



## *Impatiens theuerkaufiana* (Balsaminaceae), a new scapigerous species from the Western Ghats, India

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### Abstract

*Impatiens theuerkaufiana*, a new scapigerous species of *Impatiens* (Balsaminaceae) from Wayanad district, Kerala, India is described and illustrated. It differs from *I. dendricola* by having entire lateral sepals, a transversely elliptic, bilobed dorsal petal with wavy margins, a short straight spur less than 5 mm long, and tuberculate seeds; from *I. agumbeana* by having pendulous linear lanceolate leaves, shorter pedicels up to 3.5 cm long, non-auricled lateral united petals, and an ellipsoid capsule; and from *I. stocksii* by having long petioles of 5–8 cm, an elliptic lanceolate leaf lamina, long pedicels of 2.0–3.5 cm, and a pouch-like short spur.

**Key words:** Endemic species, Kerala, new species, Wayanad

### Introduction

The family Balsaminaceae comprises about 1000 species under only two genera, viz. *Hydrocera* Blume ex Wight & Arnott (1834: 140) and *Impatiens* Linnaeus (1753: 937) (Mabberley 2008). The genus *Hydrocera* is monotypic, and all other species belong to *Impatiens* which is primarily an Old World genus distributed throughout much of tropical Africa, India, SouthEast Asia and Japan (Grey-Wilson 1980). In India the genus is represented by more than 210 taxa mainly distributed in the Eastern Himalayas, the neighbouring North-Eastern states and the Western Ghats, which are the major centres of diversity, and with each area being characterised by its own species group (Hooker 1908, Gamble 1915, Vivekananthan *et al.* 1997, Augustine *et al.* 1999). As far as this genus is concerned, the Western Ghats region is the main area of speciation in India. Interestingly, more than 90 species of *Impatiens* are endemic to the Western Ghats including the new species described by Chandrabose (1979), Bhaskar & Razi (1983), Chandrabose *et al.* (1984), Kumar & Sequiera (1996, 2001), Bhaskar (2006), and Dessai *et al.* (2009). In India, there are about 20 known scapigerous species of *Impatiens* and are restricted to the same area which belongs to the Western Ghats-Sri Lanka Biodiversity Hotspot (Vivekananthan *et al.* 1997, Viswanathan & Manikandan 2003, Bhaskar 1981, 2006, Narayanan *et al.* 2011). Brief accounts on the history of studies of Indian species of *Impatiens* have been provided by Narayanan *et al.* (2011) and Dessai & Janarthanam (2011).

The Wayanad district of Kerala is a biodiversity rich area in the Nilgiri Phytogeographical region of the Western Ghats which harbours several endemic species (Sivadasan & Balakrishnan 1989, Sivadasan & Jaleel 2002, Narayanan *et al.* 2010a, 2010b, 2011, 2012). During the floristic study of Wayanad district, 21 species of *Impatiens* were collected from various habitats (Narayanan 2010). Two collections from high altitude evergreen forest of the district were found to be quite distinct from the hitherto known scapigerous species, and detailed studies revealed their novelty. It is described and illustrated as a new species here.

## Taxonomy

### *Impatiens theuerkaufiana* Ratheesh & Sivadasan, *sp. nov.* (Figs. 1 & 2)

The new species resembles *I. dendricola* and *I. agumbeana*, but differs by having the lower sepal with a short spur up to 5 mm long, the dorsal petal transversely elliptic, basally and distally bilobed, wavy-margined, the lateral united petals non-auricled, and a tuberculate seed coat. It differs from *I. agumbeana* by having pendulous linear lanceolate leaves, white flowers with a short pedicel up to 3.5 cm long, and ellipsoid capsules; and from *I. stocksii* by having a long petiole of 5–8 cm, an elliptic lanceolate leaf lamina, longer pedicels of 2.0–3.5 cm, and a pouch-like short spur.

**Type:**—INDIA: Kerala: Wayanad district, Chembra hills, 11° 30.716'N, 76° 06.239' E, ±1900 m a.s.l., 19 September 2006, *Narayanan MSSH 2316* (holotype MH!, isotypes Community Agrobiodiversity Centre (CABc)—MS Swaminathan Research Foundation (MSSRF) herbarium, Wayanad!).

