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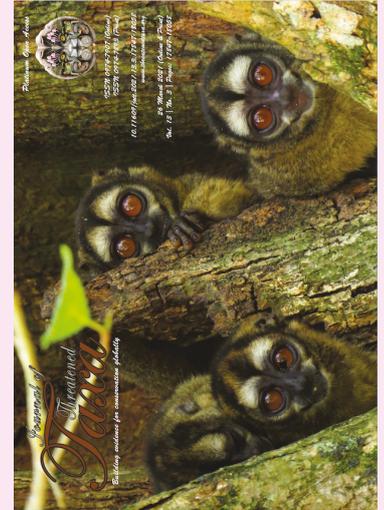
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NOTE

REVISITING THE TAXONOMY OF *STROBILANTHES LAWSONII* AND *S. PUSHANGADANII* (ACANTHACEAE), TWO ENDEMIC TAXA OF WESTERN GHATS, INDIA

Blessy Cherian, K.M. Prabhukumar, R. Jagadeesan, V.V. Naveen Kumar & Indira Balachandran

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NOTE

Revisiting the taxonomy of *Strobilanthes lawsonii* and *S. pushpangadanii* (Acanthaceae), two endemic taxa of Western Ghats, India

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Strobilanthes Blume (1826), the second largest genus in the family Acanthaceae Juss. (1789), consists of 400 species restricted to the hilly regions of tropical Asia (Wood 1998; Augustine 2018). In India, it is represented by 160–170 species from the mountains of peninsular India and the Himalaya of northeastern and northwestern India. In peninsular India, 65 taxa are recorded so far with many new recent additions (Gamble 1924; Venu 2006; Josekutty et al. 2016, 2017, 2018; Sasidharan et al. 2016; Augustine et al. 2017; Biju et al. 2017; Augustine 2018). Clarke (1885) enumerated 146 species of *Strobilanthes* in the Flora of British India. In southern India and Sri Lanka, the genus is represented by 65 species, of which most are endemics (Carine & Scotland 2002).

Eight years of explorations in the southern region of the Western Ghats has resulted in the documentation and collection of many endemic *Strobilanthes* species. Among them, materials collected from Nelliampathy forests (CMPR 8707, 9589) and Muthikulam forests (CMPR 9879) of Palakkad District, Kerala did not key out their identity exactly. After detailed taxonomic studies

with the perusal of relevant literature (Clarke 1885; Gamble 1924; Santhoshkumar et al. 2002; Venu & Daniel 2003; Carine et al. 2004; Venu 2006) revealed their identity as *S. pushpangadanii* E.S.S. Kumar et al. (2002: 73), *S. gamblei* Carine et al. (2004: 5), and *S. lawsonii* Gamble (1923: 374) respectively.

Since 1923, many subsequent researchers recorded the distribution of *S. lawsonii* from different localities of Kerala in their floristic reports (Ramachandran & Nair 1980; Sasidharan 2004, 2013). But our herbarium survey revealed that the materials so far identified as *S. lawsonii* are either *S. gamblei* or *S. pushpangadanii*. Hence our present collection is a rediscovery of *S. lawsonii* after Gamble's collection in 1884, after a lapse of 133 years.

Based on the evidence of the live collection of *S. gamblei* and *S. pushpangadanii* from Nelliampathy forests of Palakkad, we reinstate *S. pushpangadanii* as a distinct species, with the most notable morphological differences from *S. lawsonii* (Table 1) being partially fused corolla lobes, exserted stamens, and glabrous style. The latter species, *S. gamblei* has been recently reinstated by Pradeep et al. (2020).

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Strobilanthes lawsonii Gamble Bull. Misc. Inform. Kew 1923: 374. 1923. (Image 1, Figure 1)

Type: Tamil Nadu. Nilgiri Distr., 6000ft., Nov. 1883, Gamble 13387 (lectotype: K!)

