

A revision of the *Strobilanthes kunthiana*-group (*Phlebophyllum sensu Bremekamp*) (*Acanthaceae*)

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Summary. Morphological variation in the *Strobilanthes kunthiana* group is examined and species delimitation problems addressed. A taxonomic revision is presented recognising ten species from peninsular India. Two new species are described, *Strobilanthes gamblei* Carine, J. Alexander & Scotland and *S. carnatica* Carine, J. Alexander & Scotland.

Introduction

The *Strobilanthiniae* (*Acanthaceae*) *sensu* Bremekamp (1944) is a morphologically diverse group comprising approximately 450 species distributed in south and south east Asia and Melanesia. It is the focus of ongoing revisionary work (Bennett & Scotland 2003; Carine *et al.* 2000; Carine & Scotland 1998, 2000a, 2000b, 2002; Moylan & Scotland 2000, Moylan *et al.* 2002; Scotland 1998; Wood 1994, 1995, 1998; Wood & Scotland 2003; Wood *et al.* 2003).

Generic delimitation within the *Strobilanthiniae* has proven problematic with three radically different classifications of the group (Anderson 1867; Bremekamp 1944; Terao 1983), differing markedly in the number of genera recognised and their circumscription. Recent molecular (Moylan *et al.* in press) and morphological (Carine & Scotland 2000b, 2002) cladistic analyses suggest that establishing a robust and informative generic classification recognising only clearly diagnosed monophyletic groups may be impossible. Consequently, the most satisfactory approach to generic classification in the *Strobilanthiniae* is to recognise a single, expanded, *Strobilanthes*.

Nevertheless, it is possible to recognise a significant number of small but clearly diagnosable species groups within the *Strobilanthiniae*. One such group is the *Strobilanthes kunthiana*-group which corresponds to the genus *Phlebophyllum* Nees as circumscribed by Bremekamp (1944) and is endemic to peninsular India. Whilst neither morphological cladistic analysis (Carine & Scotland 2002), molecular cladistic analysis (Moylan *et al.* in press) nor combined molecular and morphological cladistic

analysis (Moylan *et al.* in press) have satisfactorily resolved the relationships of this group, it is nevertheless clearly diagnosable within *Strobilanthiniae* by spicate inflorescences, 5-partite calyces, two fertile stamens and densely hygroscopically pubescent seeds.

Within the *S. kunthiana*-group, three species are easily distinguished morphologically: *Strobilanthes kunthiana* (Nees) T. Anderson which is distributed in the Kerala High Ranges, Palni Hills and Nilgiri Hills, *Strobilanthes lanata* Nees, endemic to the Nilgiri Hills and *S. canarica* Bedd., a rare species from Karnataka known from very few herbarium collections. Considerable taxonomic and nomenclatural confusion surrounds the remaining species within the group (e.g. Clarke 1884; Mooney 1950; Rani & Matthew 1983; Matthew 1999; Saxena & Brahmam 1995) and the aim of this paper is to address these problems. In this paper, species delimitation is revised, nomenclatural issues addressed and a taxonomic revision of the *Strobilanthes kunthiana*-group is provided.

Materials and Methods

Morphological variation in the group was assessed by examination of herbarium specimens from BM, CALI, E, FHO, K and OXF and from field observations of several of the taxa. Floral dissections were prepared from herbarium material after immersion in boiling water for approximately one minute. Specimens were examined using an Olympus SZ light microscope and measurements made using Digimax Left callipers.

Accepted for publication December 2003.

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Morphological variation and the species of the *S. kunthiana*-group

A number of characters have been identified in this study that can be used reliably to distinguish between species in the *Strobilanthes kunthiana*-group. Using these characters, 10 species are now recognised within the group including two new species, *S. gamblei* and *S. carnatica*. A further species in this complex, *S. pushpangadanii*, has also recently been described (Santhosh Kumar *et al.* 2002). The characters used to distinguish between species in this group are summarised in Table 1.

There has been considerable confusion surrounding the delimitation of *S. jeyporensis*, *S. cuspidata* and *S. consanguinea*. However, this paper shows that these three species are, in fact, readily distinguished. The hooded corolla and exerted stamens of *S. consanguinea* (Fig 2L) are markedly different from the regularly lobed corolla and included stamens of *S. jeyporensis* and *S. cuspidata* (Fig 6M and 7F). Indeed, the corolla and stamen arrangement of *S. consanguinea* suggests a closer relationship with *S. gamblei* (Fig. 1M) and *S. pushpangadanii* (Fig. 1D) than with *S. cuspidata* and *S. jeyporensis*.

Strobilanthes jeyporensis (Fig. 6) is distinguished from *S. cuspidata* (Fig. 7) by its smaller corolla, glabrous style and possession of stout tapering hairs on the adaxial surface of mature leaves. Inflorescence indumentum also distinguishes the two: *S. cuspidata* has a densely glandular-pubescent inflorescence at anthesis whereas in *S. jeyporensis*, the inflorescence may be glabrous or sparsely glandular-pubescent (Table 1). These two species are also geographically disjunct with *S. jeyporensis* distributed in northern Andhra Pradesh, Orissa and Madhya Pradesh, and *S. cuspidata* occurring only in the Nilgiris (Map 3). Re-examination of the *S. jeyporensis*-*S. cuspidata*-*S. consanguinea* complex has revealed an additional species which is described here as *S. carnatica*. *Strobilanthes carnatica* is distributed in Andhra Pradesh, Karnataka and Tamil Nadu and is therefore disjunct from *S. jeyporensis* and *S. cuspidata* with which it shares greatest morphological similarity (Map 3). The interrupted or subinterrupted inflorescences, short bracts and generally glabrous abaxial leaf surfaces distinguish this species within the complex (Fig. 8).

The circumscription of *S. lawsonii* has also been problematic. *Strobilanthes lawsonii* was first described by Gamble (1923), citing material collected from the Nilgiris, Wynad and Travancore Hills. Whilst all the cited specimens possess slender spicate inflorescences and a dense cream or tawny-coloured sericeous indumentum on the leaf adaxial surface, *S. lawsonii sensu* Gamble (1923) is clearly heterogeneous and three distinct species can be recognised. *Strobilanthes lawsonii*, as circumscribed here, is endemic to the Nilgiri Hills (Map 1) and possesses a regularly lobed

corolla and included stamens at anthesis (Fig. 3T). In contrast, both *S. pushpangadanii* and *S. gamblei* have hooded corollas and exerted stamens at anthesis (Figs. 1D & 1M respectively). These two species are distributed in Kerala and Karnataka (Map 1) and are distinguished by leaf morphology and ovary pubescence (Table 1).

The majority of species in the *S. kunthiana*-group are distributed in the Western Ghats of southern peninsular India. Two species, *S. consanguinea* (Map 1) and *S. kunthiana* (Map 2), are widespread in the Western Ghats. Three species are endemic to the Nilgiris (*S. lawsonii* (Map 1), *S. lanata* (Map 2) and *S. cuspidata* (Map 3)) with the other Western Ghat species also occupying restricted distributions: *S. gamblei* in southern Karnataka and Kerala (Map 1), *S. pushpangadanii* in southern Kerala (Map 1) and *S. canarica* in southern Karnataka (Map 2). Only two species in this group do not occur in the Western Ghats: *S. carnatica*, which occurs in drier regions to the east of Western Ghats in Tamil Nadu, southern Andhra Pradesh and Karnataka (Map 3) and *S. jeyporensis* which occurs in northern Andhra Pradesh, Madhya Pradesh and Orissa (Map 3). Several accounts have suggested that *S. cuspidata* and *S. consanguinea* also occur in the northeast of the peninsula (Gamble 1924; Mooney 1950; Saxena & Brahmam 1995). These reports are based on mis-identifications of *S. jeyporensis*.

A semelparous life history has been suggested for many species of *Strobilanthinæ* and most, or all members of the *Strobilanthes kunthiana*-group are probably semelparous. Semelparous *Strobilanthinæ* flower and set seed gregariously after several years of growth and then die, to be replaced by seedlings of the next generation. Bremekamp (1944) used the term plietesial to refer to this life history strategy.

A semelparous life history strategy is well documented in *S. kunthiana* with records of mass flowering every twelve years since 1838 (Robinson 1935; Matthew 1971). Santosh Kumar *et al.* (2002) suggest that *S. pushpangadanii* is semelparous, generally flowering en masse once every six years and there is some evidence from observation of wild populations (Gamble 1924) and of cultivated specimens (Hooker 1901), to suggest that *S. lanata* is also semelparous. For the remaining species in the *S. kunthiana*-complex there is insufficient evidence to determine the life history strategy with confidence. However, the extremely limited collections of several species in the group may indicate a semelparous life history strategy (Wood 1995). Further work is needed to determine the distribution of this phenomenon within the *S. kunthiana*-group and within *Strobilanthinæ* more generally.

In the account that follows, the *S. kunthiana*-group is recognised as an informal group within *Strobilanthes*

Table 1. Characteristics of species in the *Strobilanthes kunthiana*-group.

Character	<i>S. gamblei</i>	<i>S. pushpangadanii</i>	<i>S. consanguinea</i>	<i>S. lanata</i>	<i>S. lawsonii</i>	<i>S. kunthiana</i>	<i>S. canarica</i>	<i>S. jeyporensis</i>	<i>S. cuspidata</i>	<i>S. carnatica</i>
Leaf shape	ovate to elliptic	ovate to elliptic	ovate to broadly elliptic	ovate to narrowly elliptic	ovate	elliptic to obovate	elliptic to ovate	ovate to elliptic	ovate to elliptic	broadly to narrowly ovate
Leaf apex shape	long acuminate	short acuminate	short to long acuminate	short acuminate	long acuminate	very shortly acuminate	shortly cuspidate	very long acuminate	acuminate	acuminate
Leaf margin	entire	entire to crenate-serrate	serrate or rarely +/- entire	entire	entire	+/- entire to distinctly serrate	+/- entire	+/- entire to serrate	+/- entire to serrate/dentate	entire to serrate/dentate
Abaxial leaf indumentum	dense cream or tawny woolly indumentum	dense tawny coloured indumentum	glabrous or rarely with a white sericeous indumentum	dense tawny woolly indumentum	dense tawny woolly indumentum	sparsely to densely white farinate	sparsely to densely covered in short stout tapering hairs	glabrous or rarely with a white sericeous indumentum	dense white sericeous indumentum	glabrous or rarely with sericeous indumentum
Adaxial leaf indumentum	glabrous to sparsely covered with short, stout hairs	glabrous to sparsely covered with short, stout hairs	glabrous or rarely with short, stout hairs	glabrous	glabrous	glabrous or sparsely covered with short, stout hairs	sparsely to densely covered in short, stout hairs	usually sparsely covered with short, stout hairs	glabrous	glabrous or rarely short stout tapering hairs
Max. leaf size	160 x 78 mm	82 x 40 mm	152 x 110 mm	125 x 24 mm	149 x 61 mm	65 x 39 mm	70 x 36 mm	150 x 111 mm	82 x 64 mm	145 x 73 mm
Inflorescence	narrow uninterrupted or interrupted spikes with cream or tawny coloured indumentum	uninterrupted spikes with tawny coloured indumentum	narrow interrupted-uninterrupted, sparsely pubescent spikes	broad uninterrupted spikes with dense woolly indumentum	narrow interrupted spikes with dense tawny coloured indumentum	broad uninterrupted spikes densely covered in white hairs	narrow uninterrupted to subinterrupted pubescent spikes	narrow uninterrupted or subinterrupted, glabrous or glandular hairy spikes	usually uninterrupted spikes densely covered with glandular hairs	narrow, interrupted or rarely sub-interrupted, glabrous or sparsely glandular hairy spikes
Inflorescence dimensions	40–70 x 2–4 mm	13–30 x 3.5–4 mm	10–65 x 3.5–5 mm	20–67 x 5.5–10 mm	24–79 x 3–5 mm	12–43 x 6–12 mm	11–50 x 2.5–5.5 mm	6.9–10.1 x 1.5–2.3 mm	17–60 x 4–6 mm	12–107 x 2.5–5 mm
Secondary buds in axils of bracteoles	present	present	absent	absent	absent	absent	absent	absent	present or absent	usually present
Bract:calyx ratio	+/- equal or shorter	+/- equal or shorter	+/- equal	+/- equal	shorter	longer	variable	+/- equal or longer	+/- equal or longer	+/- equal or shorter
Equality of calyx lobes	2 or 3 lobes shorter	2 or 3 lobes shorter	2 or 3 lobes shorter	+/- equal	2 or 3 lobes shorter	2 lobes shorter	+/- equal	1 lobe shorter	1 or 2 lobes shorter	2 to 3 lobes usually shorter
Degree of calyx fusion	0.2–0.3	0.2–0.3	0.4–0.5	0.5–0.6	0.4–0.5	0.3–0.4	0.3–0.5	0.2–0.4	0.3–0.6	0.4–0.6
Corolla lobes	broadly triangular, two adaxial lobes partly fused	broadly triangular, two adaxial lobes partly fused	narrowly triangular, two adaxial lobes partly fused	equally divided, overlapping, ovate-suborbicular	ovate to broadly triangular, equally divided	oblong, equally divided	broadly triangular, equally divided	broadly triangular, equal	broadly triangular, equal	broadly triangular, equal
Corolla throat length	9.5–15 mm	9–12 mm	7.4–14.8 mm	15.7–20.1 mm	14 mm	9.5–11.5 mm	6.7–8.2 mm	7.8–10.7 mm	11.5–17.5 mm	9.2–11.3 mm
Stamens	exserted	exserted	exserted	included	included	included	included	included	included	included
Ovary apex pubescence	pubescent	pubescent	pubescent	pubescent	glabrous	pubescent	glabrous	pubescent	pubescent	pubescent
Style pubescence	glabrous	glabrous	glabrous	pubescent	pubescent	pubescent	glabrous	glabrous	pubescent	glabrous

NB: leaf characters for mature leaves only, esp. indumentum characters. See text for an explanation of characters.

following the approach advocated by Carine & Scotland (2002). The results of this study and notably the description of two new species, in addition to that recently described by Santhosh Kumar *et al.* (2002), demonstrate that species diversity in the *S. kunthiana*-group has been underestimated. The complex pattern of character distribution and apparently restricted distributions of many taxa in this group also suggest intriguing patterns of evolution that would merit further field- and laboratory-based research.

Taxonomic Account

The *Strobilanthes kunthiana*-group

Phlebophyllum Nees in Wall., Pl. Asiat. Rar. 3: 75 & 83 (1832); Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41(1): 168 (1944); R. R. Rao & B. A. Razi, Fl. Mysore Dist. 528 (1981). Type: *Strobilanthes kunthiana* (Nees) T. Anderson (Bremekamp 1944).

Endopogon Nees in Wall., Pl. Asiat. Rar. 3: 76 & 99 (1832) *pro parte quoad species* in Peninsular India.

Shrubs or subshrubs, to 3 m in height, probably all semelparous. Stem subterete below, upper internodes mostly subtetragonous and grooved; nodes swollen

and ridged. Leaves isophyllous to anisophyllous, narrowly ovate to broadly elliptic, petiolate or rarely sessile; venation camptodromous. Inflorescence terminal and axillary, simple and compound spikes; flowers sessile. Bracts lanceolate to obovate, base truncate, apex acute, acuminate or rarely obtuse, margin entire. Bracteoles 2, linear-lanceolate, apex acute or acuminate, sometimes with axillary secondary buds; indumentum always as bracts. Calyx lobes 5, subequal to distinctly unequal, fused from the base for 0.2–0.6 of total length at anthesis. Corolla ventricose above a short tube, the limb either distinctly two lipped with the two adaxial lobes partially fused and forming a hood or the lobes equally divided; inner surface with 2 rows of straight white hairs to retain the style and sparse patches of white hairs either side of these rows. Stamens 2, equal, exerted or included; anthers oblong, 2-locular, mucicous, dorsifixed near the base; filaments with a prominent vascular trace, united below to form a sheath adnate to the corolla; sheath margins hairy; free filaments hairy at least in their lower $\frac{1}{2}$. Pollen prolate, tricolporate, pseudocolpate, ribs punctate. Ovary oblong-elliptic, apex glabrous or pubescent. Fruit a capsule. Seeds (where known) with a prominent areole c. $\frac{1}{2}$ total length of the seed; circumareolar region with hygroscopic hairs.