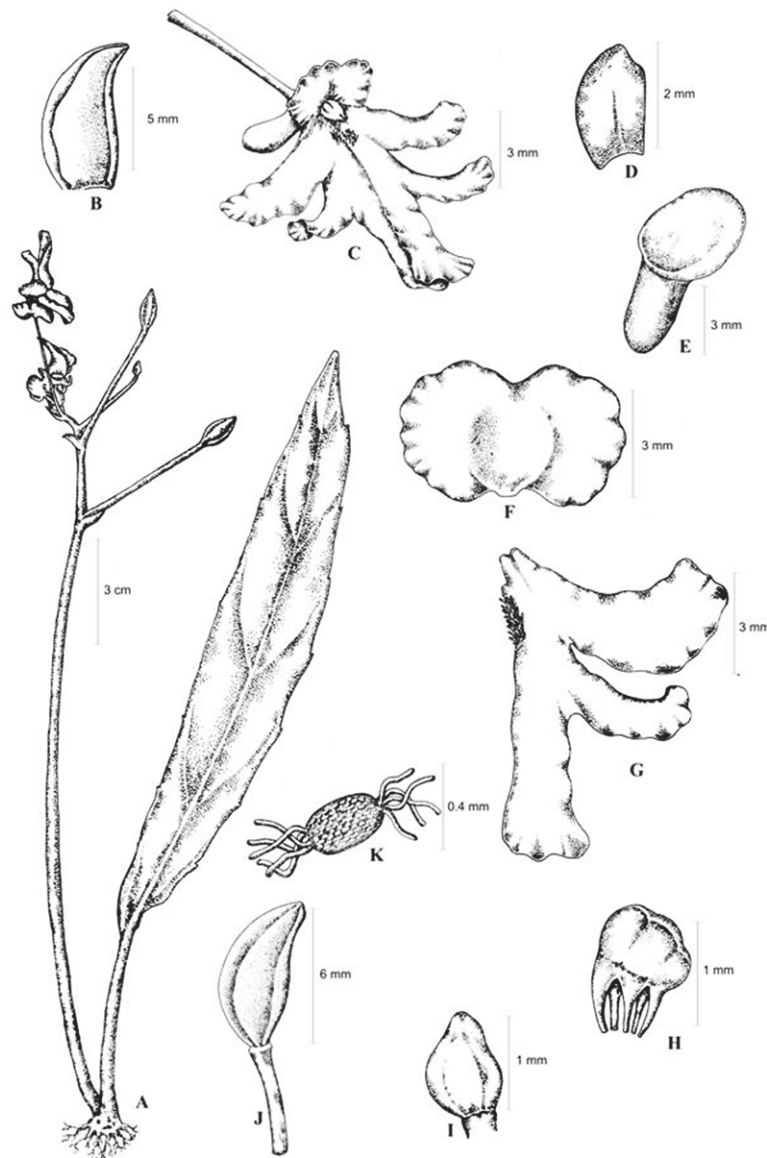
Epiphytic, scapigerous perennial herbs, 10–20 cm tall, rootstock tuberous; tubers whitish, globose. Leaves 1 or 2, radical, petiolate, pendulous, membranous; petiole 5–8 cm long, pale pink, slender, glabrous; lamina 10.0–16.0 x 1.5–3.0 cm, elliptic-lanceolate or lanceolate, apex acute, base oblique, attenuate, faintly crenate along margins, crenatures minutely apiculate, adaxially pale green, abaxially pale pink, glabrous; nerves 4–6 pairs, prominent and pale pink below. Inflorescence a simple racemose scape, semi-pendulous; peduncles slender, terete, 12–20 cm long, glabrous, 5–8-flowered; flowers distal, each 1.3–1.5 x 1.0–1.3 cm, white with yellow patches of papillae near the centre; pedicel 2.0–3.5 cm long, elongating in fruiting stage; bract broadly ovate, ca. 8 x 4 mm, concave, pale green, glabrous; sepals white, glabrous; lateral sepals ca. 2.0 x 1.2 mm, broadly ovate, entire; lower sepal broadly elliptic, spurred; spur straight, pouch-like, 3.5–5.0 mm long, white, glabrous; dorsal petal transversely elliptic, 3.5–4.0 x 5.0–6.0 mm, basally and distally bilobed, margins wavy, glabrous; lateral united petals 3-lobed, non-auricled, 1.0–1.2 cm long, white with a tuft of yellow papillae a little above the base of the inner margin; basal lobes largest, ca. 4 mm long, bent upwards, broadly obovate; middle lobe smaller, ca. 2 mm long; distal lobe narrow, straight with sub-truncate tip, 3–4 mm long; stamens 5, connate; filaments white; ovary pale yellow, broadly ellipsoid, acute at apex, glabrous. Capsule broadly ellipsoid, acute, ca. 8 mm long, glabrous; seeds up to 70, minute, tuberculate, with a dense tuft of hairs at both ends.

