The taxonomy and biology of *Stenosiphonium* Nees (Acanthaceae)

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A taxonomic revision of *Stenosiphonium* Nees is provided. Morphological variation within the genus is documented, the relationship between *Stenosiphonium* and *Simbilanthes* Blume is discussed, and problems of species delimitation are resolved. Three species are recognized. *Stenosiphonium conditifolium* (Vahl) Alston is morphologically variable and is widespread throughout peninsular India and Sri Lanka. *S. setosum* T. Anderson and *S. wightii* Bremek. are restricted endemics from the southern Western Ghats, each known from very few herbarium collections. Both *S. setosum* and *S. wightii* are recognized as rare in accordance with IUCN criteria. There is evidence to suggest that all three species of *Stenosiphonium* are pliesial which may explain the paucity of herbarium collections of both *S. setosum* and *S. wightii*. The implications of a pliesial life history strategy for the assessment of the conservation status of these species is considered.

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**ADDITIONAL KEY WORDS:**--conservation -- India -- morphology -- pliesial -- Sri Lanka -- systematics.

**CONTENTS**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>101</td>
</tr>
<tr>
<td>Morphological variation, generic circumscription and species delimitation in <em>Stenosiphonium</em></td>
<td>102</td>
</tr>
<tr>
<td>The morphology of <em>Stenosiphonium</em></td>
<td>102</td>
</tr>
<tr>
<td>Generic circumscription</td>
<td>110</td>
</tr>
<tr>
<td>Species delimitation</td>
<td>111</td>
</tr>
<tr>
<td><em>Stenosiphonium</em> life history strategy and conservation</td>
<td>111</td>
</tr>
<tr>
<td>Taxonomic account</td>
<td>114</td>
</tr>
<tr>
<td>Key to the species</td>
<td>115</td>
</tr>
<tr>
<td><em>Stenosiphonium conditifolium</em></td>
<td>115</td>
</tr>
<tr>
<td><em>Stenosiphonium setosum</em></td>
<td>119</td>
</tr>
<tr>
<td><em>Stenosiphonium wightii</em></td>
<td>121</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>123</td>
</tr>
<tr>
<td>References</td>
<td>124</td>
</tr>
<tr>
<td>Appendix: specimens seen</td>
<td>125</td>
</tr>
</tbody>
</table>

**INTRODUCTION**

*Stenosiphonium* Nees (Acanthaceae) forms a well defined and putatively monophyletic group distributed in southern India and Sri Lanka. It was one of a number of

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genera described by Nees (1832, 1847) which were morphologically similar to *Strobilanthes* Blume and which collectively correspond to the Strobilanthinae of Bremekamp (1944). Whilst the delimitation of many of Nees’ Strobilanthinae genera has proven contentious and several alternative classification schemes have been proposed (Anderson, 1867; Lindau, 1895; Bremekamp, 1944; Terao, 1983), all published treatments have maintained *Stenosiphonium* as a distinct genus (Anderson, 1867; Clarke, 1884; Gamble, 1924; Bremekamp, 1944). Clarke (1884) provided the most recent monographic treatment of *Stenosiphonium* and recognized five species and one variety. However, quantitative differences or indumentum characters were used to distinguish some taxa. The taxonomic value of these characters is questionable, and species delimitation within *Stenosiphonium* consequently remains problematic.

The aims of this paper are to clarify generic circumscription and species delimitation in *Stenosiphonium*. Morphological variation in the group is documented, the monophyly of *Stenosiphonium* and the relationship between *Stenosiphonium* and *Strobilanthes* is discussed in the context of morphological and molecular cladistic analysis, problems of species delimitation are resolved and a taxonomic revision of the genus is provided.

Life history strategy within *Stenosiphonium* is also reviewed. Within the Strobilanthinae, a pietesial life history strategy has been suggested for many species (reviewed by van Steenis, 1942; Matthew, 1971; Wood, 1994; Carine, 1999). The term ‘pietesial’ was used by Bremekamp (1944) to describe species which are monocarpic and which grow for a period of several years, flower and fruit gregariously and then die. This life history strategy represents part of the more general phenomenon of semelparity which describes a massive reproductive output directly associated with pre-programmed whole-organism death (Young & Augspurger, 1991).

Whilst there are relatively few well corroborated examples of pietesial flowering in the Strobilanthinae, Wood (1994, 1995) and Scotland (1998) have suggested that the apparent rarity of many species of *Strobilanthes* may reflect a pietesial life history strategy. The same explanation may also account for the apparent rarity of species of *Stenosiphonium*. The evidence in support of a pietesial life history strategy for *Stenosiphonium* spp. is therefore evaluated and the impact of life history strategy on the assessment of conservation status of pietesial species is considered.

MORPHOLOGICAL VARIATION, GENERIC CIRCUMSCRIPTION AND SPECIES DELIMITATION
IN STENOSIPHONUM

The morphology of Stenosiphonium

Morphological variation within *Stenosiphonium* was assessed by examination of plants in the field and by examination of preserved material from the following herbaria: C, CAL, CGE, E (including E-GL), FHO, G-DC, HIFP, K (including K-W), L, LIV, MH, OXF, PCM, PDA, RHT, Sidha Medical College Palyamkottai, TBGT, US, University of Kerala. Floral dissections were prepared from herbarium material after immersion in boiling water for approximately one minute and measurements were made using either DIGIT CAL callipers or a graticule on a Nikon SMZ 2B microscope. Pollen morphology was investigated by examination of acetolyzed pollen (Erdtman, 1960) using a Hitachi S800 field emission scanning.
electron microscope following sputter coating with gold palladium for 90 seconds in a Polaron E5000 SEM coating unit.

Particular attention is paid here to morphological characters used to delimit *Stenosiphonium* and species within the genus either in previous taxonomic treatments or in the revision presented in this paper.