Key to the species

1. Corolla ventricose, with two partly fused adaxial lobes; stamens exerted into the upper lip of the corolla (e.g. Fig. 1M) 2
Corolla campanulate or subventricose, lobes divided equally; stamens included within the throat of the corolla (e.g. Fig. 3S) 4
2. Abaxial leaf surface densely covered with cream or tawny-coloured woolly indumentum; leaf margins entire or weakly crenate-serrate 3
Abaxial leaf surface usually glabrous or rarely with a fine white sericeous indumentum; leaf margins usually distinctly serrate **3. *S. consanguinea***
3. Leaves long-petiolate, lamina 60–160 × 24–78 mm; apex long-acuminate; margin entire; spikes 40–70 mm long at anthesis, often interrupted; ovary apex pubescent **1. *S. gamblei***
Leaves shortly petiolate, lamina 15–82 × 6–40 mm; apex shortly acuminate; margin often crenate-serrate; spikes uninterrupted, less than 30 mm long; ovary apex glabrous **2. *S. pushpangadanii***
4. Stems, abaxial surface of mature leaves and inflorescences with dense tawny-coloured woolly indumentum ... 5
Stems and abaxial surface of mature leaves glabrous, or if pubescent, the hairs not tawny coloured 6
5. Inflorescence a broad, uninterrupted spike, 5.5–10 mm wide; ovary apex sparsely pubescent; leaves with a short acuminate tip **4. *S. lanata***
Inflorescence a narrow, often interrupted spike, c. 4 mm wide or less; ovary apex glabrous; leaves with a long acuminate tip **5. *S. lawsonii***
6. Leaf abaxial surface sparsely to densely covered with a white farinose indumentum; inflorescence a broad spike, c. 9 mm wide; corolla lobes oblong **6. *S. kunthiana***
Leaf abaxial surface glabrous or with sericeous or stout tapering hairs; inflorescence a narrow spike, <6 mm wide; corolla lobes triangular 7
7. Leaves with short cuspidate apex; calyx lobes ± equal in length; ovary glabrous; abaxial surface of mature leaves often with stout tapering hairs **7. *S. canarica***
Leaves with a long acuminate apex; calyx lobes distinctly unequal; ovary apex pubescent; abaxial surface of mature leaves glabrous or with a white sericeous indumentum 8

8. Corolla large, throat >11.5 mm; style sparsely pubescent; inflorescence densely glandular-hairy; mature leaves with a dense white sericeous indumentum on lower surface **9. *S. cuspidata***
 Corolla small, throat <11.5 mm; style glabrous; inflorescence glabrous to somewhat glandular-hairy at anthesis; mature leaves usually lacking a dense white indumentum on lower surface 9
9. Bracts narrowly ovate or lanceolate, equal to or longer than the calyx; leaves often with short tapering hairs on upper surface **8. *S. jeyporensis***
 Bracts ovate or obovate, equal to or shorter than the calyx; leaves rarely with short tapering hairs on upper surface **10. *S. carnatica***

1. *Strobilanthes gamblei* Carine, J. Alexander & Scotland **sp. nov.** a *S. consanguinea* (Nees) T. Anderson foliorum pagina abaxiali dense lanata non glabra vel sparse albo-sericea differt; a *S. lawsonii* Gamble staminibus exsertis non inclusis, lobis duobus adaxialibus corollae partim connatis distinguitur. Typus: India, Kerala, Wynad, Tambracheri Ghat, Barber 5686 (K holotypus!).

Strobilanthes lawsonii Gamble, Bull. Misc. Inform., Kew 1923: 374; Fl. Madras 2: 1037 (1924), *pro parte* quoad Barber 5686.

Stem glabrous below, pubescent above. Leaves ovate to elliptic, 60–160 × 24–78 mm, base decurrent, symmetrical to slightly asymmetrical; apex long, fine-acuminate; margins entire; abaxial surface densely covered with cream or tawny-coloured woolly indumentum, adaxial surface glabrous to sparsely covered with stout tapering hairs; veins 5–11 pairs, prominent on abaxial surface; petiole (10–)30–84 mm long. Inflorescence uninterrupted or interrupted narrow spikes, 40–70 × 2–4 mm; axis sparsely to densely covered with cream or tawny-coloured simple indumentum, densely glandular hairy in fruit. Bracts ovate to elliptic, 4–10.5 × 1.5–2.5 mm, equal to or shorter than the calyx; apex acute to acuminate; abaxial surface and margins with cream or tawny woolly indumentum, glandular hairs occasionally also present, adaxial surface with occasional cream or tawny-coloured hairs. Bracteoles 3.5–7.5 mm long; secondary flowers present in axils. Calyx lobes unequal with two or three lobes shorter than the rest, fused at the base for 0.2–0.3 of the total length at anthesis; lobes lanceolate, 5–9.5 mm long, apex acute; abaxial indumentum as bracts, adaxial surface with sparse simple indumentum. Corolla tube 2.5–4.5 mm long; throat ventricose, 9.5–15.5 mm long; lobes broadly triangular, 3–5.5 × 2–4.5 mm wide, two adaxial lobes partly fused; outer surface covered, often densely, with short cream or tawny-coloured hairs. Stamens exserted; anthers c. 2 mm long, filaments 8.5–12 mm long, sparsely pubescent at the base. Ovary 1.0–1.5 mm long, apex sparsely pubescent. Style 9.9–13.5 mm long, glabrous. Fruit oblong-clavate, 10–11 mm long, glabrous. Seeds c. 1.5 mm. (Fig. 1J–R).

DISTRIBUTION. India, Kerala and southern Karnataka (Map 1).

ECOLOGY. On rocky slopes, along stream banks and at forest margins.

PHENOLOGY. Flowering October to January; fruiting March.

SPECIMENS SEEN. INDIA: KARNATAKA. Kodagu Distr., Wotteculli, near bungalow, 20 Oct. 1913, Bourne 6262 (K). KERALA. Idukki Distr., Peermade, Beddome 128 (BM); Calvery Mount, 14 Oct. 1982, Mohanan 74683 (MH); Pamba Dam, 10 Oct. 1983, Mohanan 80111 (MH); Kakkidam area, 10 Oct. 1983, Pandurangan 79296 (MH). Mathappanpuzha, way to Vellarima, 560 m, 17 Oct. 1997, Pradeep 56062 (CALI); Mathappanpuzha, way to Vellarima, 960 m, 17 Nov. 1997, Pradeep 56259 (CALI); Olichuchattam, Vellarimala, 1000 m, 1 March 1999, Pradeep 56432 (CALI); Wynad Distr., Tambracheri Ghat, 21 Jan. 1903, Barber 5686 (K, holotype).

NOTES. *Strobilanthes gamblei* occurs along the western slopes of the southern Western Ghats (Map 1). Sasidharan & Sivarajan's (1996: 348–349) description and illustration of '*S. lawsonii*' from Sholayar is probably of *S. gamblei* although the information provided is insufficient to conclusively determine this and we have been unable to obtain the specimen cited.

Strobilanthes gamblei (Fig. 1J–R) is closely related to *S. pushpangadanii* (Fig. 1A–H) and *S. consanguinea* (Fig. 2). All three possess a corolla in which the two adaxial lobes are partially fused to form a hood into which the stamens are exserted. *Strobilanthes gamblei*, together with *S. pushpangadanii*, was treated as part of *S. lawsonii* (Fig. 3J–T) by Gamble (1923, 1924). However, whilst all three possess slender spicate inflorescences and a cream or tawny coloured inflorescence indumentum, the hooded corolla and exserted stamens of *S. gamblei* and *S. pushpangadanii* readily distinguish them from *S. lawsonii* as circumscribed here.

Strobilanthes gamblei may be distinguished from *S. pushpangadanii* by the characters used in the key.

Strobilanthes consanguinea also possesses the same corolla and stamen arrangement as *S. gamblei*. However, *S. gamblei* may be distinguished from *S.*

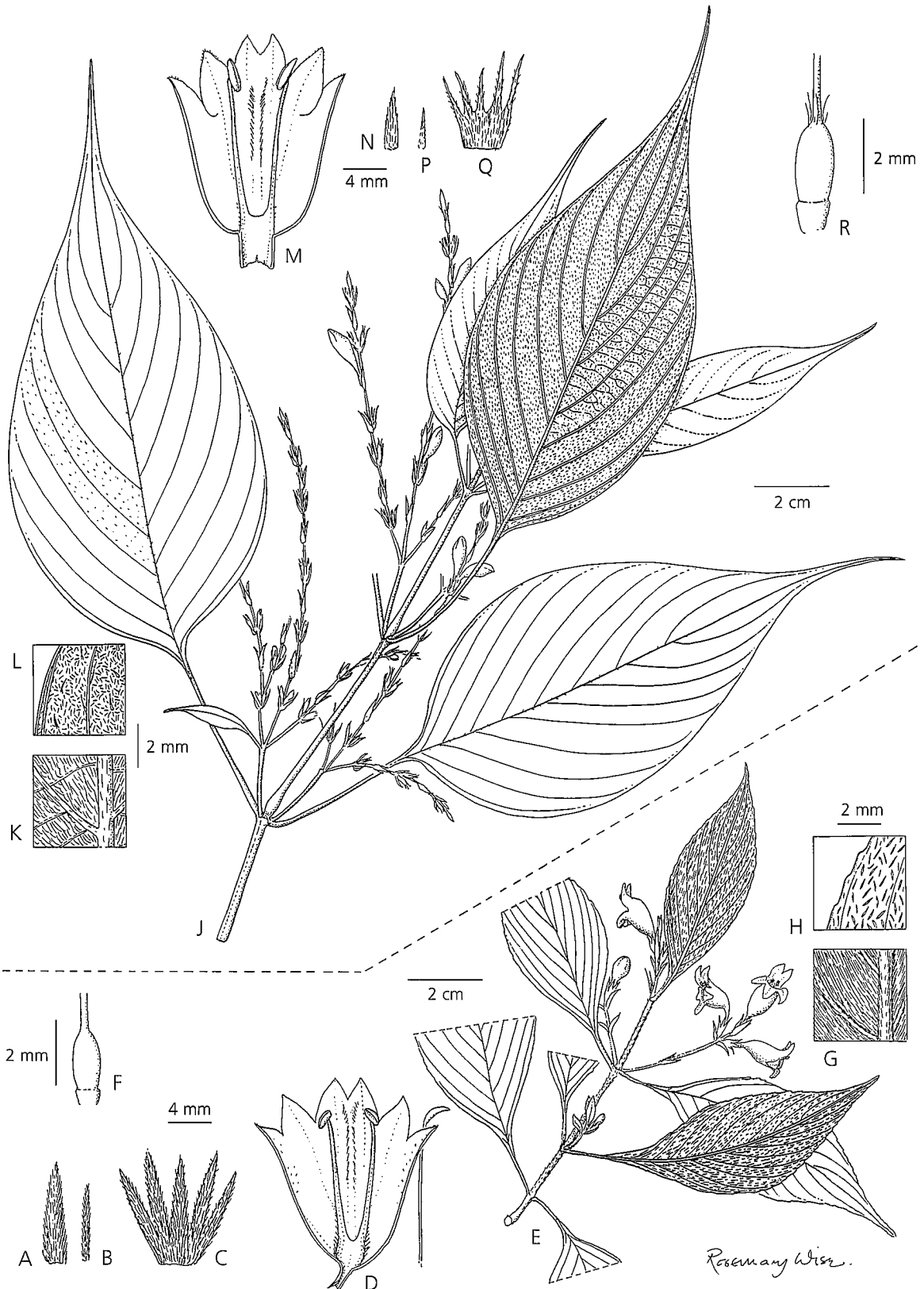
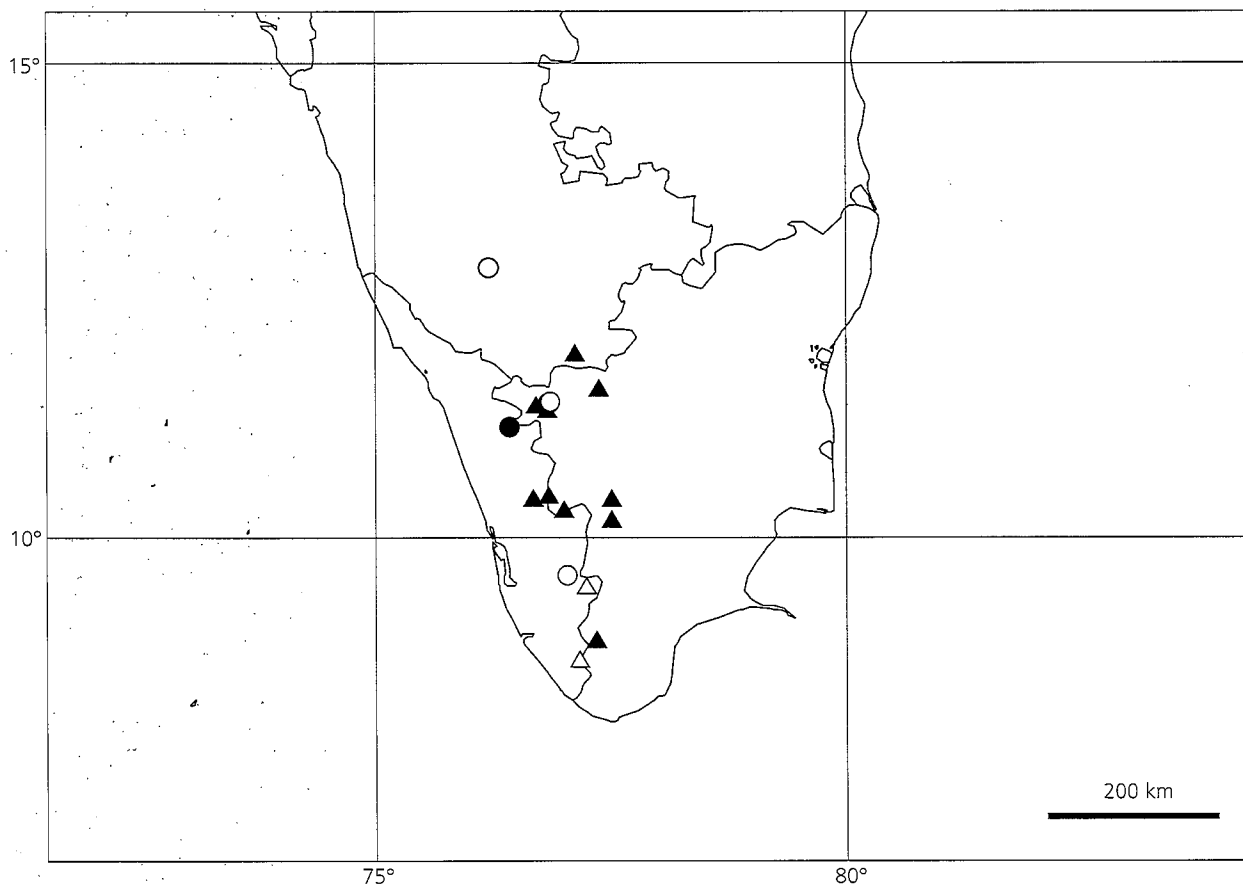


Fig. 1. A – H *Strobilanthes pushpangadanii*. A bract; B bracteole; C calyx; D flower section; E habit; F ovary; G abaxial leaf surface; H adaxial leaf surface. J – R *Strobilanthes gamblei*. J habit; K abaxial leaf surface; L adaxial leaf surface; M flower section; N bract; P bracteole; Q calyx; R ovary. A – H drawn from *Scotland* 201. J – R drawn from *Pradeep* 56062.