=*Phlebophyllum lawsonii* (Gamble) Bremek., Verh. Acad. Wet. afd. Natuurk. Sect. 2, 41: 169. 1944.

Type: Same as *S. lawsonii*.

Erect shrubs. Stem quadrangular with dense tawny coloured short simple hairs; young branches are similar to that of its main axis. Leaves opposite-decussate, petiolate; petiole 2.3–3.8 cm long, pubescence as same as in stem. Lamina 8.7–14.8 × 3.0–6.2 cm long, ovate, apex long acuminate, decurrent at base, margin entire, abaxial surface covered with dense tawny-coloured woolly indumentum, adaxial surface glabrous; venation reticulated; nerves 9–11 pairs, arcuate, parallel with invisible reticulations, prominent on both surfaces while less in adaxial surface comparatively. Inflorescence spike, axillary and terminal, simple or branched, 1–3 branches, narrowly cylindrical, 26–70 × 3.5–5 mm, interrupted; peduncle 1.0–1.5 cm long, densely covered with tawny tomentose indumentum. Bract single, 4.5–4.8 × 1.5–1.6 mm long, shorter than calyx, ovate, green, apex acuminate, margin entire, adaxial surface and margins with dense tawny woolly indumentum. Bracteole 2, ca. 3.5mm long. Flower 2–2.2 cm long, blue, covered with soft tawny hairs, sessile. Calyx 5-lobed, unequal, 2 or 3 lobes are larger than the rest, 5.6–6.5 mm long, lobes lanceolate, acuminate or acute at apex, margin entire, adaxial surface covered with simple white delicate hairs, abaxial surface densely covered with tawny indumentum, similar to that of bract. Corolla 5-lobed, equal, overlapping, 5.5–5.7 × ca. 0.5 mm long, ovate to broadly triangular, round or rarely acute at apex, margins almost entire, blue, throat campanulate, outer surface with soft tawny tomentose indumentum; tube 14.0–15.5 mm long, ventricose, outer surface with soft tawny hairs. Stamens 2, equal, included; filaments 10–10.2 mm long, sparsely white hairs at base; anthers ca 1.8mm long, ditheous, dorsifixed. Ovary 2-celled, superior, on a prominent disc, ca. 1.5mm long, oblong, glabrous. Style ca. 9.5mm long, pubescent; stigma 2.5mm long with sparsely white hairs. Capsule 14–15 mm long, elliptic to narrowly obovate, glabrous. Seeds 2.2–4.5 mm long.

Phenology: October–June.

Distribution and Ecology: Found in thick rainforest undergrowth and shades of open grassland in the evergreen forest. The distribution of the species is strictly restricted to Tamil Nadu and Kerala (based on present collection) region of Western Ghats.

Additional specimens examined: India: Tamil Nadu. Nilgiri Dist., 6000ft. alt., xi.1883, Gamble, 13387 (BM!); Kerala. Palakkad District, Way to Elival Hills, 12.xi.2016, K.M. Prabhukumar & Binu Prakash, 9879 (CMPRI!).

Reinstatement of *S. pushpangadani*: In the protologue of *Strobilanthes lawsonii*, Gamble (1923) cites four materials, two from Sispara Ghat of Nilgiri Hills (Gamble 13387, 14252), one each from Thamracheri Ghat of Wayanad (Barber 5686) and Travancore hills (Bourdillon 42), however, the collection from Wayanad and Travancore hills is now considered representing two distinct species *S. gamblei* and *S. pushpangadani*, respectively.

Carine et al. (2004) did an excellent revision of *Strobilanthes kunthiana* group in peninsular India with an understanding morphological comparison chart to distinguish the members among the group. As per the protologue, hand drawing of flower on the type specimen (Gamble 13387; lectotype designated by Carine et al. (2004) and Isolectotype) and the present collection from Muthikulam Hills (9879), it is very clear that, *S. lawsonii*



Image 1. *Strobilanthes lawsonii* Gamble.: A,B—Habit | C—inflorescence showing flowers with equal corolla lobes.