**Phenology:**—Flowering from early July with peak in August; fruiting in September.

**Eponymy:**—The specific epithet is in honor of Mr. Wolfgang D. Theuerkauf, founder of the Gurukula Botanical Sanctuary, Alattil, North Wayanad, Kerala and an ardent naturalist and botanist who devoted his life for conservation of wild plants of Western Ghats, and creating awareness and imparting education on nature, natural resources, and conservation.

**Distribution, habitat and ecology:**—*Impatiens theuerkaufiana* grows in montane evergreen forests at elevations of 1,900–2,000 m. It is known only from the Chembra hills of the Wayanad district, Kerala. Small populations of this species are distributed in two montane evergreen forests in the area. The species is usually seen as an epiphyte on the moss-covered trunks of evergreen tree species. Density of the individuals is higher on trees inside the shola forest. The delicate species appears with the onset of monsoon and the leaves perish within a short period, even with just a week-long non-rainy period during monsoon season. The host-tree species include *Holigarna nigra* Bourdillon (1904: 95), *Ixora sivarajiana* Pradeep (1997: 315), *Symplocos racemosa* Roxburgh (1832: 539), *Syzygium hemisphericum* (Wight 1841: 14) Alston in Trimen (1931: 115), etc. The associated species include *Belosynapsis vivipara* Fischer (1928: 254), *Impatiens jerdoniae* Wight (1850: 15, t. 1602), *I. parasitica* Beddome (1859: 66), *Medinilla malabarica* Beddome (1868–1874: 33), *Oberonia brunoniana* Wight (1851: 3, t. 1622), *O. nayarii* Ansari & Balakrishnan (1990: 17), *O. tenuis* Lindley (1859: 3), etc.

**Interrelationships:**—*Impatiens theuerkaufiana* resembles *I. dendricola* Fischer (1935: 157) in its pendulous habit, white flowers, 3-lobed lateral united petals with a tuft of papillae a little above the base and near the centre along the inner margin, and seeds with tufts of hairs at both ends. The length of the peduncle and pedicel, shape and size of the lateral sepals, dorsal petal, spur and lateral united petals and texture of seeds distinguish the new species from the latter. The new species has entire, broadly ovate lateral sepals and a