Map 1. Distribution of *S. gamblei* (○), *S. lawsonii* (●), *S. consanguinea* (▲) and *S. pushpangadanii* (△).

consanguinea by the cream or tawny-coloured woolly inflorescence indumentum and entire leaf margins. In *S. consanguinea* the inflorescence is glabrous or sparsely pubescent and the leaf margins are serrate or rarely subentire.

Strobilanthes gamblei is named in honour of James Sykes Gamble (1847–1925), the author of *Flora of the Presidency of Madras* (1915–1925).

2. *Strobilanthes pushpangadanii* E. S. S. Kumar, Jabbar & A. E. S. Khan, *Rheedea* 12: 73–76 (2002). Type: India, Kerala, Thiruvananthapuram Distr., Mankayam Hills, Santhosh Kumar E.S.S. 14722 (TBGT!, holotype; MH, CALI, isotypes).

Stem glabrous below, pubescent above. Leaves ovate to elliptic, 15–82 × 6–40 mm, base decurrent, symmetrical to slightly asymmetrical; apex shortly acuminate; margins crenate-serrate to entire; abaxial surface with tawny indumentum, adaxial surface glabrous to sparsely covered with stout tapering hairs; veins 5–10 pairs, prominent on abaxial surface; petiole 4–20 mm long. Inflorescence of uninterrupted

spikes, 13–30 × 3.5–4; axis densely covered with tawny-coloured indumentum. Bracts ovate to elliptic, 6–9 × 1.5–2.5 mm, equal to or shorter than the calyx; apex acute to acuminate; abaxial surface and margins with tawny-coloured woolly indumentum, adaxial surface with occasional cream or tawny-coloured hairs. Bracteoles 4–7 mm long; secondary flowers present in axils. Calyx lobes unequal with two or three lobes shorter than the rest, fused at the base for 0.2–0.3 of the total length at anthesis; lobes lanceolate, 5.5–9.2 mm long, apex acute; abaxial indumentum as bracts, adaxial surface with sparse simple indumentum. Corolla tube 2.5–5 mm long; throat ventricose, 9–12 mm long; lobes broadly triangular, two adaxial lobes partly fused; outer surface covered, often densely, with short cream or tawny-coloured hairs. Stamens exserted; anthers c. 2 mm long, filaments 8–10 mm long, sparsely pubescent at the base. Ovary c. 1.0 mm long, glabrous. Style 10–12 mm long, glabrous. Fruit clavate, c. 10 mm long, glabrous. Seeds c. 2.5 mm long (Fig. 1 A–H).

DISTRIBUTION. India, Kerala. (Map 1).

ECOLOGY. Evergreen forest margins and open grassland, often along rocky cliffs.

PHENOLOGY. Flowering August to March; fruiting December to March.

SPECIMENS SEEN. INDIA: KERALA. Idukki Distr., Vellimala, 1700 m, 20 Aug. 1994, *Augustine* 14030 (CALI); Thiruvananthapuram Distr., Ponmudi, *Barnes* s.n. (K); Ponmudi, c. 2000 ft, 25 Aug. 1956, *Joseph* 3091 (K); Chemingi, c. 900 m, 24 Jan. 1992, *Mohan* 11157 (CALI), Mankayam Hills, *Santhosh Kumar* 14722 (TBGT holotype). In cult: TBGRI, Palode, 21 Nov. 1996, *Scotland* 201 (FHO).

NOTES. *Strobilanthes pushpangadanii* is apparently restricted to Thiruvananthapuram and Idukki Districts in Kerala where it occurs in open grassland and at forest margins. Santosh Kumar *et al.* (2002) suggest that this species is semelparous, generally flowering *en masse* once every six years.

3. *Strobilanthes consanguinea* (Nees) T. Anderson in Thwaites, Enum. Pl. Zeyl. 226 (1858), J. Linn. Soc. 9: 465 (1867); Bedd., Icon. Pl. Ind. Or. 1: 50 (1874); C. B. Clarke in Hook. f., Fl. Brit. India 4: 435 (1884); Gamble, Fl. Madras 2: 1037 (1924); P. F. Fyson, Fl. S. Ind. Hill Stations 1: 447 (1932); Matthew, Fl. Palni Hills, S. India 2: 951 (1999); Illustrations Fl. Palni Hills, S. India, t. 561 (1996) Type: as *Endopogon consanguineus*.

Endopogon consanguineus Nees in Wall., Pl. Asiat. Rar. 3: 99 (1832), DC., Prod. 11: 104 (1847): Type: *Wight, R. prop. no. 27*; 1982 (lectotype K!, **designated here**).

Endopogon amomum Nees in Wall., Pl. Asiat. Rar. 3: 99 (1832), DC., Prod. 11: 104 (1847); Type: Dindigul, *Wight* s.n., Dec 1826, Wall. Cat. n.2408c (lectotype K-W!, **designated here**).

Endopogon hypoleucus Nees in Wall., Pl. Asiat. Rar. 3: 99 (1832), DC., Prod. 11: 104 (1847) Type: Herb. *Wight*, Wall. Cat. n.2408b (lectotype K-W! **designated here**).

Endopogon viscosus Nees var. *humilis* Nees in DC., Prod. 11: 104 (1847); *Wight*, Icon. Pl. Ind. Or. 4: 20; t. 1498 (1850). Type: India, Tamil Nadu, Courtallum, *Wight* s.n. (lectotype K!, **designated here**).

Strobilanthes consanguinea var. *amomum* (Nees) C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 435 (1884). Type: as *E. amomum*.

Strobilanthes consanguinea var. *hypoleuca* (Nees) C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 436 (1884). Type: as *E. hypoleucus*.

Strobilanthes humilis (Nees) Gamble., Fl. Madras: 1035 (1924). Type: as *E. viscosus* var. *humilis*

Phlebophyllum spicatum (Roth.) Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41 (1): 169 (1944); R. R. Rao & B. A. Razi, Fl. Mysore Distr.: 528 (1981) *pro parte excl. typus*.

Phlebophyllum spicatum var. *amomum* (Nees) Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41 (1): 169 (1944). Type: as *E. amomum*.

Phlebophyllum spicatum var. *hypoleucum* (Nees) Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41(1): 169 (1944). Type: as *E. hypoleucus*.

Phlebophyllum humile (Nees) Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41(1): 169 (1944). Type: as *E. viscosus* var. *humilis*.

Phlebophyllum spicatum var. *rothii* Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41(1): 169 (1944), *nom. inval.*

Strobilanthes neglectus Saxena & Brahmam, The Flora of Orissa 3: 1390 (1995), *nom. illegit.*

Stenosiphonium parviflorum sensu N. Rani & K. M. Matthew in Matthew, Fl. Tamilnadu Carnatic 3(2): 1200 (1983); Matthew, Illus. Fl. Tamilnadu Carnatic t. 542 (1982) *non* T. Anderson.

Strobilanthes cuspidata sensu Matthew, Fl. Palni Hills, S. India, 2: 952 (1999); Illus. Fl. Palni Hills, S. India, t. 562 (1996) *non* T. Anderson.

[*non Phlebophyllum spicatum* (Roth) Bremek *pro parte* quoad typus = *Stenosiphonium cordifolium* (Nees) T. Anderson)]

Stem glabrous or pubescent above. Leaves ovate to broadly elliptic, 5 – 152 × 3 – 110 mm, base long decurrent, symmetrical to slightly asymmetrical; apex short- to long-acuminate; margins serrate or rarely subentire; abaxial surface glabrous or rarely covered with a white sericeous indumentum, adaxial surface glabrous or very rarely with short tapering hairs; veins 3 – 11 pairs, prominent on both surfaces; petiole 5 – 65 mm long, glabrous. Inflorescence somewhat interrupted to uninterrupted narrow spikes, 10 – 65 × 3.5 – 5 mm; axis glabrous to sparsely simple or glandular pubescent. Bracts ovate, 5.2 – 9.6 × 1.5 – 2.4 mm, subequal in length to calyx; apex acuminate; abaxial surface and margins glabrous or glandular hairy, adaxial surface glabrous. Bracteoles 3.9 – 6.0 mm long; lacking secondary buds in axils. Calyx lobes usually unequal with two or three lobes distinctly shorter than the rest, fused from the base for 0.4 – 0.5 of the total length at anthesis; lobes lanceolate, 4.8 – 8.1 mm long, apex acute; abaxial indumentum as bracts, adaxial surface shortly simple hairy. Corolla tube white, 2.1 – 4.8 mm long; throat blue or white, ventricose, swollen on abaxial side, 7.4 – 14.8 mm long; lobes blue or white, two adaxial lobes partly fused, narrowly triangular, 3.2 – 7.6 × 2.0 – 3.3 mm, apices acute; outer surface glabrous or with minute hairs. Stamens exerted; anthers 0.8 – 1.7 mm long, held perpendicular to the filament; filaments 6.4 – 11.6 mm long, sparsely pubescent at the base. Ovary 1.0 – 1.5 mm long, apex pubescent. Style 9.7 – 14.0

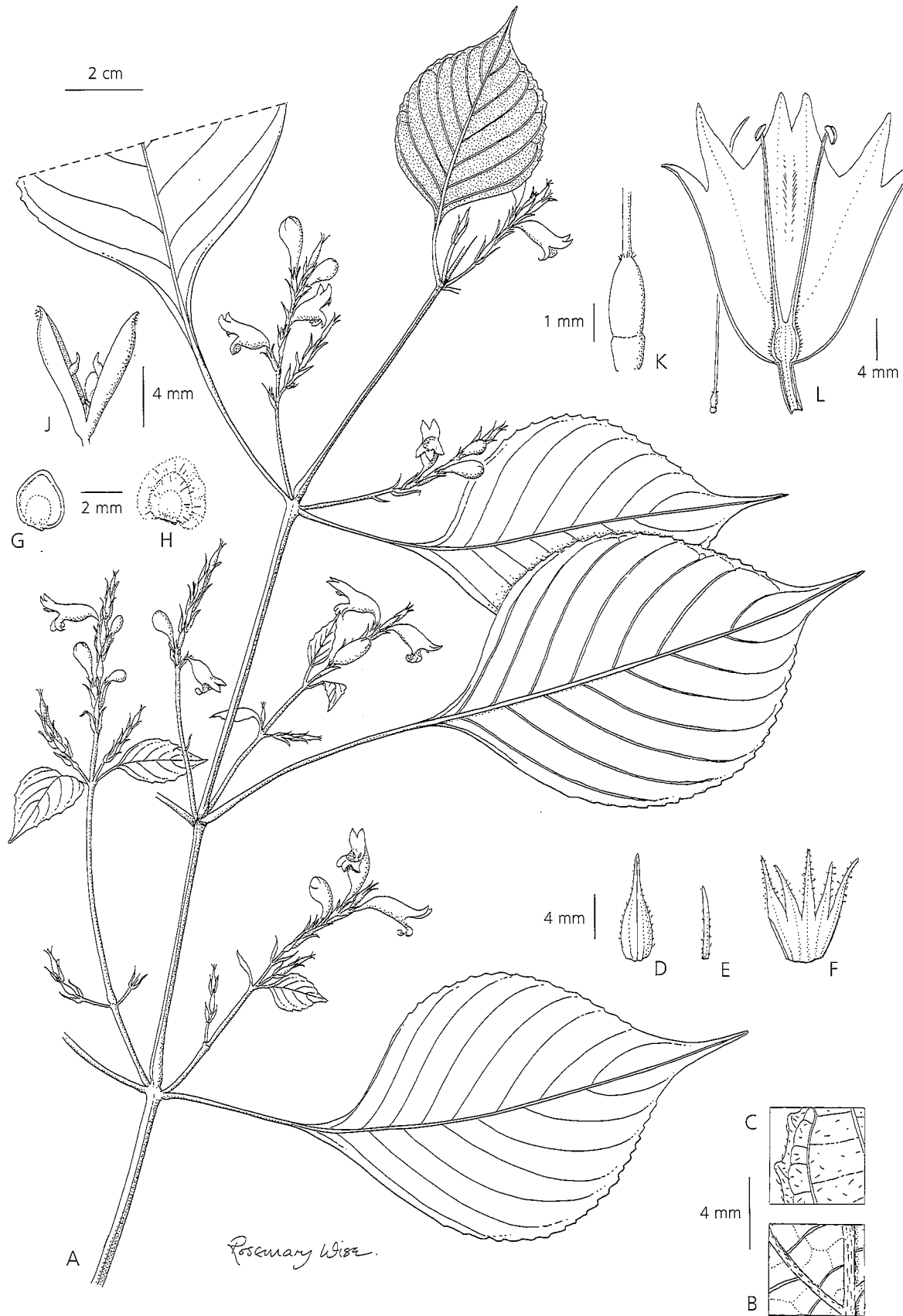


Fig. 2. *Strobilanthes consanguinea*. **A** habit; **B** adaxial leaf surface; **C** abaxial leaf surface; **D** bract; **E** bracteole; **F** calyx; **G** seed before wetting; **H** seed after wetting; **J** capsule; **K** ovary; **L** flower section. **A – F, K & L** drawn from *Scotland 92*; **G – J** from *Beddome 130*.

mm long, glabrous. Stigma 2.6 – 3.7 mm long with sparse short white hairs. Fruit elliptic to narrowly obovate, 9.0 – 12.5 mm long, glabrous. Seeds 2, c. 2 mm long. (Fig. 2).

DISTRIBUTION. India, Kerala and Tamil Nadu. (Map 1).

HABITAT. On hillsides, often forming dense undergrowth alongside roads, of the Western Ghats.

PHENOLOGY. Flowering July to January; fruiting January to March.

SPECIMENS SEEN. INDIA: KERALA, Palakkad Distr., Nelliampathi Hills, *Beddome* 130 (BM). TAMIL NADU, Coimbatore Distr., Anaimalai Hills, *Beddome* s.n. (BM); Duibham Ghat, 1902, *Lachington* s.n. (K); 15 km from Valparai on road from Polachi, 22 Oct. 1995, *Scotland* 92 (FHO). Dindigulanna Distr., Palni [Pulney] Hills, 28 Dec. 1898, *Bourne* 1670 (K); Palni [Pulney] Hills, 18 Nov. 1897, *Bourne* 1667 (K); Palni [Pulney] Hills, 18 Nov. 1897, *Bourne* 1667 (K); Pulney Hills, 15 Dec. 1912, *Evershed* s.n. (BM); Palni [Pulney] Hills, Dec. 1908, *Evershed* s.n. (BM); Palni [Pulney] Hills, below Lane Cottage, 5000 ft, March 1919, *Evershed* s.n. (BM). Kodaikanal taluk, Shembaganur, Periakulam Bridlepath, 18 Nov. 1987, *Matthew* 51441 (K). Dindigul, *Wight* s.n., Dec 1826, Wall. Cat. 2408c, (K-W). Madurai Distr., Periakulam taluk, Sothupparai (Periakulam) below Dam site, *Matthew, Usha & Rajendren* RHT 43208 (K). Nilgiri Distr., Masnigudi, 1 May 1940, *Barnes* 2241, (K); Coonoor Ghat, *Beddome* 131 (BM); Masnigudi, Sept. 1884, *Gamble* 15671 (K); Kullar, Jan. 1883, *Gamble* 11934 (K); Coonoor, Dec. 1886, *Lawson* s.n., (OXF); towards Takkanery, Kunjapanai R.F., 25 Nov. 1970, *Vajravelu* 37058 (MH); Coonoor to Mettupalaiyam, 18 Jan. 1979, *van der Maesen* 3405 (K); Nilgiris, July 1845, *Wight* s.n. (OXF). Tirunelveli Distr., Courtallum, *Wight* 783 (K); Courtallum, Feb. 1836, *Wight* 784 (E). Without locality, *Wight* 1981 (K); *Wight* 1980 (E, K); *Wight* 1982 (2655) (E); *Wight* 1981; *Wight* 2408b, (K-W); *Wight* 1890, (K); *Wight* 1982 (prop no. 27) (K lectotype); *Wight* 1982 (2655) (E, K).