**Vegetative morphology**

*Stenosiphonium* comprises spreading to erect shrubs up to 2.5 metres in height. Leaves are opposite and are isophyllous to anisophyllous. In anisophyllous pairs the length of the smaller leaf is never less than 40% of the length of the larger leaf. Lower leaves are petiolate, with the lamina elliptic or ovate in outline, the apices acuminate and bases decurrent on the petiole. Leaves subtending the inflorescence are sessile or sub-sessile, and ovate, orbiculate or caudate in outline. The presence of these leaves subtending the inflorescence may be used to distinguish *Stenosiphonium* from species of *Strobilanthes* with similar inflorescences which were referred to *Pseudostenosiphonium* Lindau or *Phlebophyllum* Nees by Bremekamp (1944).

The upper surface of the leaf is glabrous, or rarely a few stout and tapering hairs are present. The lower surface may be glabrous or hairs may be present along the vascular tissue. In some specimens of *Stenosiphonium cordifolium* (Vahl) Alston the lower leaf surface has a prominent sericeous indumentum and these specimens have previously been referred to a distinct variety (*S. cordifolium* var. *subsericea* (Nees) L. H. Cramer). However, this character lacks any taxonomic significance. For example, during the preparation of this revision, five specimens of *S. cordifolium* were examined from Vandalur, Chengalpattu District, Tamil Nadu (12°50'N, 80°05'E). Of these specimens, one was prominently sericeous on the lower surface of all leaves (*Narasingham* 1009, MH), one sericeous on the lower surface of only the smallest leaves (*Bourne* 5379, K) and three lacked a sericeous indumentum on the lower leaf surface (*Barnes* 1006, 1007, K; *s.c.* 11499, MH). A similar pattern of indumentum variation was observed in specimens collected from the Tirunelveli Hills, Tamil Nadu (*c.* 8°56’N 77°20’E): *Wight* s.n. (K) is prominently sericeous on the lower leaf surface whereas only the smallest leaves of *Bowden* 4 (K), *Carine* 15 (FH) and *Sebastine* 5892 (CAL) are prominently sericeous with leaves becoming glabrescent with increasing size. Thus, the presence of a sericeous indumentum on the lower surface of leaves in *S. cordifolium* is variable within an individual and is apparently related to development. Specimens of *S. cordifolium* collected from the same locality are variable both in the extent and the persistence of the indumentum on larger leaves and this pattern of variation is repeated in widely dispersed localities. For these reasons, leaf indumentum has not been used for taxon delimitation and no distinction is made between the two varieties previously distinguished using this character.

**Inflorescence**

The description of inflorescence parts used here broadly follows earlier accounts of *Stenosiphonium* (e.g. Clarke, 1884; Gamble, 1924; Bremekamp, 1944). A bract is a leaf-like structure subtending a flower in its axil and a bracteole is a small leaf-like structure between the bract and calyx, with a pair of bracteoles subtending each flower. However, in *Stenosiphonium*, secondary flowers are present in the axils of
bracteoles, which themselves are subtended by a pair of bracteoles (Fig. 1D & E). The secondary flowers may remain vestigial or may subsequently develop and result in dense flower clusters. Thus, in *Stenosiphonium*, a bract subtends a primary flower in its axil with bracts in opposite pairs along the inflorescence axis (Fig. 1B). Bracteoles subtend a secondary flower in their axils and two bracteoles are present between the bract and calyx of each primary flower. Bremekamp (1944) described the inflorescence of *Stenosiphonium* as a series of reduced cymes. This inflorescence structure is an indeterminate thyrs (Weberling, 1992) (Fig. 1A). However, the pedicels are reduced and the secondary flowers rarely develop giving the superficial impression that the inflorescence is a spike *sensu* Weberling (1992). The presence of secondary flowers in the axils of bracteoles was one of the characters used to distinguish *Stenosiphonium* from related taxa by Bremekamp (1944). However, this character is more widely
TABLE 1. Characters used to distinguish S. setosum and S. purpureum by Gamble (1924). All are either quantitative or minor qualitative differences. Gamble (1924) cited two specimens of S. purpureum and one specimen of S. setosum in the account. ? indicates that this character is not supported by observation of the material.

<table>
<thead>
<tr>
<th>Character</th>
<th>S. setosum</th>
<th>S. purpureum</th>
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<tbody>
<tr>
<td>Spikes</td>
<td>Dense interrupted clusters</td>
<td>Slender interrupted small clusters</td>
</tr>
<tr>
<td>Spike pubescence</td>
<td>Prominently viscid pubescent</td>
<td>Glandular pubescent</td>
</tr>
<tr>
<td>Corolla length</td>
<td>1.9 mm</td>
<td>1.25 mm</td>
</tr>
<tr>
<td>Corolla tube</td>
<td>Narrow</td>
<td>Very narrow</td>
</tr>
<tr>
<td>Corolla throat</td>
<td>Broadly ventricose</td>
<td>Ventricle</td>
</tr>
<tr>
<td>Bract shape</td>
<td>Linear-lanceolate</td>
<td>Lanceolate</td>
</tr>
<tr>
<td>Bract length</td>
<td>0.75 mm</td>
<td>0.6 mm</td>
</tr>
<tr>
<td>Bracteole shape</td>
<td>Narrowly linear-lanceolate</td>
<td>Linear</td>
</tr>
<tr>
<td>Bract and bracteole length</td>
<td>0.75 mm</td>
<td>0.6 mm</td>
</tr>
<tr>
<td>Calyx length</td>
<td>0.75 mm</td>
<td>0.6 mm</td>
</tr>
<tr>
<td>Calyx lobe shape</td>
<td>Linear, hair pointed</td>
<td>Linear</td>
</tr>
<tr>
<td>Calyx pubescence</td>
<td>Very glandular</td>
<td>Glabrous (?)</td>
</tr>
<tr>
<td>Leaf margin</td>
<td>Shallowly dentate</td>
<td>Dentine</td>
</tr>
</tbody>
</table>

distributed among the southern Indian and Sri Lankan Strobilanthinae, and vestigial flowers are found in the axils of bracteoles in the following species of Strobilanthes: S. exserta C. B. Clarke, S. gardneriana (Nees) T. Anderson, S. helicoides (Nees) T. Anderson, S. humitis Gamble, S. jeyupensis Bedd.