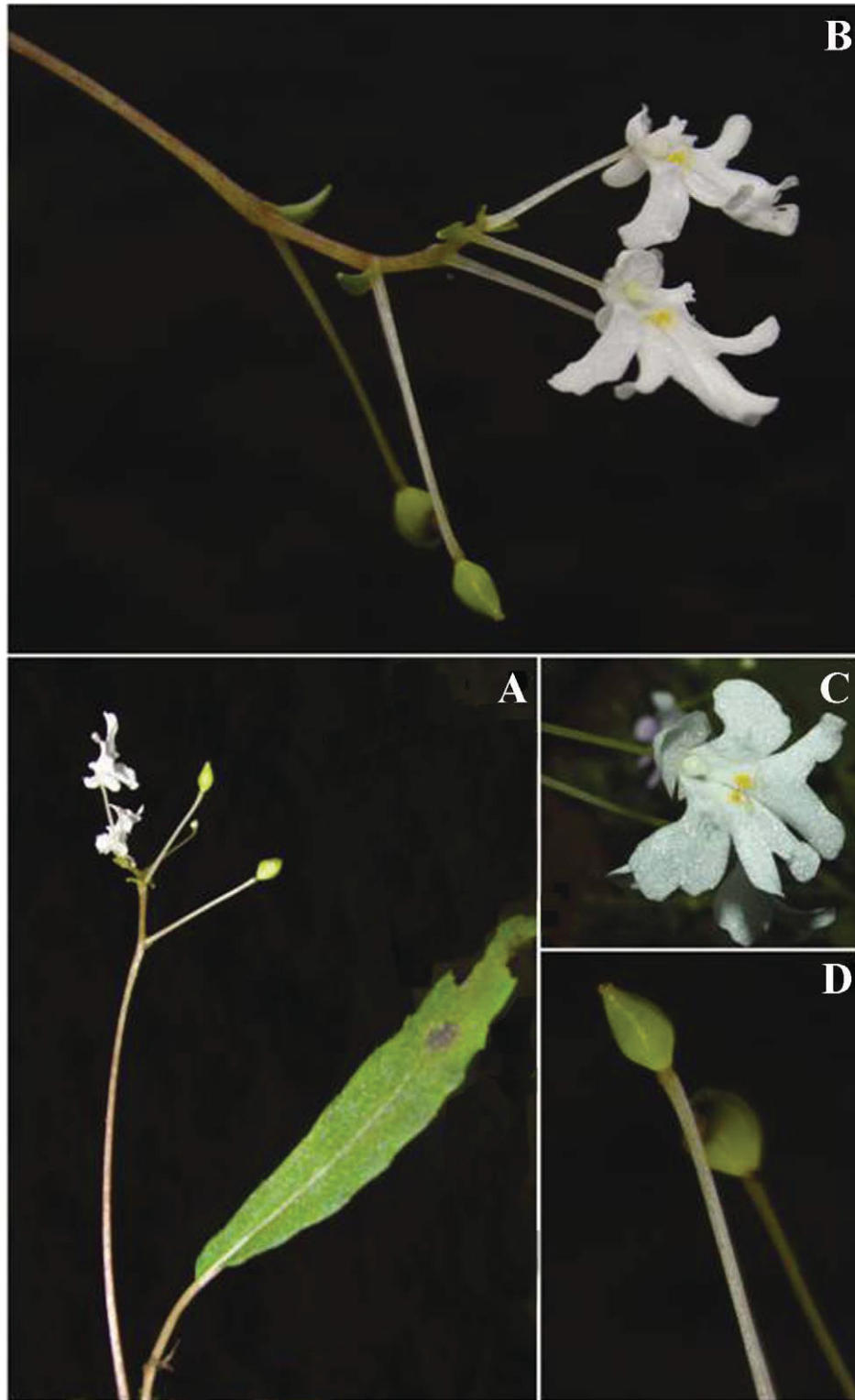


**FIGURE 1.** *Impatiens theuerkaufiana*. A. Habit. B. Bract. C. Single flower. D. Lateral sepal. E. Lower sepal with spur. F. Dorsal petal, dorsal view. G. Lateral united petals. H. Stamens. I. Pistil. J. Fruit. K. Seed. Drawings by Jayesh P. Joseph from living specimens.

basally and distally bilobed, transversely elliptic dorsal petal with wavy margins in contrast to the falcate-ovate lateral sepals with deeply lobed base, and entire dorsal petal of *I. dendricola*. *Impatiens theuerkaufiana* has also a short straight pouch-like spur of less than 5 mm in contrast to the 1.0–1.5 cm long, strongly curved, clavate spur of *I. dendricola*. The lateral united petals of the new species are less than 1.5 cm long, strongly recurved, basal lobes broadly obovate of ca. 4 mm long with wavy margins, and seeds are tuberculate, while in *I. dendricola* the lateral united petals are up to 2 cm long with a straight, strap-shaped, apically rounded basal lobes of ca. 8 mm length, and seeds with a muriculate surface. The new species also resembles *I. agumbeana* Bhaskar & Razi (1938: 382) in some of its characters such as the short spur less than 5 mm long, lateral united petals with a large recurved basal lobe and seeds with dense tufts of elongated hairs at both ends. It differs by its pendulous lanceolate leaves, flowers with pedicels up to 3.5 cm long, lateral united petals without a dorsal auricle, and an ellipsoid capsule, whereas *I. agumbeana* shows ovate leaves with an acute base, laterally united petals with a prominent dorsal auricle, flowers with pedicels up to 20 cm long, and an ovoid capsule. *Impatiens stocksii* Hooker & Thomson (1859: 119) exhibits some resemblance with the new species in its white flowers with yellow patches of papillae, but differs in its broadly ovate or elliptic to