NOTES. The hooded corolla and exerted stamens of *S. consanguinea* (Fig. 2) suggest a close relationship with *S. gamblei* and *S. pushpangadanii* and readily distinguish it from *S. jeyporensis* (Fig. 6) and *S. cuspidata* (Fig. 7) with which it has long been confused (e.g. Gamble 1924; Mooney 1950; Saxena & Brahmam 1995).

The inflorescence and adaxial leaf indumentum of *S. consanguinea* is extremely variable; both Clarke (1884) and Gamble (1924) used indumentum characters to recognise varieties. However, variation in indumentum may often be observed between plants collected from the same locality and in some cases may be observed within a single plant and this variation does not warrant recognition at varietal level.

Gamble (1924) treated *Strobilanthes humilis* (Nees) Gamble (= *Endopogon viscosus* Nees var. *humilis*) as distinct from *S. consanguinea* because of its glabrous

seeds. However, the type of *E. viscosus* Nees var. *humilis* in Herb. Hooker (K) is a mixed sheet with *Strobilanthes viscosa* (Arn. ex Nees) T. Anderson, a species endemic to Sri Lanka. The latter has glabrous seeds, whilst the former has pubescent seeds, in keeping with other specimens of *S. consanguinea*. Wight's specimens of *E. viscosus* var. *humilis* are both small (less than c. 22.5 cm tall), but Wight's illustration (1850: t. 1498) clearly shows that the floral morphology is indistinguishable from that *S. consanguinea*, with which it is here treated as conspecific.

The nomenclature of this species has been problematic and whilst the name *S. consanguinea* (Nees) T. Anderson has been widely used to refer to this species, the validity of this combination has been questioned. Clarke (1884) drew attention to the fact that Nees (1832) cited only southern Indian specimens in the protologue of *Endopogon consanguinea* Nees, but in his subsequent treatment (Nees 1847) also included material from Sri Lanka (now considered *Strobilanthes diandra* (Nees) Alston, see Wood 1998). Anderson's (1864) publication of the new combination *S. consanguinea* cited the Nees (1832) protologue, but again listed only Sri Lankan specimens and both Rani & Matthew (1983) and Saxena & Brahmam (1995) have concluded that, as a result, the name *S. consanguinea* cannot be applied to the Indian species. However, the ICBN clearly states that a name formed from a previously published legitimate name is, in all circumstances, typified by the type of the basionym and that this rule applies even if the new combination is first applied erroneously to a taxon now considered not to include that type (Article 7.4). Consequently, the name *S. consanguinea* (Nees) T. Anderson is the valid name for this species. *Strobilanthes neglectus* Saxena & Brahmam, a manuscript name of T. Anderson cited by Clarke (1884) and recently published as a *nomen novum* for this species (Saxena & Brahmam 1995), is illegitimate.

Whilst Nees (1847) did not see any material of *Ruellia spicata* Roth, he suggested that it was possibly a synonym of *Endopogon hypoleucus* Nees, which is itself here considered a synonym of *Strobilanthes consanguinea* (Nees) T. Anderson. Subsequent authors (e.g. Clarke 1884; Gamble 1924; Bremekamp 1944) have treated *R. spicata* and *S. consanguinea* as synonymous, and Bremekamp (1944) published the new combination *Phlebophyllum spicatum* (Roth) Bremek. based on what he considered to be the earliest published name for this taxon. However, the type material of *Ruellia spicata* collected by Heyne (K-W 2408aβ) is, in fact, a specimen of *Stenosiphonium cordifolium* (Nees) T. Anderson and Bremekamp's application of this name is therefore incorrect. In his account of this species, Bremekamp (1944) indicated that his new variety (*Phlebophyllum spicatum* var. *rothii*

Bremek.) was the 'type variety' of this species. However, as the name of an infraspecific taxon that includes the type of the species should repeat the specific epithet unaltered, Bremekamp's var. *rothii* is invalid.

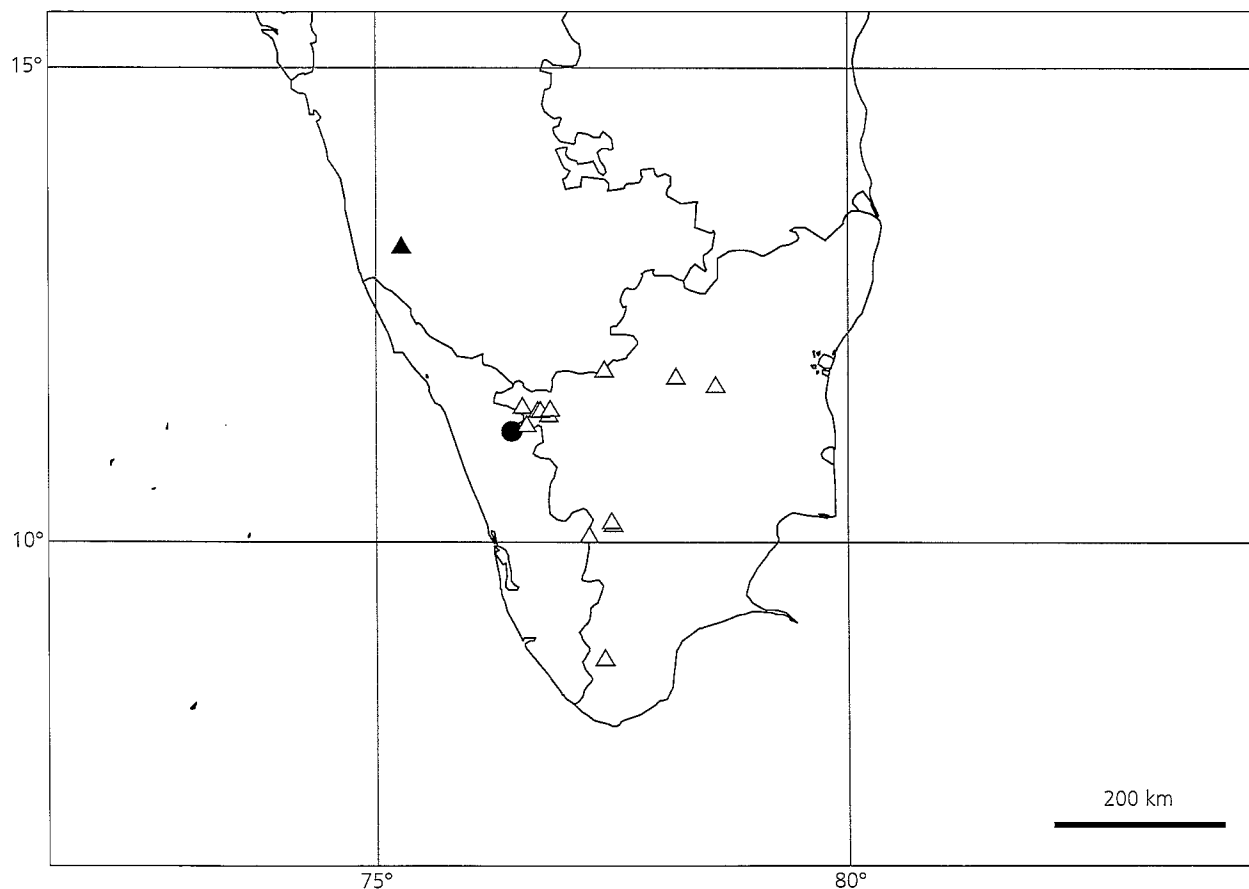
The three names published by Nees (1832) have been lectotypified. The material cited in the protologue of *E. hypoleucus* belongs to two distinct species (*S. consanguinea* and *S. carnatica*) and Wallich 2408b (K-W), a specimen of *S. consanguinea*, has been selected as lectotype to reflect the common usage of the combination *S. consanguinea* var. *hypoleuca* (Nees) C. B. Clarke.

4. *Strobilanthes lanata* Nees in DC., Prod. 11: 191 (1847). Type: Perrottet 121 in h. mus. Paris n. 143 (P lectotype! (designated here); K!, P! isolectotypes).

Strobilanthes gossypinus T. Anderson, J. Linn. Soc. 9: 466 (1867); Bedd., Icon. Pl. Ind. Or. 1: 45 (1874); C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 434 (1865); Gamble, Fl. Madras 2: 1027 (1924). Type: India, in montibus Mysore, Lobb s.n. (holotype: K!).

Phlebophyllum lanatum (Nees) Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41(1): 169 (1944). Type: as *S. lanata*.

Stem with dense white or tawny coloured woolly indumentum. Leaves ovate to narrowly elliptic, 10 – 125 × 3 – 24 mm; base shortly decurrent, often asymmetrical; apex shortly acuminate; margins entire; abaxial surface with dense tawny woolly indumentum, adaxial indumentum similar on young leaves but receding towards the base with age; veins 6 – 13 pairs, prominent on the abaxial surface, less so on adaxial surface; petiole 0 – 47 mm long, densely pubescent. Inflorescence of broad uninterrupted spikes, 20 – 67 × 5.5 – 10 mm wide; axis densely pubescent; flowers sessile. Bracts narrowly ovate to elliptic, 7.5 – 18.5 × 2.8 – 5.0 mm, subequal in length to calyx; apex acuminate; abaxial surface and margins with dense tawny woolly indumentum, adaxial surface glabrous or with woolly indumentum, particularly near apex. Bracteoles 5.7 – 10.1 mm long. Calyx five-lobed, subequal, fused for 0.5 – 0.6 of the total length at anthesis; lobes lanceolate, acuminate, 7.1 – 13.0 mm long; abaxial indumentum as bracts, adaxial surface glabrous or often with simple white hairs and tawny wool near the apex. Corolla blue; tube 4.0 – 6.5 mm; throat campanulate, 15.7 – 20.1 mm; lobes equal, overlapping, ovate to sub-orbicular, ± emarginate,



Map 2. Distribution of *S. canarica* (▲), *S. lanata* (●) and *S. kunthiana* (Δ).

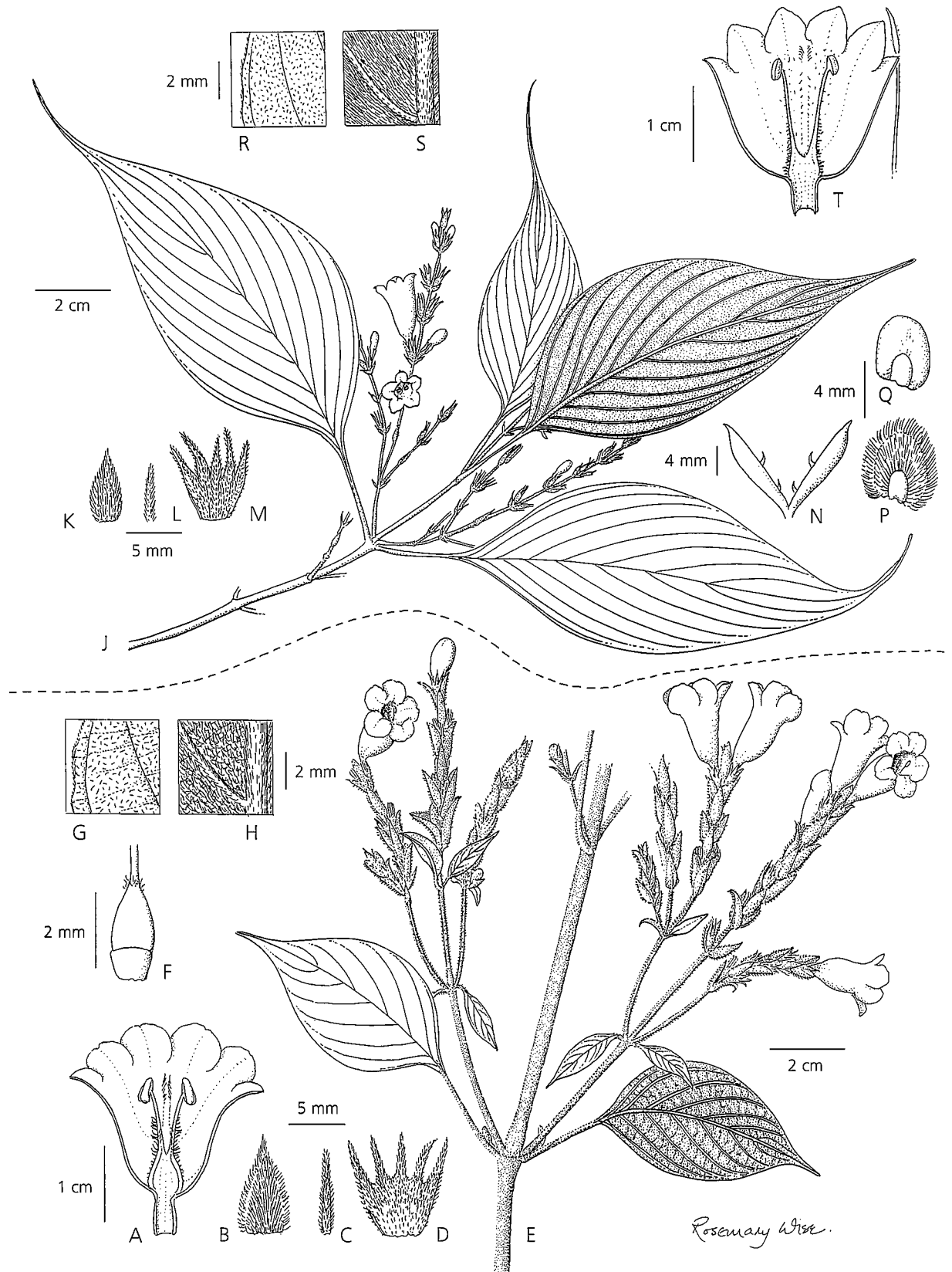


Fig. 3. A – H *Strobilanthes lanata*. A flower section; B bract; C bracteole; D calyx; E habit; F ovary; G abaxial leaf surface; H adaxial leaf surface. J – T *Strobilanthes lawsonii*. J habit; K bract; L bracteole; M calyx; N capsule; P wetted seed Q seed before wetting; R adaxial leaf surface; S abaxial leaf surface; T flower section. A – H drawn from *Scotland* 87. J – T drawn from *Gamble* 13387.

5.6 – 8.9 × 5.4 – 10.0 mm; outer surface with dense tawny indumentum. Stamens included; anthers 1.9 – 2.3 mm long; filaments 7.6 – 12.1 mm long, pubescent below for more than half the length. Ovary 1.8 – 2.3 mm long, apex sparsely pubescent. Style 10.4 – 17.5 mm long, sparsely pubescent. Stigma 3.4 – 5.6 mm long with short white hairs. Fruit and seeds not seen. (Fig. 3A – H).

DISTRIBUTION. India: Karnataka (?), Tamil Nadu (Map 2).

PHENOLOGY. Flowering August to January; fruiting unknown.