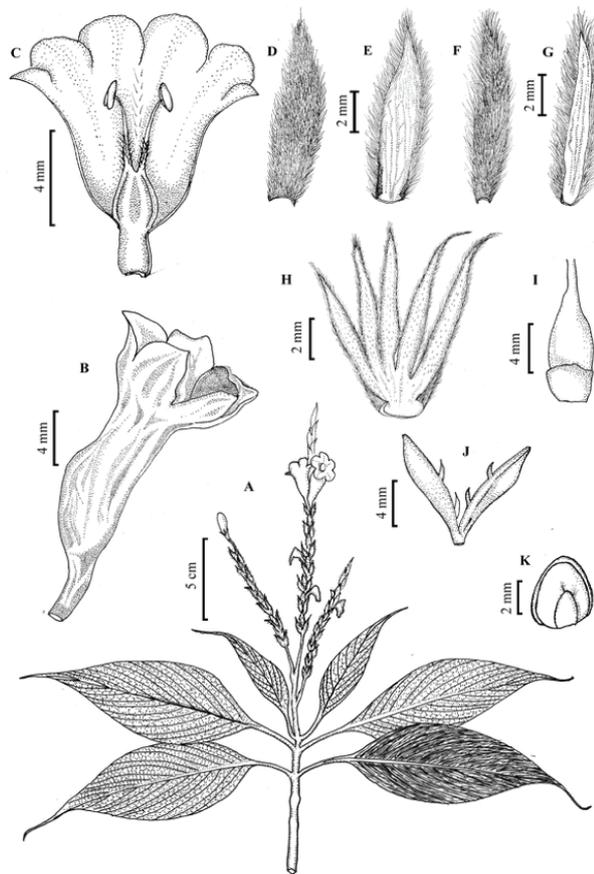


Figure 1. Illustration of *Strobilanthes lawsonii* Gamble.: A—Habit | B—flower | C—L.S. of flower | D—bract- adaxial view | E—bract-abaxial view | F—bracteole-adaxial view | G—bracteole-abaxial view | H—calyx | I—ovary | J—capsule | K—seed.

is distinct from *S. gamblei* and *S. pushpangadanii* by means of its equally divided corolla lobes. But during the revisionary work of *Strobilanthes* in peninsular India, Venu (2006) synonymised *S. gamblei* and *S. pushpangadanii* under *S. lawsonii* with commenting “*S. lawsonii* looks very similar and stands between *S. pushpangadanii* and *S. gamblei*”. But he completely ignored the most notable morphological feature of this group, fusion of corolla lobes, exertion of stamens, and pubescence nature of style. Based on the evidence of live collections and strong distinguishing characters between the taxa, status of *S. pushpangadanii* as a distinct species (Table 1 & Image 2). The latter species, *S. gamblei* (Image 3) has been recently reinstated by Pradeep et al. (2020).

Special notes: Augustine (2018) used a few photographs of the above discussed taxa provided by PKM with due acknowledgment.

Strobilanthes pushpangadanii E.S.S. Kumar, Jabbar & A.E.S. Khan, *Rheedea* 12: 73. 2002. (Image 2).

Type: India. Kerala. Thiruvananthapuram district, Mankayam hills, E.S.S. Kumar 14722 (Holotype: TBGT; Isotype: MH, CALI!)

Flowering & Fruiting: August–March.

Distribution and Ecology: Margins of evergreen forest and open grasslands in Kerala. Carine (2004) noted that the distribution of the species is strictly restricted to Thiruvananthapuram and Idukki districts of southern Kerala, but our field surveys reveal that the occurrence of the species extends up to the Palakkad gap.