orbicular leaves with a short petiole of 1.0–4.5 cm, short scapes of 3.0–8.5 cm with flowers having short pedicels of 0.9–1.3 cm and without a spur. Diagnostic morphological characters of *Impatiens theuerkaufiana* and the related species are provided in Table 1.

**Additional specimen examined (paratype):**—INDIA. Kerala: Wayanad District, Chembra hills, N 11° 30.716' E 76° 06.239', ±1900 m, 20 August 2009, *Narayanan MSSH 4026* (Herbarium of CAbC-MSSRF, Wayanad!).



**FIGURE 2.** *Impatiens theuerkaufiana*. A. Habit. B. Inflorescence. C. Flower. D. Young fruit. Photos by M. K. Ratheesh Narayanan.

**TABLE 1.** Diagnostic morphological characters of *Impatiens theuerkaufiana* and related species

Characters	<i>I. theuerkaufiana</i>	<i>I. dendricola</i>	<i>I. agumbeana</i>	<i>I. stocksii</i>
Leaves	1–2, pendulous	4 or 5, pendulous	2–5, erect	2–5, pendulous
Petiole	5–8 cm long	1.5–7.0 cm long	3–4 cm long	1.0–4.5 cm long
Leaf lamina	Elliptic-lanceolate, oblique, attenuate at base, 10–16 cm long	Ovate to oblong-lanceolate, cuneate or oblique to obtuse at base, 1.2–6.0 cm long	Ovate, obtuse, acute at base, 1.0–1.5 cm long	Broadly ovate or elliptic to orbicular, obtuse to truncate at base, 1.0–2.5 cm long
Scape	Semi-pendulous, 12–20 cm long	Erect, 5–18 cm long	Erect, 8–10 cm long	Erect, 3.0–8.5 cm long
Flowers	White with yellow patches of papillae near the centre	White with yellowish brown to orange patches of papillae near the centre	Pink without papillae	White with yellow patches of papillae near the centre
Pedicels	2.0–3.5 cm long	1–2 cm long	18–20 cm long	0.9–1.3 cm long
Lateral sepals	Broadly ovate, entire	Falcate-ovate, deeply lobed at base	Asymmetrically ovate, entire	Ovate, entire
Lower sepals	Broadly elliptic, white, glabrous	Broadly ovate, white, glabrous	Spathulate, flat, pink, glabrous	Saccate, white with a yellow spot, glabrous
Spur	Pouch-like, 3.5–5.0 mm long, white	Clavate, long, rounded at apex, flat, 1.3–1.5 cm, white	Cylindric-obtuse, slightly curved, 4–5 mm long, pink white	Absent
Dorsal petal	Transversely elliptic, basally and distally bilobed, margins wavy	Ovate, margins not wavy	Orbicular to reniform, margins not wavy	Sub-orbicular forming a small sac-like structure at base, margins not wavy
Lateral united petals	1.0–1.2 cm long, not auricled, white with a tuft of yellow papillae	1.6–2.0 cm long, auricled, white with yellowish brown to orange papillae	1.0–1.2 cm long, auricled, pink, without papillae	1.3–1.6 cm long, not auricled, white with a tuft of yellow papillae
Basal lobes of lateral petals	Larger than the distal lobes	Smaller than the distal lobes	Smaller than the distal lobes	Smaller than the distal lobes
Capsules	Broadly ellipsoid	Ellipsoid or oblanceoloid to lanceoloid	Ovoid	Broadly ellipsoid
Seeds	Tuberculate, with a dense tuft of hairs at both ends	Muriculate with tuft of hairs at both ends	Spirally banded, with hairs at both ends	Spirally banded, with hairs at both ends

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