SPECIMENS SEEN. INDIA: TAMIL NADU, Nilgiri Distr., Sispara, 25 April 1870, *Beddome* 119 (BM, K); Nilgiris, 1885, *Beddome* 126, (BM); Sispara, Nov. 1883, *Gamble* 13385 (K); Sispara, Oct. 1883, *Lawson* s.n., (OXF); Nilgiris, *Perrotet* 847, (K, P lectotype); Sispara Ghat, s. coll., s.n. [Herb. no. 37714] (MH) LOCALITY IMPRECISELY KNOWN: Mysore, *Lobb* s.n. (K). In Cult.: Tamil Nadu, Nilgiri Distr., Udagamandalam, Govt. Gardens, 15 Oct. 1917, *Bourne* 6431 (K); Udagamandalam, Oct. 1885, *Gamble* 17034 (BM, K); Carolina Estate, Coonoor, Aug. 1933, *Robinson* s.n. (BM); Gardens of Helidy Hotel, 15 Oct. 1995, *Scotland* 87 (FHO); Botanic Gardens, Ooty (Udagamandalam), 15 April 1950, 'Curator' 93865 (MH). Sri Lanka, Central Province, Nuwara Eliya, cultivated in Hakgala Gardens, 11 Jan. 1932, *Simpson* 9117 (BM).

NOTES. *Strobilanthes lanata* is readily distinguished by its broad overlapping spikes (Fig. 3A – H) that are covered in a dense tawny indumentum, and by the ovate to suborbicular overlapping corolla lobes. It is endemic to the Nilgiris and is known from relatively few wild collections. The type collection of Lobb has the locality 'Mysore'. However, it seems unlikely that this species occurs in Karnataka as all other wild collections were made in the vicinity of Sispara, Tamil Nadu. Gamble (1888) reported that *S. lanata* was abundant in Sispara, and the paucity of collections in herbaria probably reflects a semelparous life history strategy for this species. A thirteen-year flowering cycle seems plausible. Gamble (1924) lists 1867, 1870 and 1883 as flowering years and seeds planted at Kew in 1887 flowered and subsequently died in 1900 (Hooker 1901). The attractiveness of this species has led to its cultivation both in the Nilgiris (e.g. *Bourne* 6431; *Robinson* s.n.; *Scotland* 87) and also elsewhere (e.g. *Simpson* 9117).

5. *Strobilanthes lawsonii* Gamble, Bull. Misc. Inform., Kew 1923: 374 (1923) *pro parte quoad typus*. Type: *Gamble* 13387 (lectotype: K! designated here).

Phlebophyllum lawsonii (Gamble) Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41 (1): 169 (1944). Type: as *S. lawsonii*.

Stem covered with dense tawny coloured short simple hairs. Leaves ovate, 87 – 149 × 31 – 61 mm; base decurrent, slightly asymmetrical; apex very long acuminate; margins entire; abaxial surface with dense tawny-coloured woolly indumentum, adaxial surface glabrous; veins 9 – 11 pairs, prominent on both surfaces, less so on adaxial surface; petiole 23 – 38 mm long, pubescence as stem. Inflorescence narrow, usually distinctly interrupted spikes, 24 – 79 × 3 – 5 mm; axis pubescence as stem. Bracts ovate, c. 4.6 × 1.8 mm, shorter than the calyx; apex acuminate; abaxial surface and margins with dense tawny woolly indumentum, adaxial surface glabrous. Bracteoles c. 3.4 mm long; lacking axillary secondary buds. Calyx lobes unequal, two or three distinctly shorter than the rest, fused from the base for 0.4 – 0.5 of the total length at anthesis; lobes lanceolate, acuminate or acute, 5.6 – 6.5 mm long; abaxial indumentum as bracts, adaxial surface with delicate white hairs. Corolla pale blue, tube c. 4.1 mm long; throat campanulate, c. 13.8 mm long; lobes equal, overlapping, ovate to broadly triangular, apex rounded to acute, c. 5.5 × c. 5 mm; outer surface with soft tawny hairs. Stamens included; anthers oblong, two-locular, c. 1.8 mm long, filaments c. 10.3 mm long, with sparse white hairs for approximately 0.7 – 0.8 of the length. Ovary c. 1.5 mm long, glabrous. Style c. 9.6 mm long with occasional white hairs. Stigma c. 2.8 mm long with sparse short white hairs. Fruit an elliptic to narrowly obovate capsule, 14.0 – 15.2 mm long, glabrous. Seeds 2, 2.3 – 4.6 mm long. (Fig. 3J – T).

DISTRIBUTION. India: Tamil Nadu. (Map 1).

HABITAT. In thick rainforest undergrowth.

PHENOLOGY. Flowering November, fruiting June.

SPECIMENS SEEN. INDIA: TAMIL NADU, Nilgiri Distr., Sispara Ghat, Nov. 1883, *Gamble* 13387 (BM, K lectotype); Sispara, June 1884, *Gamble* 14252 (K); Sims Park, Coonoor, 16 April 1900, *Bourne* s.n. (K).

NOTES. *Strobilanthes lawsonii* is similar to *S. lanata* in that both possess a dense tawny indumentum and overlapping corolla lobes. As with *S. lanata*, this species is only known from Sispara Ghat in the Nilgiris. Whilst the two species are probably closely related they are easily distinguished because *S. lawsonii* possesses narrow, usually interrupted spikes and long-acuminate leaf apices whereas *S. lanata* has broad, overlapping spikes and shortly acuminate leaf apices.

The protologue of *S. lawsonii* (Gamble 1923) cites material collected from the Nilgiri Hills, Wynad and the Travancore Hills. However the material from Wynad and Travancore is now considered to represent two distinct species (*S. gamblei* and *S. pushpangadanii*). *Gamble* 13387 from the Nilgiri Hills has therefore been selected as the lectotype of *S. lawsonii*.

6. *Strobilanthes kunthiana* (Nees) T. Anderson ex Benth., Fl. Hongk.: 262 (1861); T. Anderson, J. Linn. Soc. 9: 465 (1867); C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 434 (1884); Gamble, Fl. Madras 2: 1026 (1924); Rani & Matthew in Matthew, Fl. Tamilnadu Carnatic 3 (2): 1204 (1983); Matthew, Illus. Fl. Tamilnadu Carnatic t. 544 (1982); Matthew, Fl. Palni Hills, S. Ind. 2: 954 (1999); Illus. Fl. Palni Hills, S. Ind. t. 564 (1996). Type: as *Phlebophyllum kunthianum*.

Phlebophyllum kunthianum Nees in Wall., Pl. Asiat. Rar. 3: 83 (1832); R. R. Rao & B. A. Razi, Fl. Mysore Distr.: 528 (1981). Type: E Notan, Nilghiris, s. coll., Wall. Cat. 2367, (holotype: K-W!).

Phlebophyllum angustifolium Benth. ex C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 434 (1884). *nom. nud.*

Stem glabrous to sparsely pubescent, usually only so in the grooves and on nodes; lenticels and leaf scars sometimes prominent. Leaves elliptic to obovate, 9–65 × 4–39 mm; base shortly decurrent, symmetrical; apex very short acuminate; margins subentire to prominently serrate; abaxial surface sparsely to densely covered with a white farinose indumentum, adaxial surface glabrous or sparsely covered with stout tapering hairs; veins 4–10 pairs, both primary and secondary veins prominent on abaxial surface, somewhat less so on adaxial surface; petiole 0–5.4 mm long, glabrous or with stout tapering hairs, especially along margins. Inflorescence broad uninterrupted spikes, 12–43 × 6–12 mm; axis sparsely to densely covered in short white hairs. Bracts broadly ovate or rarely elliptic, 9.2–12.8 × 2.3–5.2 mm, slightly longer than calyx; apex acuminate; abaxial surface and margins with prominent short white hairs, adaxial surface glabrous. Bracteoles 3.7–4.4 mm long. Calyx with 2 lobes typically shorter than the rest, fused for 0.3–0.4 of the total length at anthesis; lobes narrowly ovate, 5.8–13.9 mm long, apex acuminate; abaxial indumentum as bracts, adaxial surface glabrous or rarely with simple hairs. Corolla pale blue to mauve; tube 3.4–4.4 mm long; throat campanulate, 9.5–11.4 mm long; lobes equal, somewhat overlapping, oblong, 2.8–5.3 × 2.1–3.7 mm, apex broadly obtuse or often emarginate; outer surface with short, reflexed hairs. Stamens included; anthers 1.3–1.8 mm long; filaments 5.1–7.1 mm long, sparsely pubescent below for approximately half the length. Ovary 1.3–1.8 mm long, apex pubescent. Style 9.3–10.1 mm long, sparsely pubescent. Stigma 3.0–4.6 mm long with short white hairs. Fruit a narrowly elliptic capsule, 10.0–12.0 mm long, hairy at apex. Seeds c. 2.5 mm long. (Fig. 4).

DISTRIBUTION. India, Kerala and Tamil Nadu. (Map 2).

HABITAT. On bare slopes, ravines etc. above 1800 m.

PHENOLOGY. Flowering May–January; fruiting January–March.

SPECIMENS SEEN. INDIA: KERALA, Idukki Distr., Santhapava, Travancore High Ranges, May 1937, *Barnes* 1764 (K); Madupatti, 1964, *Guyer* 111 (K). TAMIL NADU, Chengalpattu Distr., Madras, 28 Sept. 1898, *Bannerman* s.n. (BM); Coimbatore Distr., Anamalai Hills, Oct. 1852, *Wight* 2201 (K), Dindigulanna Distr., Kodaikanal taluk, Vandaravu-Marian shola, Levinge path, 29 July 1987, *Matthew* 50528 (K); Palni Hills, Lidcot Valley, *Bourne* 1068 (K); Palni Hills, *Evershed* 4 (BM); Kodaikanal, 30 Oct. 1982, *van der Maesen* 4750 (K). Nilgiri Distr., Nilgiris, *Beddome* 125 (BM); Kotagiri Road, 4 Sept. 1910, *Bourne* 5394 (K); Udagamandalam (Ootacamund), 20 March 1870, *Clarke* 11086C (BM); 24 Dec. 1850, *Faulkes* s.n. (K); Coonoor, Aug. 1886, *Gamble* 1859 (BM); Udagamandalam (Ootacamund), Jan. 1883, *Gamble* 11930 (K); Nilgiris, *Gardner* s.n. (BM); Nilgiri Mts, *Hohenacker* 1424 (BM, K); Nilgiri Mts, *Hohenacker* 1178 (K); Nilgiri Mts, *Hohenacker* 1179 (BM, K); Nilgiri Mts, *Hohenacker* s.n. 2 (BM); Udagamandalam (Ootacamund), Feb. 1886, *Lawson* s.n. 3, (OXF); *Perrotet* 849 (K); *Perrotet* 850 (K); Nilgiri Hills, July 1934, *Robinson* s.n. (BM); *Schmid* s.n. (K); Udagamandalam (Ootacamund), *Schmid* 87 (BM); Naduvattam, Outcher Ioney Reserve Forest, Rhododendron arboretum, 1840 m, 16 Oct. 1995, *Scotland* 88 (FHO); Coonoor, 9 Sept. 1910, *Thomson* s.n. (OXF); Nilgiris Mts, *Thomson* s.n. (BM, K); Dodabetta, 22 Jan. 1973, *Townsend & Ramamoorthy* 46 (K); Avalanchi, 22 km from Ooty, 17 Jan. 1970, *van der Maesen* 3396 (K); Dodda Betta, July 1885, *Wight* s.n. (OXF); E Notan, Nilghiris, s. coll., Wall. Cat. 2367 (K-W holotype). Salem Distr., Shevaroy, Oct. 1897, *Bourne* s.n. (K); Yercad taluk, Servarayan Hills, Yercad, Marappalam (Nagalur), 15 Aug. 1980, *Matthew, Britto & Rani* 28023 (K); Yercad taluk, Lady's Seat, 17 Aug. 1980, *Matthew, Britto & Rani* 28107 (K). Tirunelveli Distr., Tinnevely Hills, *Beddome* 124 (BM). Locality unknown or undetermined, 1847, *Gardner* (K); 1887, *Lawson* s.n. (OXF); 'Mysore', *Lobb* s.n. (K); *Wight* 1942, (K).

NOTES. *Strobilanthes kunthiana* is readily distinguished from other members of the group by the farinose indumentum on the lower leaf surface. It is perhaps the best-known species of *Strobilanthes* and its semelparous life history is well documented with mass flowering events recorded every twelve years since 1838 (Robinson 1935; Matthew 1971). Mass flowering events of *S. kunthiana* were landmarks in the lives of the hill tribes of the Western Ghats (Matthew 1971) and continue to generate significant popular interest. The name Nilgiris ('Blue Mountains') may be attributed to the mass flowering of this species. Whilst most plants are in flower during the twelfth year of the cycle, some flowering does occur in the years before and after the main bloom (Matthew 1971).

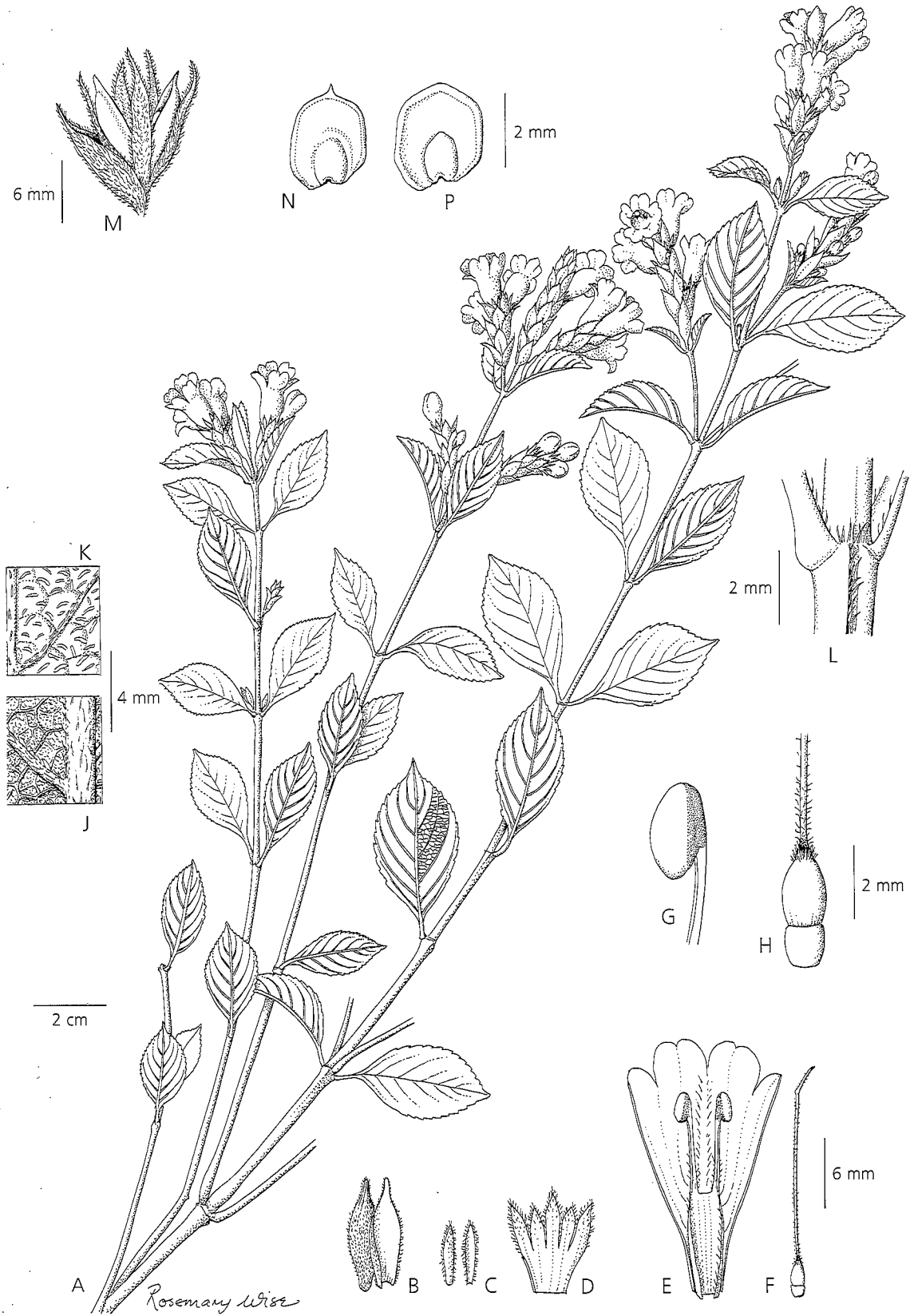


Fig. 4. *Strobilanthes kunthiana*. **A** habit; **B** bracts; **C** bracteoles; **D** calyx; **E** flower section; **F** gynoecium; **G** anther detail; **H** ovary; **J** abaxial leaf surface; **K** adaxial leaf surface; **L** stem node; **M** capsule; **N** seed before wetting; **P** seed after wetting. **A – K** drawn from Barnes 1764; **M – P** from Bourne 1068.