Nees (1847) distinguished Stenosiphonium conferturn Nees by the prominently hairy calyx which was longer than the bracts. In other respects, notably the possession of didynamous stamens and obovate or elliptic bracts, it is the same as S. cordifolium. Clarke (1884) noted that the spikes of S. conferturn were covered with both glandular and simple hairs, and Gamble (1924) considered that the close clustering of flowers in the spike, particularly towards the apex, further distinguished S. conferturn.

Most specimens determined as S. conferturn have been fruiting specimens, in which the accrescent calyx is longer than the bracts and the inflorescence is typically glandular pubescent (e.g. Perumal 22543, K, RHT). Wood (1995) considered differences in inflorescence indumentum to be related to development in Strobilanthes and examination of Stenosiphonium has shown that glandular hairs are more common on all vegetative parts of the inflorescence (i.e. axis, bracts, bracteoles, calyces) in flowering specimens than in flowering specimens. For example, the flowering specimen Cramer et al. 6943 (K, PDA) collected from Dambulla, Matale Dist., Sri Lanka, has a glabrous inflorescence and widely spaced flower clusters. In contrast, the inflorescence of the fruiting specimen Cramer and Weerasooriya 6802 (E, PDA, US), from the same locality, is densely glandular pubescent and has larger and more closely packed flower clusters. The apparently simple hairs described by Clarke (1884) are simply long glandular hairs which have lost their glandular apex. Thus, those characters used to distinguish S. conferturn from S. cordifolium are related to development and are typical of fruiting specimens of S. cordifolium. There are no characters or combination of characters with which to distinguish S. conferturn from S. cordifolium that are not related to development, and the two are therefore treated as conspecific.

Differences in the size of inflorescence parts, together with qualitative differences have been used to distinguishing S. setosum T. Anderson and S. purpureum T. Anderson. This is illustrated in Table 1 which compares the characters used to distinguish these two species in Gamble’s account of the genus for the Flora of the Presidency of
M. A. CARINE AND R. W. SCOTLAND

Mudm (Gamble, 1924). In the accounts of the genus provided by Clarke (1884) and Gamble (1924), a single specimen was cited for S. setosum (Thomson, Strobilanthes 68, BM, CAL, K, L). Clarke (1884) cited a single specimen of S. parviflorum in his account, (Thomson, Strobilanthes 67, BM, CAL, CGE, K, L) and Gamble (1924) cited two, citing additionally Ruma Rao 665 (CAL, TBGT). However, examination of other herbarium collections at TBGT and the University of Kerala and of living material at TBGT recently collected from Achancovil (Thomas et al., 1995), has shown that the distinction based on size is unjustifiable. For example, whilst Gamble (1924) distinguished the two species using bract length (Table 1), variation in this trait is continuous and overlapping (Fig. 2). S. setosum and S. parviflorum, which were distinguished using size of inflorescence parts and minor qualitative differences, are clearly conspecific.

**Bracts and bracteoles**

Three distinct bract morphologies can be distinguished in Stenosiphonium. In S. cordifolium, the bracts are obovate or elliptic, shorter than or equal to the calyx and with an acute or shortly acuminate apex (Fig. 3H). In S. setosum, the bracts are narrowly triangular, equal to or longer than the calyx and with acuminate apices (Fig. 4G). In S. wightii, the bracts are ovate, shorter than the calyx and with an acute apex (Fig. 5F). The bracteoles are linear to narrowly triangular (Figs 3G, 4H, 5G) and are equal to, or slightly shorter than, the bracts.

**Calyx**

The calyces of Stenosiphonium species comprise five lobes which at anthesis are united for part of their length. The lobes may be linear with acute apices (Figs 3I, 5H) or narrowly lanceolate and acuminate (Fig. 4J). The outside of the calyx is usually glandular hairy, although in S. cordifolium it may be villose hairy or glabrous.
The inside of the free segments is often pubescent (e.g. Fig. 3I). In fruit, the calyx elongates and divides basally between each segment.

**Corolla**

The corolla comprises a ventricose throat above a narrow, cylindrical, twisted (resupinate) tube (e.g. Fig. 1B). There are five obtuse corolla lobes. Bremekamp (1944) considered the resupinate corolla in *Stenosiphonium* a useful character to distinguish the genus from species of southern Indian and Sri Lankan *Strobilanthes* which were superficially similar and which he placed in *Pseudostenosiphonium*. However, Bremekamp’s assessment of corolla resupination in *Strobilanthes* has been shown to...
be problematic (Wood, 1994) and Pseudostenosiphonium species also possess a twisted corolla tube.

The colour of the corolla varies from almost white to dark violet and is variable within a species. Thus, the corolla of S. cordifolium varies from deep to pale violet and the corolla of S. wightii is dark violet at low altitudes, whilst at higher altitudes it is much paler (V. Chellandurai, pers. com.). There are two darker spots on each of the three adaxial lobes of the corolla and a single darker spot on each of the two abaxial lobes (Fig 4F).

