in Wall Herb., except in the flowers not being verticillate, and in the remarkable character of the posticous lobes of the lateral petals (alae) being included into the spur, which I cannot but regard as an anomalous character. The whorled pedicels, numerous long erect racemes, small flowers and straight spur best distinguish racemosa." So, they described *I. laxiflora* flowers as yellow and pink because they were treating collections of three species i.e. *I. racemosa* (=*I. laxiflora* var. *khasiana*), *I. tingens* (=*I. laxiflora* var. *stracheyi*) and true *I. laxiflora*.

Hooker and Thomson [40] pointing out unique anomalous character of *I. tingens* wrote 'one lobe is developed in aestivation within the spur.' Further they wrote under *I. tingens* "In some of the specimen I found the posticous lobes of the lateral petals (which are extremely variable in form and shape) included in the spur, as described by Edgeworth; in others they are free, and I am disposed to regard the former arrangement as owing to an anomalous form of the petals, which are normally simply and shortly 2-lobed as in *I. racemosa* and others."

In 1905, J.D. Hooker while summarizing *Impatiens* in the Indian subcontinent in a series of papers as "An Epitome of British Indian Species of *Impatiens*" [29] excluded all the varieties from *I. laxiflora*. *Impatiens laxiflora* var. *stracheyi* Hook.f. was synonymized with *I. tingens* Edgew. and it was mentioned that this species is distributed from Western Himalaya to eastward up to Central Nepal.

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Figure 6. A - *Impatiens tingens* Edgew. lectotype; B – *Impatiens scullyi* Hook.f. (J. Scully 272, K000694939, holotype). Note type specimen of both species A & B showing illustrated long auricle arising from the base of lateral united petal. Images copyright Royal Botanical Garden, Kew.

***Impatiens laxiflora* var. *stracheyi* Hook.f. in Fl. Brit. India 1: 480 (1875)**

Edgeworth [35] described many new species from northwestern India based on his own herbarium collection. For most species, he had not only herbarium specimens but also the notes taken from living plants at the time of collection. One of these species is *Impatiens micranthemum* Edgew. [35, p. 40], in most sources, it is treated as a synonym of *I. laxiflora* Edgew. [35, p. 40];[48]. It was described as having predominantly white or whitish flowers, but inflorescences with 3–4 flowers, stems with sparse black glands and round lower lobe of lateral united petals. These features clearly differentiate it from *I. scullyi*, as described by [29] and [34]. There is, however, nothing in Edgeworth's description of *I. micranthemum* about a long appendage on lateral united petals, characteristic of *I. scullyi* (see [34] and very rare in other species of the *Impatiens* genus.

Identity of name *Impatiens micranthemum* Edgew. as *I. laxiflora* Edgew. is also confirmed by author (A.S.) after recollecting *I. micranthemum* from its type locality Hatu Peak, Narkanda, Shimla district, Himachal Pradesh where the lower elevation limits of this species descends with *I. tingens* population.

Specimens Examined –

FRLH124715, 14.ix.2021, INDIA, Himachal Pradesh, Shimla District, Narkanda, 31.15070N & 77.28050E, 2650 m, coll. Ashutosh Sharma; BSS124716, 14.ix.2021, India, Himachal Pradesh, Shimla District, Narkanda, Below Hattu Peak, 31.15060N & 77.28540E, 2805 m, coll. Ashutosh Sharma; DD172573, 04.viii.2018, India, Himachal Pradesh, Mandi District, Dhaved (near Khanni), 31.6530N & 77.2830E, 1,600–1,900 m, coll. Ashutosh Sharma; DD172574, 15.viii.2018, India, Himachal Pradesh, Kullu District, Jhuni, 31.8700N & 77.3240E, 1,800–2,100 m, coll. Ashutosh Sharma; No. 9420261, 12.viii.1994, Nepal, Rasuwa District, Lingju Tibling, 28012'N & 85007'E, 2,040–2,130 m, coll. F. Miyamoto, K.R. Rajbhandari, S. Akiyama, M. Amano, H. Ikeda & Y. Tsukaya (KATH005907; seen as a picture); No. 8427, 16.ix.1954, Nepal, Mardi Khola, 2,280m, coll. Stainton, Sykes & Williams

(KATH030467; seen as a picture); No. 4367, 12.ix.1954, Nepal, Gurjakhani, 2,590m, coll. Stainton, Sykes & Williams (E00848293; seen as a picture); No. 9043, 15.x.1954, Nepal, Bhujihola, 2,440m, coll. Stainton, Sykes & Williams (E00848290; seen as a picture). No. 26818, 4.x.1958, India, Uttarakhand, Chakrata forest division, Kathyan - Mundali 2,070m, coll. K.C. Sahni, (DD 128670; seen as a picture); No. 71231, 8.viii.1958, India, Uttarakhand, Chakrata forest division, Kathyan - Mundali 2,070m, coll. K.C. Sahni, (DD 128670; seen as a picture); https://ivh.bsi.gov.in/phanerogams-gen-coll-details/en?link=CAL0000046687&column=szBarcode

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