This species formerly occupied extensive areas of the Western Ghats, dominating the hillsides and covering them in blue blossom during flowering years. However, as Matthew (1999) notes, changing land management practices have seen a considerable reduction in the abundance of this species.

7. *Strobilanthes canarica* Bedd., Icon. Pl. Ind. Or. 1: 50 (1874); C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 434 (1884); Gamble, Fl. Madras 2: 1036 (1924); T. P. Ramamoorthy in C. J. Saldanha & D. H. Nicolson, Flora of Hassan Distr. Karnataka, India: 557 (1976). Type: Kudremuhk Mt, S. Canara, *Beddome* s.n., May 1874 (holotype K!).

Phlebophyllum canaricum (Bedd.) Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41 (1): 173 (1944). Type: as *S. canarica*.

Stem glabrous below, with prominent white or tawny simple or stout tapering hairs towards branch apices; occasional lenticels and prominent leaf scars present. Leaves broadly elliptic to ovate, 20–70 × 14–36 mm, clustered towards branch apices; base shortly decurrent; apex shortly cuspidate; margins entire to subentire; both surfaces of mature leaves glabrous to densely covered with stout tapering hairs, particularly prominent on the veins, sometimes the younger leaves with a dense tawny woolly indumentum; veins 7–9 pairs, primary veins prominent on abaxial and adaxial surfaces; petiole up to 3.5–11.3 mm long, indumentum continuous with the stem. Inflorescence narrow uninterrupted to subinterrupted spikes, 11–50 × 2.5–5.5 mm, axis with prominent simple multicellular hairs. Bracts broadly ovate to obovate, 4.4–5.0 × 2.2–2.6 mm, longer or shorter than calyx; apex acute to obtuse; abaxial surface and margins with prominent stout tapering and glandular hairs or tawny woolly indumentum, adaxial surface generally glabrous or with tawny or white short simple hairs. Bracteoles 4–6 mm long, lacking axillary secondary buds. Calyx lobes subequal, fused from the base for 0.3–0.5 of the total length at anthesis; lobes lanceolate, 4.3–7.4 mm long, apex acute; abaxial surface with glandular or simple, tawny hairs, adaxial surface with simple or tapering hairs, particularly prominent near the apices. Corolla tube 1.3–2.7 mm long; throat campanulate, 6.7–8.2 mm long; lobes subequal, broadly triangular, 1.5–3.6 × 1.6–2.7 mm; outer surface with short, curled hairs. Stamens included; anthers 1.5–2.0 mm long; filaments 2.5–3.5 mm long, white-pubescent for approximately half the length. Ovary 0.5–2.8 mm long, glabrous. Style 4.6–6.2 mm long, glabrous. Stigma 1.5–2.5 mm long with very sparse short white hairs. Fruit and seeds not seen. (Fig. 5).

DISTRIBUTION. India, endemic to Western Ghats of southern Karnataka (Map 2).

HABITAT. Steep rocky slopes.

PHENOLOGY. Flowering December to May; fruiting unknown.

SPECIMENS SEEN. INDIA: KARNATAKA, Dakshina Kannada Distr., Kudremuhk, W Ghats, May 1874, *Beddome* s.n. (K holotype); Mysore Distr., Genkalbetta, 4 Dec. 1970, *Saldanha* 1169 (K)

NOTES. *Strobilanthes canarica* is easily distinguished from other species in the group by its shortly cuspidate leaf apices, prominent leaf scars and short, slender overlapping spikes. It is known only from south-western Karnataka where Saldanha & Nicolson (1976) noted that it was locally common on steep rock faces at Genkalbetta.

8. *Strobilanthes jeyporensis* Bedd., Icon. Pl. Ind. Or. 1: 50 (1874); C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 436 (1884); Gamble, Fl. Madras 2: 1027 (1924); Saxena & Brahmam, Fl. Orissa (3): 1389 (1995). Type: Jeypur Hills, Vizag, *Beddome* 133, (BM lectotype!, designated here).

Phlebophyllum jeyporensis (Bedd.) Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41 (1): 169 (1944); Pullaiah & Babu, Fl. Andhra Pradesh 2: 724 (1997); Khanna, Tripathi & Mugdal in Mugdal, Khanna & Hajra, Fl. Madhya Pradesh 2: 348 (1997). Type: as *S. jeyporensis*.

Phlebophyllum versicolor sensu Pulliah & Babu, Fl. Andhra Pradesh 2: 725 (1997); Khanna, Tripathi & Mugdal in Mugdal, Khanna & Hajra, Fl. Madhya Pradesh 2: 348 (1997), non Bremek.

[*Strobilanthes neglecta sensu* Saxena & Brahmam, Fl. Orissa 3: 1390 (1995) (*S. neglectus*)]

Stem glabrous to sparsely covered with delicate white or rarely tawny-coloured hairs; lenticels occasionally prominent. Leaves ovate to elliptic, 24–150 × 11–111 mm; base prominently decurrent, symmetrical; apex often curving to a long-acuminate tip; margins subentire to serrate; abaxial surface often with dense white sericeous indumentum when young, glabrescent, adaxial surface usually sparsely covered with short stout tapering hairs; veins 5–13 pairs, prominent on both surfaces; petiole 5–108 mm long, glabrous to sparsely covered with delicate white or rarely tawny-coloured hairs. Inflorescence narrow interrupted or sometimes uninterrupted spikes, 16–72 × 4–5.5 mm at anthesis; axis glabrous or sparsely to densely covered with simple or glandular hairs. Bracts narrowly ovate to lanceolate, 6.9–10.1 × 1.5–2.3 mm, approximately equalling or longer than the calyx; apex acuminate; abaxial surface glabrous or glandular-hairy, adaxial surface glabrous. Bracteoles 4.4–9.0 mm long; axillary secondary buds rare.

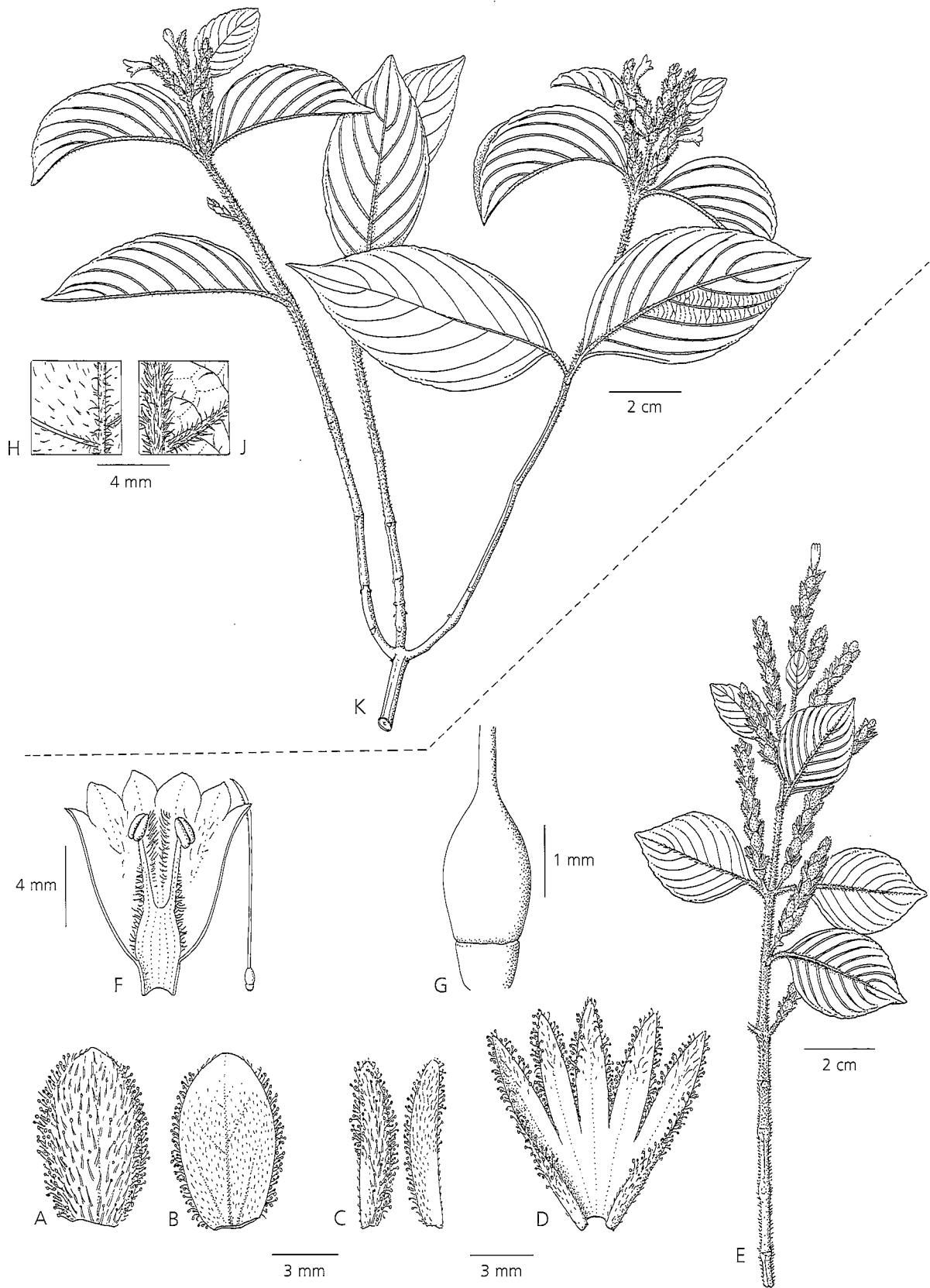


Fig. 5. *Strobilanthes canarica*. **A** abaxial bract surface; **B** adaxial bract surface; **C** bracteoles; **D** calyx; **E** habit; **F** flower section; **G** ovary; **H** adaxial leaf surface; **J** abaxial leaf surface **K** habit. **A – G** drawn from *Saldanha & Ramamoorthy* 1169, **H – K** from *Beddome* s.n. DRAWN BY ROSEMARY WISE.

Calyx with one lobe shorter than the rest, fused from the base for 0.2 – 0.4 of the total length at anthesis; lobes lanceolate, 5.9 – 11.2 mm long, apex acuminate; abaxial indumentum as bracts, adaxial surface glabrous or occasionally sparsely hairy. Corolla white, sometimes tinged blue or lilac or with distinctly blue or lilac lobes; tube 2.9 – 5.2 mm long; throat campanulate to subventricose, 7.8 – 10.7 mm long; lobes divided equally, broadly triangular, 2.2 – 4.3 × 2.0 – 4.2 mm, apices obtuse; outer surface glabrous. Stamens included; anthers 1.5 – 2.0 mm long; filaments 3.5 – 5.1 mm, densely hairy for approximately half the length. Ovary 1.0 – 3.5 mm long, apex sparsely hairy. Style 6.0 – 9.4 mm long, glabrous. Stigma 2.4 – 3.0 mm long, sparsely to prominently hairy. Fruit a narrowly obovate capsule, 9.0 – 12.2 mm long, glabrous to sparsely simple-hairy. Seeds 4, 2.2 – 2.7 mm long. (Fig. 6).

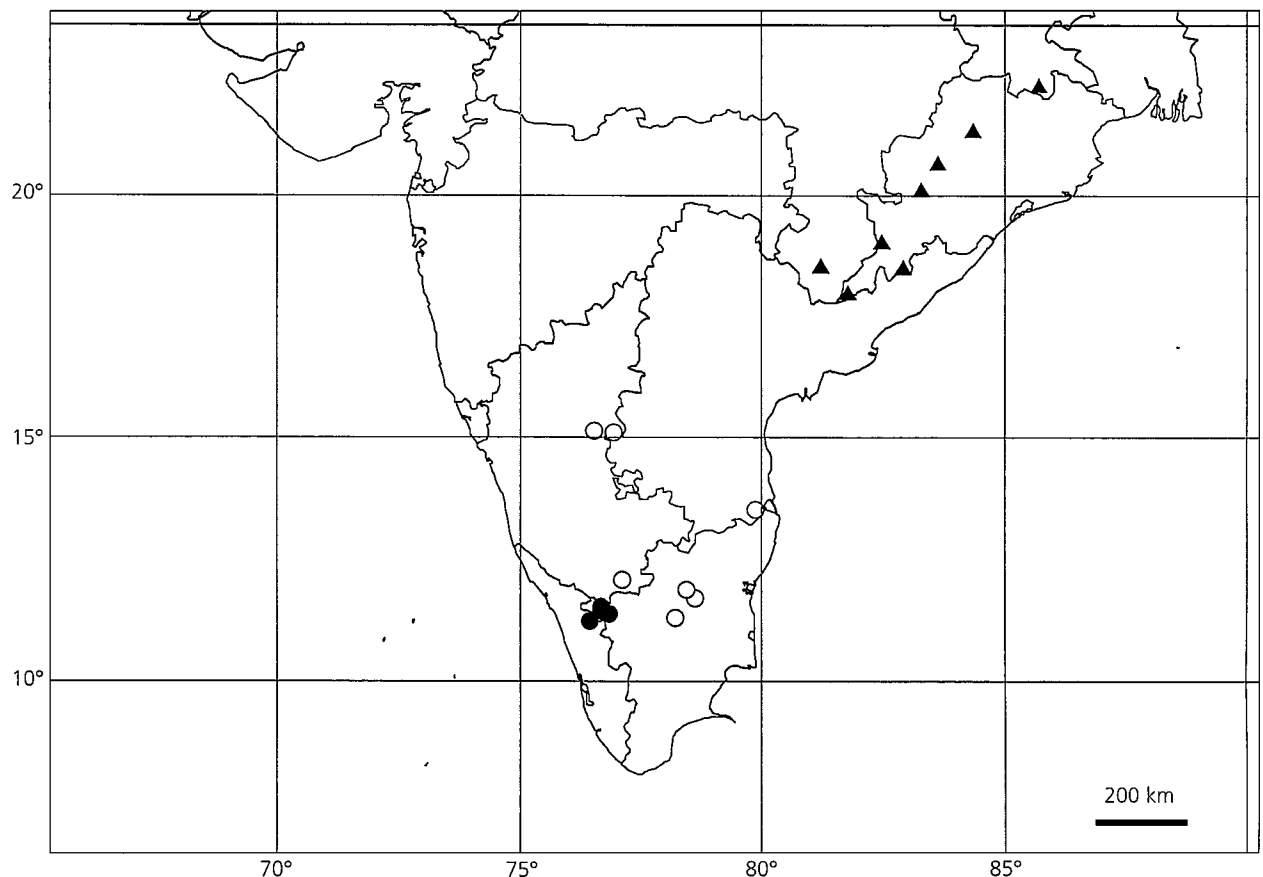
DISTRIBUTION. India: Andhra Pradesh, Orissa and Madhya Pradesh (Map 3).