The outside of the corolla is glandular hairy in bud. At anthesis, the outside of the corolla is sparsely glandular pubescent in S. wightii and glabrous in S. cordifolium and S. setosum. The inside of the corolla in all species is glabrous except for two tufts of hairs borne on flaps of corolla tissue (papillae) between the two abaxial lobes at the mouth of the corolla (e.g. Fig. 3E) which retain the style. This character was considered diagnostic for Stenosiphonium by Bremekamp (1944), but is also found in Strobilanthes exserta, Strobilanthes gardneriana and Strobilanthes stenodon C. B. Clarke among the southern Indian and Sri Lankan Strobilanthinae.

Androecium

The androecium is didynamous or diandrous. S. cordifolium is didynamous with the anterior stamens strongly exerted and the posterior stamens always slightly
exserted (Fig. 3E). In S. setosum there are two strongly exserted stamens and two infertile staminodes which terminate at the mouth of the corolla in a slightly swollen tip (Fig. 4D, F). Rarely, a third staminode is present. S. wightii is diandrous with the stamens strongly exserted. In this species, two vestigial staminodes may be present as short vascularized projections from the staminal sheath (Fig. 5E, I).

In all species, the filaments are fused below to form a membranous sheath which is adnate to the corolla and which extends to the base of the corolla tube. The free filaments are glabrous, whilst the membranous sheath is prominently hairy along its length in S. cordifolium and S. setosum and is sparsely hairy towards the base in S. wightii (Fig. 3E, 4D, 5E).

Pollen

Pollen grains of Stenosiphonium are prolate, three-colporate and pseudocolpate. The ribs between pseudocolpi have a punctate tectum. The endoaperture is lalongate. This pollen morphology is common among the southern Indian and Sri Lankan species of Strobilanthes (Carine & Scotland, 1998), but distinguishes Stenosiphonium from species referred to Pseudostenosiphonium by Bremekamp (1944) and from Strobilanthes exserta and Strobilanthes gardneriana.

Fruit and seeds

The fruit of Stenosiphonium is an oblong, 4-sided, flattened capsule containing 6–8 seeds borne on hooked retinacula (Fig. 3J, 4K). Up to eight mature seeds may be present, but some seeds within a capsule may not develop and are much smaller (fig. 4K). The seeds in Stenosiphonium have a prominent areola and elastic hygroscopic hairs which have annular thickened walls (e.g. Fig. 3K, L). This seed morphology easily distinguishes Stenosiphonium from Pseudostenosiphonium and Strobilanthes gardneriana which have glabrous seeds.

Generic circumscription

There are no unique diagnostic characters with which to distinguish Stenosiphonium from other taxa in the Strobilanthisae. Rather, the genus is diagnosed by the following combination of characters: thrysoid inflorescence with secondary flowers in the axils of bracteoles; corolla with a ventricose throat above a narrow, twisted (resupinate) tube; the presence of papillae bearing hairs to retain the style against the corolla; pollen prolate, tricolporate and pseudocolpate with a perforate tectum; seeds six to eight per capsule, areolate and hygroscopic hairy.

Terao (1983), in an unpublished thesis, proposed that Stenosiphonium should be expanded to include also Strobilanthes gardneriana and Strobilanthes exserta. However, whilst both of these species possess papillae to retain the style against the corolla and secondary flowers in the axils of bracteoles, the pollen morphology of these two species differs from that of Stenosiphonium (Carine & Scotland, 1998). There are also differences in seed and corolla structure (Wood, 1998). These two species do not possess all of the characters diagnostic of Stenosiphonium and they are consequently excluded from the genus as circumscribed here, a decision supported by morphological cladistic analysis (Carine, 1999; Carine & Scotland, in press).

The monophyly of Stenosiphonium s.s. is supported by cladistic analysis of both
molecular and morphological data (Carine, 1999; Carine & Scotland, in press). These data also suggest that \textit{Stenosiphonium} is nested within \textit{Strobilanthes} sensu Anderson from southern India and Sri Lanka. Whilst there may therefore be grounds for placing \textit{Stenosiphonium} into synonymy with \textit{Strobilanthes}, \textit{Stenosiphonium} is maintained as a distinct genus in this revision. Wood (1994) suggested that the Anderson classification represents the most satisfactory approach to generic delimitation in the \textit{Strobilanthinae} pending a detailed study of generic delimitation in the group, work which is currently in progress. Any nomenclatural changes proposed here may be quickly superseded and, for this reason, the genus is maintained.

\textit{Species delimitation}

Luckow (1995) and McDade (1995) have emphasized the importance of an explicit species concept in taxonomic revisions. However, Mayden (1997) reviewed 22 species concepts currently in use, illustrating the lack of consensus among biologists regarding the definition of species. Given the problematic nature of process-based definitions (e.g. Nixon & Wheeler, 1990; Rosen, 1979; Smith, 1994; Stevens, 1992), most plant systematists have adopted a pattern-based concept. In this revision, the species concept of Nelson & Platnick (1981:12) is followed: “the smallest detected sample of self-perpetuating organisms that have a unique set of characters”. Following this concept, the species is the lowest rank of the phylogenetic hierarchy; self-perpetuation implies that the entire life-cycle is included in a single species and that species are defined by unique sets of characters assuming only reproductive cohesion. This is a very low-level and unproblematic theory (Hull, 1997).

Three \textit{Stenosiphonium} species have been recognized. \textit{S. cordifolium} is distinguished by the possession of didynamous stamens and by bracts which are obovate or elliptic and equal to or shorter than the calyx at anthesis. Indumentum characters which were previously used to distinguish \textit{S. setosum} and a variety of \textit{S. cordifolium} (\textit{S. cordifolium} var. \textit{subsericeum}) are linked to development and consequently are not used to distinguish taxa in this revision.