Additional specimens examined: 14722 (CALI!, Isotype), India, Kerala, Thiruvananthapuram District, Mankayam Hills, 800m, 20.x.1992, coll. E.S. Santosh Kumar; 14030 (CALI!), Idukki District, Vellimala, 1,700m, 20.viii.1994, coll. Augustine; 11157 (CALI!), Thiruvananthapuram District, Ponmudi, Barnes s.n (K!); 5936 (KFRI!), Chemingi, c. 900m, 24.i.1992, coll. Mohanan; Thrissur District, Sholayar, 25.x.1992, coll. N. Sasidharan; 9879 (CMPR), Palakkad District,



Image 2. *Strobilanthes pushpangadanii* E.S.S. Kumar et al.: A—habit | B—inflorescence showing flowers with unequal corolla lobes.

Table 1. Comparison of morphological features of *Strobilanthes lawsonii*, *S. gamblei*, and *S. pushpangadanii*

Character	<i>S. gamblei</i>	<i>S. pushpangadanii</i>	<i>S. lawsonii</i>
Young stem	quadrangular	cylindrical	quadrangular
Petiole length	3–9 cm	1.5–2 cm	2.3–3.8 cm
Leaf size	5.5–15 × 2–6 cm	3.2–12 × 1–4.5 cm	8.7–14.8 × 3.0–6.2 cm
Leaf apex	long acuminate	caudate - acuminate	long acuminate
Leaf margin	entire	denticulate	entire
Leaf abaxial surface	densely covered with cream or tawny-colored woolly indumentum	abaxial soft silky texture due to the presence of dense tawny indumentum	abaxial surface covered with dense tawny-colored woolly indumentum
Leaf adaxial surface	glabrous	coriaceous, glabrous or sparsely pilose above	glabrous
Nerves (pairs)	6–11	7–13	9–11
Inflorescence type	interrupted	uninterrupted	interrupted
Inflorescence dimension	4–15 × 0.2–0.4 mm	5.5–6.2 × 0.5–0.8 mm	26–70 × 3.5–5 mm
Peduncle length	1–1.5 cm long	2.3–6.5 cm long	1–1.5 cm long
Bracts	glandular golden brown woolly indumentum outside	glandular golden brown woolly indumentum outside	adaxial surface and margins with dense tawny woolly indumentum
Bracteole	tawny woolly indumentum abaxially	golden brown woolly tomentose abaxially	tawny woolly indumentum abaxially
Calyx length	7.7–10.2 mm long	4–6 × 1–1.5 mm long	5.6–6.5 mm long
Calyx	glabrous or rarely hairy with tawny tomentose	dense tawny tomentose abaxially and adaxial glabrous	adaxial surface covered with simple white delicate hairs, abaxial surface densely covered with tawny indumentum
Corolla	light pink; 1.5–1.8 cm long, hairy	light pink with dark purple venation, 1.5–1.9 cm long, hairy	blue, outer surface with soft tawny tomentose indumentum
Corolla tube	1.1–1.3 cm long	1.0–1.2 cm long,	1.4–1.6 cm long
Corolla lobes	unequal, bi-lipped	unequal, bi-lipped	equal
Stamens	exserted	exserted	inserted
Filament	8.5–11 mm long	ca. 2.2 cm	10–10.2 mm long
Style	glabrous	glabrous	pubescent

Key to the species

- 1a. Two partially fused corolla lobes, stamens exserted, style glabrous 2
 1b. Corolla lobes divided equally, stamens included, style pubescent *S. lawsonii*
 2a. Leaves with up to 9cm long petiole and acuminate apex, margins entire, spikes uninterrupted, up to 6.5cm long, peduncle long, 2.3–6.5 cm long, corolla light pink *S. gamblei*
 2b. Leaves shortly petiolate up to 2cm long, apex short candidate-acuminate, margins denticulate or crenate-serrate, spikes interrupted, up to 10cm long, peduncle short, 1–1.5 cm long, corolla light pink with dark purple venation *S. pushpangadanii*

Nelliampathy, Minnampara, 12.xi.2016, coll. K.M. Prabhukumar & Binu Prakash.

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Image 3. *Strobilanthes gamblei* Carine et al.: A & B—habit (Inflorescence showing flowers with unequal corolla lobes).

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