HABITAT. In damp, shaded conditions in ravines, among rocks and on slopes above 600 m.

PHENOLOGY. Flowering October to January; fruiting February to March.

SPECIMENS SEEN. INDIA: ANDHRA PRADESH, Godavari Distr., Kenddampundi R., Godavari, 8 Dec. 1902, *Barber* 5232 (K); Sukmamri Hills, 1500 ft, Feb. 1885, *Gamble* 16078 (K); Sukmamri Hill, 300 ft, Godavari, Feb. 1885, *Gamble* 16079 (K). MADHYA PRADESH, Phuljhar Distr., between Rebna and Jamai, in the Phuljhar at head of Koasi R., 3 Oct. 1939, *Joshi & Mooney* 1161 (K); Dantewada Distr., Biladilia, in valley, on stony ground nr. stream, 17 Dec. 1938, *Mooney* 912 (K); Biladilia. Summit of range, 16 Dec. 1938, *Mooney* 896 (K). ORISSA, Ganjam Distr., Mahendragini, March 1884, *Gamble* 14009 (MH); Mahendragini, 15 Aug. 1931, *Narayanaswamy* 5569 (MH). Kalahandi Distr., Karlapat, 16 Jan. 1938, *Mooney* 660 (K); Saling Jhori, Chaddragiri, Kaspipur, 24 Jan. 1938, *Mooney* 698 (K); Koraput Distr., Jeypore Hills, 1885, *Beddome* 133 (BM lectotype); Pottangi, 10 Oct. 1950, *Mooney* 4078 (K); under shade in shrubby jungle near stream, Barubandha nr. Pottangi, *Mooney* 4155 (K); Sambulpur Distr., Uparapadar, 23 Dec. 1948, *Mooney* 3201 (K). Without locality, *Mooney* 2486 (K).

NOTES. *Strobilanthes jeyporensis* is confined to the Eastern Ghats. It appears that no other representatives of the *S. kunthiana*-group occur in this



Map 3. Distribution of *S. jeyporensis* (▲), *S. cuspidata* (●) and *S. carnatica* (○).

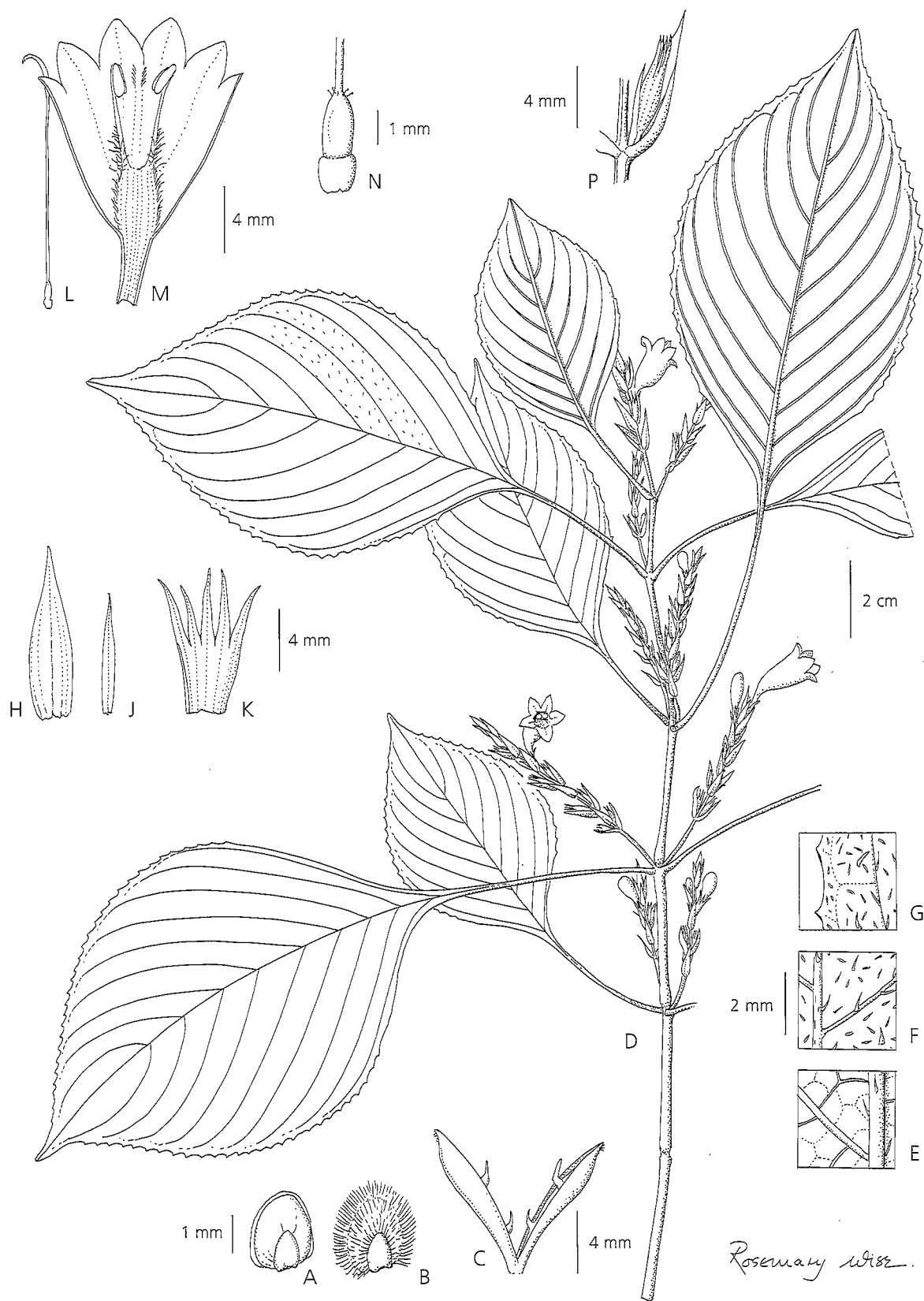


Fig. 6. *Strobilanthes jeyporensis*. **A** seed before wetting; **B** seed after wetting; **C** capsule; **D** habit; **E** adaxial leaf surface; **F** abaxial leaf surface; **G** abaxial leaf margin; **H** bract; **J** bracteole; **K** calyx; **L** gynoecium; **M** flower section; **N** ovary; **P** detail of bud. **D** & **F**–**P** drawn from Mooney 1161; **A**–**C** & **E** from Joshi 1161.

region and all collections that we have seen from this region determined as either *S. consanguinea* or *S. cuspidata* are in fact *S. jeyporensis*.

The name *S. neglecta* H. O. Saxena & Brahmam was published as an avowed substitute for *S. consanguinea* (Nees) T. Anderson, by Saxena & Brahmam (1995) in Flora of Andhra Pradesh. However, the material cited in the account is of *S. jeyporensis*.

Beddome cited two of his own specimens in the protologue of *S. jeyporensis*. The flowering specimen has been chosen as the lectotype in preference to the fruiting specimen as it bears the closest resemblance to the illustration in Beddome (1874).

9. *Strobilanthes cuspidata* (Benth.) T. Anderson, J. Linn. Soc. 9: 465 (1867); Bedd., Icon. Pl. Ind. Or. 1: 53 (1874); C. B. Clark in Hook. f., Fl. Brit. Ind. 4: 435 (1884); Gamble, Fl. Madras 2: 1027 (1924); Fyson, Fl. S. Ind. Hill Stations 1: 446 (1932); Rani & Matthew in Matthew, Fl. Tamilnadu Carnatic 3 (2): 1203 (1983); Saxena & Brahmam, Fl. Orissa (3): 1388 (1995). Type: as *E. cuspidatus*.

Endopogon cuspidatus Benth., Linnaea 24: 646 (1851).

Type: Nilgiris, *Hohenacker* 1169 (lectotype: K! designated here).

Endopogon versicolor Wight, Icon. Pl. Ind. Or. 4: 19 (1849). Type: Nilgierries, *Wight* s.n. (lectotype: K!).

Phlebophyllum versicolor (Wight) Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41 (1): 169 (1944); Pullaiah & Babu, Fl. Andhra Pradesh (4): 724 (1997). Type: as *E. versicolor*.

Stem glabrous or with a sparse white sericeous indumentum below, glandular hairy on uppermost sections. Leaves ovate to elliptic, 6.2–82.1 × 3.3–63.5 mm; base decurrent, symmetrical; apex distinctly acuminate; margins subentire to slightly dentate or serrate; abaxial surface with dense white sericeous indumentum, adaxial surface glabrous; veins 3–11 pairs, prominent on abaxial surface, less so on adaxial surface; petiole 3.9–52.4 mm long, pubescent. Inflorescence interrupted to uninterrupted spikes, 17–60 × 4–6 mm at anthesis, axis glandular pubescent. Bracts narrowly ovate, 8.8–11.6 × 1.7–2.0 mm, equal to or longer than the calyx; apex acuminate, often recurved; abaxial surface and margins glandular-hairy, adaxial surface with glandular hairs at apex. Bracteoles 5.8–8.5 mm long; usually with axillary secondary buds. Calyx with one or two lobes distinctly shorter than the rest, fused from the base for 0.3–0.6 of the total length at anthesis; lobes lanceolate, 4.8–11.7 mm long, apex acute; outer surface glandular-hairy, inner surface with sparse simple white hairs, sometimes glandular hairy at the tip. Corolla tube 3.5–5.4 mm long; throat campanulate to subventricose, 11.5–17.5 mm long; lobes divided equally, broadly

triangular, 3.1–5.1 × 3.0–3.8 mm, apices broadly to narrowly obtuse; outer surface glabrous or rarely with minute hairs. Stamens included; anthers 1.6–2.4 mm long; filaments 6.5–7.4 mm long, long white hairs below for 0.5–0.7 the length or rarely glabrous. Ovary 1.2–2.8 mm long, apex sparsely pubescent. Style 9.6–14.2 mm long, sparsely pubescent. Stigma 3.0–3.5 mm long, sparsely pubescent. Fruit an elliptic to narrowly obovate capsule, 10.7–11.7 mm long, glabrous. Seeds 2, 2.0–2.5 mm long. (Fig. 7).

DISTRIBUTION. India, Tamil Nadu. (Map 3).

HABITAT. Forest undergrowth or on drier exposed slopes on hillsides to 900 m.

PHENOLOGY. Flowering July to March; fruiting March.

SPECIMENS SEEN. INDIA: TAMIL NADU, Nilgiri Distr., Coonoor, 13 March 1870, *Clarke* 10721A (K); Coonoor, 13 March 1870, *Clarke* 10766B (BM); Coonoor, 13 March 1870, *Clarke* 10766E (K); Kulhatti, 5000 ft, June 1884, *Gamble* 14560 (K); Sigur Ghat, Nov. 1884, *Gamble* 15670 (K); Sigur Ghat, Nov. 1886, *Gamble* 18445 (BM); Kaintze R., *Gough* 544 (K); Khoondas, *Hohenacker* 1169 (BM); Nilgiris, *Hohenacker* 1169 (K, lectotype); Kaguchi, 24 Jan. 1885, *Lawson* s.n. (MH); Nilgiris, Jan. 1885, *Lawson* s.n. (OXF); Nilgiris, March 1838, *Munro* 1755 (K); Kalhatti-Masinagudi Road, 29 Nov. 1971, *Rathakrishnan* 39076 (MH); View Point, Kadanad, 29 Jan. 1972, *Vajravelu* 39696 (MH); *Wight* 2206 (K); *Wight* s.n., (K); Nilgiris, July 1845, *Wight* s.n. (OXF); Nilgiris, *Wight* s.n. Ic.1498 (K); Kulhatti, 30 Sept. 1886, s. coll. 148 (E); Kulhatti, 26 Feb. 1887, s. coll. 122 (E); Segur Ghat, June 1884, s. coll. s.n. [Herb no. 37687] (MH).

NOTES. *Strobilanthes cuspidata* is endemic to the Nilgiri Hills and is distinguished from other species in this group by the combination of a densely glandular hairy inflorescence, a dense white sericeous underside to mature leaves and long, often recurved, bracts giving the inflorescence a somewhat wispy appearance.

Both *Endopogon cuspidatus* Benth. and *Endopogon versicolor* have been lectotypified here. *Hohenacker* 1169 from the Nilgiris is cited by Bentham (1851) in the protologue of *E. cuspidatus* and the corresponding specimen in Bentham's herbarium at Kew has been selected as the lectotype. There has been some confusion surrounding the identity of the species illustrated by Wight (1849) under the name *E. versicolor* (t. 1497). However, the illustration is quite clearly of *S. cuspidata* and not of *S. viscosa* as Anderson (1867) suggests. Anderson's confusion surrounding the illustration stems from the mislabelling of the Wight specimen used for the illustration which is at K and is labelled *Endopogon versicolor*, Icones 1948, Nilgierries. Whilst this specimen is the lectotype of *E. versicolor*, the number given on the sheet is incorrect, and refers to a different illustration (i.e., t. 1948 rather than '1497').

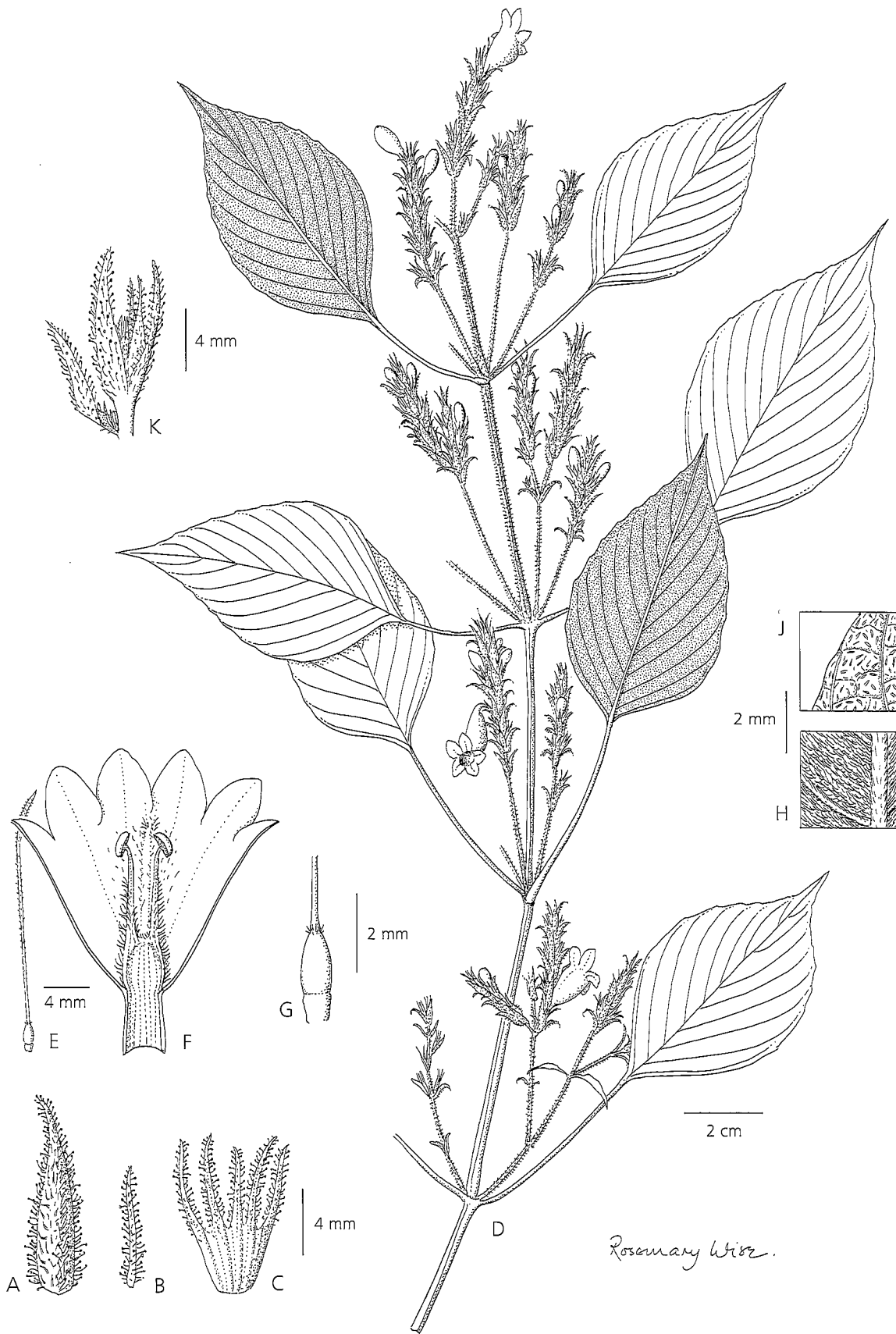


Fig. 7. *Strobilanthes cuspidata*. **A** bract; **B** bracteole; **C** calyx; **D** habit; **E** gynoecium; **F** flower section; **G** ovary; **H** abaxial leaf surface; **J** adaxial leaf surface; **K** detail of bud. All drawn from *Lawson* s.n.