Increased sampling has shown that the distinction between \textit{S. parviflorum} and \textit{S. setosum} based on size of inflorescence parts and minor qualitative differences is unjustified. There is no discrete variation in these traits that can be used to distinguish two taxa and they are therefore treated as conspecific. \textit{S. setosum} is distinguished from other species of \textit{Stenosiphonium} by the bracts which are narrowly triangular, acuminate and equal to or longer than the calyx at anthesis and by the possession of two strongly exserted stamens and two staminodes which end in a slightly swollen tip at the mouth of the corolla.

\textit{S. wightii} is distinguished from other species of \textit{Stenosiphonium} by the ovate bracts which are shorter than the calyx and by the total or near total suppression of the anterior stamens.

\textit{STENOSIPHONIUM LIFE HISTORY STRATEGY AND CONSERVATION}

\textit{Stenosiphonium setosum} and \textit{Stenosiphonium wightii} are both restricted endemics from the southern Western Ghats (Figs 7 and 8). The poor representation of these species
in herbarium collections (they are known from only eight and six collections respectively) would suggest that they are extremely rare and *S. wightii* was identified as endangered by Nayar (1996). However, Nayar’s (1996) assessment of the conservation status of this species did not take into account the life history strategy of *S. wightii* and there is evidence to suggest that all three species of *Stenosiphonium* are plietesial.

Bowden (1950) reported that *Stenosiphonium cordfolium* flowered gregariously at Dohnavur, Tirunelveli District, India in 1945 with a secondary flowering in 1946, after which the plants died back. In plietesial species of *Strobilanthes*, the main flowering actually takes place over several years, rather than in a single year (e.g. Wood, 1994) and these observations are therefore consistent with a plietesial life history strategy for this widespread species. A plietesial life history strategy for *Stenosiphonium cordfolium* would also account for recent observations of this species in Sri Lanka by the first author. Flowering specimens of *S. cordfolium* were collected from Batu Oya, Polonnaruwa District in 1993 (Cramer and Weerasooriya 6820, K, PDA, US). However, during fieldwork in the same locality in 1996, no flowering specimens were found, but immature plants up to 2 metres in height were abundant. Fieldwork was also undertaken in other localities in Sri Lanka during 1996 where *S. cordfolium* had similarly flowered abundantly in preceding years and again no mature specimens were found. A long-lived plietesial habit, with mass flowering followed by death and subsequent regeneration from seed would be consistent with these observations and with those of Bowden (1950).

Evidence which apparently contradicts this suggestion include a report by H. P. C. Armitage in the Ceylon Observer of 1899 (Petch, 1924), describing *S. cordfolium* as a biennial. Given the size of the plants (up to 2.5 metres) this is unlikely to be the case. In cultivation at the Tropical Botanical Garden and Research Institute in Kerala (TBGRI), this species flowered during both 1996 and 1997, although Janzen (1976) suggested that under favourable cultivation conditions, plietesial species may revert to polycarpy and the pattern of flowering for cultivated individuals may consequently be misleading. An alternative explanation to account for the recent observations of the Batu Oya population which does not invoke plietesial flowering was offered by Fr. L. H. Cramer (pers. com.). He suggested that the homogenous population of young plants observed during 1996 might be the result of human clearance of mature fruiting plants for wood in 1993, followed by the subsequent germination and growth of new individuals from seeds. A similar explanation for the apparent plietesial flowering cycle of *Strobilanthes callosa* Nees, from the Bombay Ghats, was offered by Kirtikar (1892). Thus, whilst Bowden (1950) and recent observations of *S. cordfolium* in Sri Lanka suggest a plietesial life history strategy for *S. cordfolium*, the evidence is equivocal, being contradicted by observations from cultivated specimens, historical anecdotal evidence and alternative explanations to account for recent field observations. These anomalies can only be resolved by further detailed observations of this widely distributed species in the field.

*S. setosum* is represented in herbarium collections by six collections. It is cultivated at TBGRI where it flowered in both 1996 and 1997 although, as already discussed, plants grown in cultivation cannot be used reliably to determine life history strategy (Janzen, 1976). *S. setosum* was collected in 1912 from Thalaparra, (Rama Rao 665, CAL, TBGT). The collecting details describe the locality as “Thalaparra and then down also” which may suggest widespread flowering. Vencoba Rao, 2754 (TBGT) collected the plant from Naduvathuwayhi in 1915 where it was “confined to a few places”. The most recent field collection of *S. setosum* was made from Achancovil in
1993 (Santhosh Kumar, 15546, TBGT) where the plant was described as 'common'. During a subsequent fieldtrip to Achancovil in 1997 to collect this species, no plants were found. These observations may therefore suggest that *S. setosum* does not flower annually and that the paucity of herbarium collections of this species reflects a plesesiial life history strategy.

*Stenosiphonium wightii* is known from only eight collections in the herbaria consulted during the preparation of this revision. The species was first collected in the 1830s and the paucity of collections made during the following 160 years would suggest that the species is extremely rare. The fact that this species occurs in the Agasthamalai Hills, Tamil Nadu, a region well known for its high botanical diversity and consequently the subject of extensive study over a long period (Wight, 1835, 1836; Ramaswami, 1914; Nair & Nayar, 1986; Nayar, 1996) adds further weight to this suggestion. However, Bowden (1950), collected *S. wightii* from Dhonavur (Bowden, 3 [K]), erroneously described as *Stenosiphonium parvisporum* by Bowden, and noted that the species was in 'full flower' in 1947. Furthermore, in 1997, a large population of *S. wightii* was observed flowering gregariously and in abundance over a long distance beside the road in Mundanthurai Wildlife Sanctuary (V. Chellandurai, pers. com.). These observations, coupled with the paucity of collections separated by long periods, would suggest that the apparent rarity of *S. wightii* may actually reflect a long-lived plesesiial life history strategy.