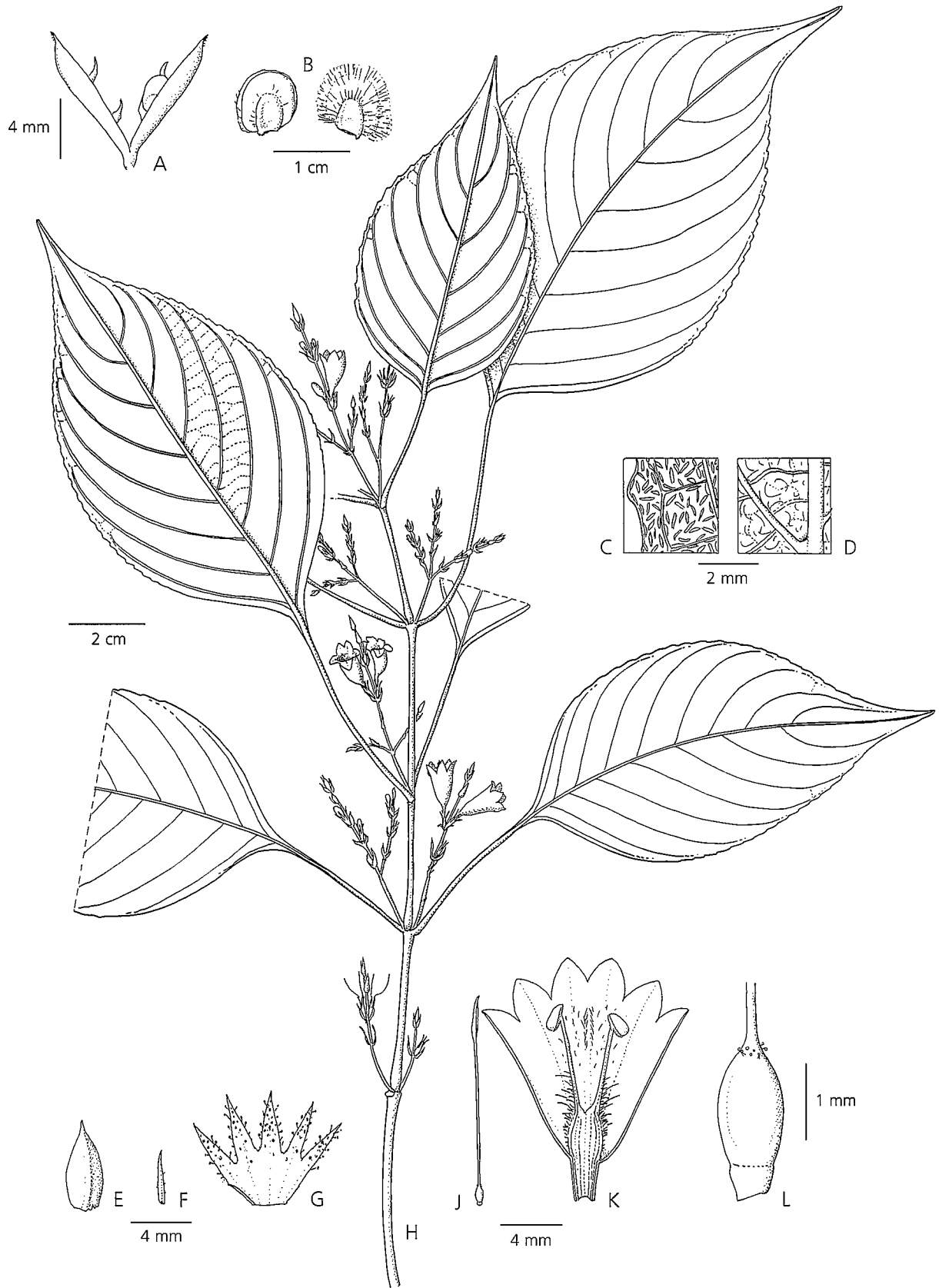


Fig. 8. *Strobilanthes carnatica*. **A** capsule; **B** seeds before and after wetting; **C** adaxial leaf surface; **D** abaxial leaf surface; **E** bract; **F** bracteole; **G** calyx; **H** habit; **J** gynoecium; **K** flower section; **L** ovary. **A** & **B** drawn from *Matthew 27088*; **C** – **L** from *Scotland 93*. DRAWN BY ROSEMARY WISE.

10. *Strobilanthes carnatica* Carine, J. Alexander & Scotland sp. nov. *Strobilanthes cuspidatae* (Benth.) T. Anderson habitu similis sed internodiis superioribus caulis et axibus inflorescentiae glabris vel sparse glandulifero-pubescentibus, bracteis calycem subaequantibus vel eo brevioribus, stylo stigmatique glabro differt. Typus: Denkanikotta, Javalagiri R.F., nr. Rest House, *Jayaseelan* RHT 26509 (K! holotypus; RHT isotypus).

Endopogon hypoleucus Nees in Wall., Pl. Asiat. Rar. 3:99 (1832); DC., Prod. 11: 104 (1847), *pro parte*.

Stem glabrous or rarely with sparse white indumentum around the nodes or in the grooves of upper internodes. Leaves broadly to narrowly ovate, 5.4–145.2 × 3.1–73.2 mm; base decurrent, often asymmetrical; apex of mature leaves long-acuminate; margins entire to slightly dentate or serrate; abaxial surface of young leaves with dense white sericeous indumentum, often becoming glabrous with age, adaxial surface glabrous or rarely with short stout tapering hairs; veins 4–9 pairs, prominent on both surfaces; petiole up to 65 mm long, glabrous or rarely with white sericeous indumentum. Inflorescence distinctly interrupted or rarely subinterrupted narrow spikes, 12–107 × 2.5–5 mm at anthesis, axis glabrous or sparsely glandular hairy. Bracts ovate or rarely obovate, 4.4–7.4 × 1.5–2.7 mm, shorter than, or rarely equal to the calyx; base truncate; apex acuminate or rarely obtuse; margins entire; abaxial surface and margins glandular-hairy or glabrous, adaxial surface glabrous or with few simple white hairs. Bracteoles 3.2–4.7 mm long; secondary buds in axils usually present. Calyx unequal, often with two or three lobes distinctly shorter than the rest, fused for 0.4–0.6 of the total length at anthesis; lobes lanceolate, 4.8–8.1 mm long, apex acute; outer indumentum as bracts, inner surface with sparse white simple hairs. Corolla pale blue; tube 2.1–4.5 mm long; throat campanulate, 9.2–11.3 mm long; lobes divided equally, broadly triangular, 2.2–4.4 × 2.5–3.9 mm, apices obtuse; outer surface glabrous or rarely with short reflexed hairs. Stamens included; anthers c. 0.5 mm long; filaments 4.4–6.0 mm long; few long white hairs below for most of the length. Ovary 0.9–1.5 mm long, apex pubescent. Style 5.1–10.6 mm long, glabrous. Stigma 1.7–2.6 mm long, glabrous. Fruit a narrowly obovate capsule, c. 10 mm long, glabrous. Seeds c. 2.2 mm long. (Fig. 8).

DISTRIBUTION. India, Tamil Nadu, Karnataka and Andhra Pradesh. (Map 3).

HABITAT. Locally abundant on moist slopes in the Eastern Ghats.

PHENOLOGY. Flowering October to February; fruiting February to March.

SPECIMENS SEEN. INDIA: ANDHRA PRADESH, Chittoor

Distr., Kambakam Hills, Chingleput, 9 Feb. 1922, *Fischer* 4729 (K); Kakula Dibba (Eethakayala Mandapam) 31 Dec. 1975, *Subba Rao* 46892 (MH). KARNATAKA, Bellary Distr., Bellary, May 1880, *Beddome* 22 (K); Ramandrug, 1885, *Beddome* 132 (BM). TAMIL NADU, Coimbatore Distr., *Fisher* 785 (K); Dharmapuri Distr., Denkanikotta, Javalagiri R.F., nr. Rest House, *Jayaseelan* RHT 26509 (K holotype); Chitteri Hills, 17 March 1980, *Matthew* 27088 (K); Way to Ponmachi, Kollegal, 6 Feb. 1930, *Narayanaswamy* 19530 (MH). Salem Distr., Perivakalrayannuda, 20 Feb 1979, *Venugopal* 22227 (K); Road to Yercaud from Shevroy Hills, 2900 ft, 31 Oct. 1995, *Scotland* 93 (FHO).

NOTES. Specimens belonging to *Strobilanthes carnatica* have often been determined as *S. consanguinea* or *S. cuspidata*. *Strobilanthes carnatica* (Fig. 8) is most similar to the Nilgiri endemic *S. cuspidata* (Fig. 7). Both possess equally divided corolla lobes and included stamens, characteristics that readily distinguish the two from *S. consanguinea*. *Strobilanthes carnatica* and *S. cuspidata* may be distinguished by the spikes that are interrupted or sub-interrupted and glabrous to somewhat glandular-hairy in *S. carnatica* but prominently overlapping and densely glandular-hairy in *S. cuspidata*. The bracts are generally shorter than the calyx in *S. carnatica* but longer than the calyx in *S. cuspidata*, and the style is glabrous in *S. carnatica* and pubescent in *S. cuspidata* (Table 1).

Material of this species was cited in the protologue of *Endopogon hypoleucus* Nees together with material of *S. consanguinea*. However, material of *S. consanguinea* was selected as lectotype to reflect common usage of the name. Consequently, *S. carnatica* is described here for the other element that has not previously been recognised as a distinct taxon. The name *S. carnatica* has been chosen as the distribution of this species includes the Carnatic region as circumscribed by Hooker & Thomson (1855).

Acknowledgements

We are grateful to the curators of CALI, E, K and MH for access to material, R. Wise for illustrations, M. Penn for assistance with maps, V. Bharatan for help with collection localities, N. K. B. Robson for Latin advice and E. C. Moylan, J. R. I. Wood, J. M. Lock and two anonymous reviewers for comments on the paper.

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Enumeration of taxa

- Endopogon amomum* (= **Strobilanthes consanguinea** (Nees) T. Anderson)
- Endopogon consanguineus* Nees (= **Strobilanthes consanguinea** (Nees) T. Anderson)
- Endopogon cuspidatus* Benth. (= **Strobilanthes cuspidata** (Benth.) T. Anderson)
- Endopogon hypoleucus* Nees *pro parte* (= **Strobilanthes consanguinea** (Nees) T. Anderson)
- Endopogon hypoleucus* Nees *pro parte* (= **Strobilanthes carnatica** Carine, J. Alexander & Scotland)
- Endopogon versicolor* Wight (= **Strobilanthes cuspidata** (Benth.) T. Anderson)
- Endopogon viscosus* var. *humilis* Nees (= **Strobilanthes consanguinea** (Nees) T. Anderson)
- Phlebophyllum canarica* (Bedd.) Bremek. (= **Strobilanthes canarica** Bedd.)
- Phlebophyllum humile* (Nees) Bremek. (= **Strobilanthes consanguinea** (Nees) T. Anderson)
- Phlebophyllum jeyporensis* (Bedd.) Bremek. (= **Strobilanthes jeyporensis** Bedd.)
- Phlebophyllum kunthianum* Nees (= **Strobilanthes kunthiana** (Nees) T. Anderson)
- Phlebophyllum lanatum* (Nees) Bremek. (= **Strobilanthes lanata** Nees)
- Phlebophyllum lawsonii* (Gamble) Bremek. (= **Strobilanthes lawsonii** Gamble)
- Phlebophyllum spicatum* (Roth) Bremek. *pro parte* excl. *typus* (= **Strobilanthes consanguinea** (Nees) T. Anderson)
- Phlebophyllum spicatum* (Roth) Bremek. *pro parte* *quoad typus* (= *Stenosiphonium cordifolium* (Nees) T. Anderson)
- Phlebophyllum spicatum* var. *amomum* (Nees) Bremek. (= **Strobilanthes consanguinea** (Nees) T. Anderson)
- Phlebophyllum spicatum* var. *hypoleucum* (Nees) Bremek. (= **Strobilanthes consanguinea** (Nees) T. Anderson)
- Phlebophyllum spicatum* var. *rothii* Bremek. (= **Strobilanthes consanguinea** (Nees) T. Anderson)

- Phlebophyllum versicolor* (Wight) Bremek. (= **Strobilanthes cuspidata** (Benth.) T. Anderson)
- Phlebophyllum versicolor sensu* Pulliah & Babu (= **Strobilanthes jeyporensis** Bedd.)
- Phlebophyllum angustifolium* Benth. (= **Strobilanthes kunthiana** (Nees) T. Anderson)
- Stenosiphonium parviflorum sensu* Rani & Matthew (= **Strobilanthes consanguinea** (Nees) T. Anderson)
- Strobilanthes canarica** Bedd.
- Strobilanthes carnatica** Carine, J. Alexander & Scotland
- Strobilanthes consanguinea** (Nees) T. Anderson
- Strobilanthes consanguinea* var. *amomum* (Nees) C. B. Clarke (= **Strobilanthes consanguinea** (Nees) T. Anderson)
- Strobilanthes consanguinea* var. *hypoleuca* (Nees) C. B. Clarke (= **Strobilanthes consanguinea** (Nees) T. Anderson)
- Strobilanthes cuspidata** (Benth.) T. Anderson
- Strobilanthes cuspidata sensu* Matthew (= **Strobilanthes consanguinea** (Nees) T. Anderson)
- Strobilanthes gamblei** Carine, J. Alexander & Scotland
- Strobilanthes gossypinus* T. Anderson (= **Strobilanthes lanata** Nees)
- Strobilanthes humilis* (Nees) Gamble (= **Strobilanthes consanguinea** (Nees) T. Anderson)
- Strobilanthes jeyporensis** Bedd.
- Strobilanthes kunthiana** (Nees) T. Anderson
- Strobilanthes lanata** Nees
- Strobilanthes lawsonii** Gamble
- Strobilanthes lawsonii* Gamble *pro parte* (= **S. gamblei** Carine, J. Alexander & Scotland)
- Strobilanthes neglectus* H. O. Saxena & Brahmam (= **Strobilanthes consanguinea** (Nees) T. Anderson)
- Strobilanthes neglectus sensu* Saxena & Brahmam (= **Strobilanthes jeyporensis** Bedd.)
- Strobilanthes pushpangadanii** E. S. S. Kumar, Jabbar & A. E. S. Khan