The flowering of plesesiial *Strobilanthes* follows a regular pluriannular cycle. In the southern Indian *Strobilanthes* flora, the best documented example is *S. kunthiana* (Nees) T. Anderson, the 12 year flowering cycle of which has been documented for over 150 years (Robinson, 1935; Matthew, 1971). However, estimates of the duration of the flowering cycle for most plesesiial species of *Strobilanthes* have been based on collection dates from herbarium material (e.g. Gamble, 1924). The collection dates for *S. wightii* are as follows: 1836, 1947, 1958, 1971, 1984, 1987, 1997. During 1947 (Bowden, 1950) and 1997 (Chellandurai, pers. com.) there were gregariousflowerings and from the collecting details, the 1987 collection (Subramanian 4495, Survey of Medical Plants Unit, Siddha, Palyamkottai) represents an isolated flowering individual. This is consistent with our knowledge of flowering in plesesiial *Strobilanthes* in which some individuals in a population often flower out of synchrony with the majority (e.g. Matthew, 1971; Wood, 1994). No record of relative abundance was indicated for any of the other collections of *Stenosiphonium wightii*. Disregarding the 1836 collections as too distant from the rest to be of value in assessing the flowering cycle of this species and the 1987 collection as an asynchronous flowering event, the years separating collections of *S. wightii* are as follows: 11; 13; 13; 13. Given that mass flowering typically takes place over several years rather than a single year (Wood, 1994), these intervals would be consistent with a flowering cycle of approximately 12 or 13 years duration. However, the use of herbarium material for assessing the duration of plesesiial life cycles needs to be undertaken with some caution. If there are no details on the abundance of flowering individuals at the time of collection and if visits to collecting localities are sporadic, then herbarium material can provide little if any information on the duration of the flowering cycle for plesesiial species.

In a conservation context, a plesesiial life history strategy may effect the accurate assessment of the conservation status of a species. Nayar's (1996) decision to recognize *S. wightii* as endangered was clearly based on the restricted distribution of this species coupled with a paucity of known collections. However, a knowledge of the life history of this species and in particular its recent abundant flowering in Mundanthurai...
Wildlife Sanctuary, might lead to a more appropriate classification of the conservation status of this restricted endemic. The category endangered includes taxa in danger of extinction whose survival is unlikely if the causal factors continue to operate (Walters & Gillett, 1998). Whilst both *S. setosum* and *S. wkhtii* are restricted in their distributions, both occur in protected forest areas and are periodically abundant. If the occurrence of these species in protected areas ensures the stability of their habitats and if their life history strategy is considered in the management of these areas then both are more appropriately categorized as Rare. This category includes taxa with small world populations that are at risk, but that are not at present vulnerable or endangered (Walters & Gillett, 1998).

**TAXONOMIC ACCOUNT**


*Strobilanthes* sect. *Stenosiphonium* (Nees) Terao, Unpub. thesis. MS.

Spreading or erect shrubs, to 2.5 m in height. STEM circular, sub-tetragonous to tetragonal; nodes swollen, with a prominent transverse ridge often bearing multicellular hairs tapering from stout bases; internodes sometimes grooved, glabrous or with glands, short stout hairs or long villous hairs. LEAVES opposite, isophyllous or weakly anisophyllous, petiolate; lamina narrowly elliptic to ovate; base decurrent; apex acuminate; margin crenate to serrate; lower surface glabrous or sparsely to densely covered with long fine hairs, or with stout tapering hairs along the vascular tissue, upper surface glabrous, or with few stout tapering hairs; cystoliths elongate, c. 0.1–0.7 mm long, flattened at one end and pointed at the other, prominent, particularly on upper surface, arranged randomly or sometimes radially around hairs; venation camptodrome, veins 5–8 pairs, prominent on both surfaces; leaves subtending inflorescence similar to lower leaves but sessile or sub-sessile, ovate, orbiculate or cordate, with 2–6 pairs of veins and sessile glands sometimes present on the upper surface. INFLORESCENCES terminal and axillary indeterminate thyrses, sometimes aggregated to form compound thyrses; flowers sessile, development of secondary flowers in the axils of bracteoles rare; axis glabrous, glandular hairy, or rarely with both villous and glandular hairs present. BRACCTS in opposite pairs, narrowly triangular, ovate, obovate, or elliptic, longer or shorter than the calyx; apex acute or acuminate; glandular hairy, or rarely villous hairy or glabrous outside, glabrous inside, the margin sometimes shortly ciliate; in fruit, glandular hairy or rarely with both glandular and long, fine,
eglandular hairs. Bracteoles 2, linear or linear-lanceolate; apex acute; glandular hairy or rarely villous hairy; secondary flowers present in the axils which may or may not mature. Calyx 5-lobed, subequal, connate at anthesis, accrescent and dividing in fruit; lobes linear or lanceolate; apex acute or acuminate; outside glandular hairy or rarely villose hairy or glabrous, inside the free segments pubescent; in fruit glandular hairy or rarely with both glandular and long, fine, eglandular hairs. Corolla ventricose above a narrow tube, white to pale violet; tube cylindrical and resupinate, often paler than the throat and lobes; throat recurved and ventricose; lobes 5, obtuse, 3 adaxial and 2 abaxial, with 2 dark violet spots on each adaxial lobe and one on each abaxial lobe; outside glandular hairy in bud, glabrous or sparsely glandular pubescent at anthesis, inside glabrous except for two tufts of simple stiff hairs borne on papillae between the 2 abaxial corolla lobes to retain the style. Stamens 4, didynamous, exerted, or 2 exerted with 2 (rarely 0 or 3) included staminodes, the staminodes slender with a swollen apex, or reduced to two small extensions of the staminal sheath; anthers oblong, two celled, muticous, dorsifixed approximately one third from the base; filaments glabrous, fused at the base to form a membranous sheath adnate to the corolla which may be prominently hairy or sparsely hairy only towards the base. Pollen prolate, tricolporate, pseudocolpate. Ovary 2-locular, oblong, glandular hairy at apex or glabrous. Style exserted, curved and glabrous. Stigma a single hooked and ornamented lobe. Fruit a longitudinally dehiscing 2-valved capsule, 4-sided, oblong, dorso-ventrally flattened and with a groove running down both dorsal and ventral sides. Seeds 6–8 with prominent areola and long hygroscopic hairs, borne from the base on retinacula; undeveloped seeds sometimes present in mature capsules.

**Distribution.** Southern India (Andhra Pradesh, Karnataka, Kerala, Tamil Nadu) and Sri Lanka.

**Habitat.** Evergreen and deciduous dry forest, often associated with seasonal or perennial water courses.

*Stenosiphonium* comprises three species, one widespread at low altitudes in southern India and Sri Lanka and two endemics restricted to the Western Ghats of India.

**KEY TO THE SPECIES**

1. Fertile stamens 4, didynamous; bracts obovate or elliptic often prominently 3-veined and equal to, or rarely shorter than, the calyx at anthesis ... *S. cordifolium*  
   Fertile stamens 2, bracts ovate or narrowly triangular, single veined ............ 2

2. Staminodes 2, 2–3 mm, rarely a third staminode c. 0.5 mm also present. Bracts narrowly triangular, acuminate, recurved and as long or longer than the calyx at anthesis .......................................................... *S. setosum*  
   Staminodes 2, small projections from the staminal sheath, c. 0.25 mm long or staminodes 0; bracts ovate, acute, shorter than the calyx at anthesis  *S. wightii*

*Stenosiphonium cordifolium*  
(Fig. 3)


SHRUB to 2.5 m, possibly pietesial. LEAVES weakly anisophyllous; lamina narrowly elliptic to ovate, 46–96 × 20–66 mm; lower surface glabrous or sparsely to densely covered with long fine hairs or with stout tapering hairs along the vascular tissue, young leaves usually with a dense covering of long fine hairs on the lower surface, upper surface glabrous or with few stout tapering hairs; cystoliths prominent on the upper leaf surface, arranged randomly or sometimes radially around hairs; veins prominent, 6–8 pairs; petiole 6–50 mm; leaves subtending inflorescence similar to lower leaves but sessile or sub sessile, ovate or cordate, lamina 6–72 × 5–46 mm, veins 4–5 pairs and with sessile glands sometimes present on the upper surface. INFLORESCENCE 28–90 mm; flowers widely spaced to densely packed along the inflorescence axis; axis glandular hairy or rarely with villous and glandular hairs present or glabrous. BRACTS green, obovate or rarely elliptic, 4–9.3 × 1.8–7.5 mm, equal to or rarely shorter than the calyx; apex acute or slightly acuminate; glandular hairy or rarely glabrous or villous hairy outside, the margin sometimes shortly ciliate; often prominently 3-veined. BRACTEOLES green, linear, 2.6–8.2 × 0.5–1.6 mm; glandular hairy or rarely villous hairy. CALYX green with red or brown apices, connate for more than half of their length at anthesis; lobes linear, 4.4–8 mm long, apex acute; outside glandular hairy or rarely villose hairy or glabrous, pubescent inside the free segments. COROLLA violet; tube 6–9.5 mm, paler than the throat and lobes; throat ventricose (7–13 mm); lobes 2.6–4 mm long with 2 dark violet spots present on each adaxial lobe and one on each abaxial lobe; outside of the corolla
glandular hairy in bud, glabrous at anthesis. **Stamens** 4, didynamous; anterior pair strongly exserted, posterior stamens slightly exserted; anterior anthers 1.8–2.6 mm, posterior anthers 0.8–2.0 mm; anterior filaments 5.7–16.5 mm, posterior filaments 2.6–6 mm; posterior stamens joining the prominently hairy staminal sheath at the same level as, or 0.6–1.1 mm above the anterior stamens. **Ovary** 1.5–2.7 mm long, apex glandular comose. **Style** exserted, 17–20 mm, glabrous. **Stigma** 1.3–3 mm, hooked and ornamented. 9–12 mm long, apex glandular hairy. **Seeds** 6–8, c. 1.6 mm long; undeveloped seeds sometimes present in mature capsules.

**Distribution.** India and Sri Lanka. In India, widespread throughout Tamil Nadu, extending north into Karnataka and Andhra Pradesh and west into southern Kerala. In Sri Lanka, confined to the arid and semi-arid zones.

**Habitat.** In India, occurring in dry deciduous and evergreen forest to 1300 m, often near to seasonal or perennial water courses. In Sri Lanka, often forming dominant stands in secondary forest.

**Phenology.** Flowering October–April; fruiting March–May.

A list of specimens of *S. cordifolium* examined during the preparation of this revision is provided in the Appendix.

*S. cordifolium* is distinguishable from other species of *Stenosiphonium* by the possession of didynamous stamens (Fig. 3E) and bracts which are obovate or elliptic (Fig. 3H, N), as long as or shorter than the calyx at anthesis and often with three prominent veins. This species shows considerable variation in leaf and inflorescence indumentum, variation that has previously been used to distinguish three taxa which are here recognized as a single variable species.

*S. russellianum* has here been lectotypified. Patrick Russell (1727–1805) is the eponym for *S. russellianum* and the Russell specimen in K-W, cited by Nees (1832) in the protologue has been selected as lectotype to reflect this.

Cramer (1998) lectotypified *S. subsericeum* citing a specimen in K-W (Wall. Cat. 24086). However, this number was not listed in the protologue (Nees, 1832) and in fact does not exist in either the Wallich Catalogue or in K-W. Cramer's (1998) specimen citation must therefore represent a typographic error. The following specimens from K-W were cited in the protologue of *S. subsericeum*: Wall Cat. 2416; Wall. Cat. 2408a (*ex parte*); Wall. Cat. 2408b (*ex parte*); Wight Herb. propr. N. 26 and the most obvious explanation for the error in Cramer (1998) is that Wall. Cat. 2408b has been incorrectly cited. However, this material is not consistent with the current usage of the name (e.g. Clarke, 1884). Part of Wall. Cat. 2408a is consistent with current usage and this specimen was labelled ‘b’ by C.B. Clarke. Whilst Cramer did not annotate any of the specimens in K-W, we conclude that this specimen must represent the lectotype of *S. subsericeum* selected but incorrectly cited by Cramer (1998).

*S. confertum* remains to be lectotypified. Nees (1847) cited two specimens in the protologue of this species: one collected by Robert Wight from Courtallum, Tamil Nadu, and one collected by Charles Belanger. The Wight specimen could not be located. The label of the Belanger specimen cites the collecting locality as ‘Bouton’, which could not be traced. It is unlikely that this refers to Bhutan, as Belanger did not collect in that region (Grierson & Long, 1983) and *Stenosiphonium* is in any case endemic to peninsular India and Sri Lanka. The Belanger specimen is in de Candolle’s herbarium (G-DC) and a photograph of the specimen confirms that it
Figure 6. Distribution of *Stenosiphonium cordifolium* (Vahl) Alston. Solid circles represent localities for selected collections. Indian localities are taken from Gazetteer of India and Pakistan (Director of Military Survey, 1950, 1953). Sri Lankan localities are taken from 1:250,00 scale Survey Department Maps. Empty circles represent District capitals for districts in which *S. cordifolium* has been collected but for which no precise locality details are available.

was annotated by Nees. The specimen is apparently in fruit and prominently glandular pubescent which would agree with the usage of this name. However, it is impossible to positively identify this specimen from the photograph and we have consequently refrained from designating it lectotype.

The distribution of this species is shown in Figure 6. It is widespread throughout the dry and arid lowlands of Sri Lanka and in India it is found throughout Tamil Nadu, in Andhra Pradesh south of the Godavari River, in southern Karnataka and in southern Kerala. *S. cordifolium* is absent from the Hill country in Sri Lanka and from the upper slopes of the Western Ghats in India where *Strobilanthes* forms an important component of the vegetation. Trimen (1895: 298) noted that, in Sri Lanka, *S. cordifolium* "plays the part of a species of *Strobilanthes* in the dry-country forests". In Sri Lanka, *S. cordifolium* frequently forms dominant stands in secondary forest in the arid and semi-arid lowlands, often close to water courses. In India, it is often associated with perennial or seasonal water courses in dry deciduous forest and is also found in evergreen forests in the foothills of the southern Western Ghats.


Spreading shrubs to 2 m in height, probably plietesial. Leaves weakly anisophyllous, lamina ovate 25–45 mm × 13–75 mm, glabrous above, glabrous or sparsely hairy along the veins below; cystoliths prominent and randomly arranged on both upper and lower surfaces; veins prominent, 5–6; petiole 8–35mm; leaves subtending the inflorescence similar to lower leaves but sessile or subsessile, ovate or cordate, lamina 11–35 × 7 – 20 mm, veins 2–5. Inflorescence 20–70 mm long, flowers maturing from the base and more densely clustered towards the base of the spike; axis glandular hairy. Bracts green, narrowly triangular, 3–8 mm × 1–2 mm, recurved, equal to or longer than the calyx; apex acuminate; glabrous or glandular hairy at anthesis, in fruit becoming prominently glandular hairy; single veined. Bracteoles green, narrowly triangular, 3–6 mm × 0.5–1 mm; apex acuminate; glandular hairy, more densely so towards the apex. Calyx lobes green towards the apex, pale below, narrowly lanceolate, 3–6 mm long, connate for no more than half of their length at anthesis; apex acuminate; glandular hairy outside, rarely with simple hairs inside the free segments. Corolla pale violet to white; tube 6 mm; throat 6–8 mm; lobes 3–5 mm, with two darker violet spots present on each of the adaxial lobes and one on each abaxial lobe; sparsely glandular pubescent on outer surface. Stamens 2, strongly exerted; anthers 4 mm long, yellow with a black stripe along the ventral surface; filaments 5–11 mm long, white; staminodes 2 (rarely 3), 2–3 mm, white, reaching the mouth of the corolla and ending in a slightly expanded apex, the third staminode when present c. 0.5 mm long and located between the two larger staminodes; staminodes fusing to the prominently hairy membranous sheath slightly above the stamens. Ovary 1.5–2 mm, glabrous or the apex glandular comose. Style 12–14 mm, strongly exerted. Stigma somewhat elaborated, hooked, c. 1.5 mm. Capsule 8–10 mm long, glandular hairy or glabrous at the apex. Seeds 6, c. 1.5 mm long, up to 3 seeds may fail to mature and are much smaller (less than 0.5 mm).

Distribution. India, Pathanamthitta District, Kerala and Upper Kodayar, Kanniyakumari District, Tamil Nadu.
Habitat. Evergreen forest.

Phenology. Flowering November–March; fruiting unknown.

A list of specimens of S. setosum examined during the preparation of this revision is provided in the Appendix.

S. setosum can be distinguished from other species of Stenosiphonium by the bracts which are narrowly triangular, acuminate and equal to or longer than the calyx at anthesis (Fig. 4G) and by the possession of two strongly exserted stamens and two staminodes which end in a slightly swollen apex at the mouth of the corolla (Fig. 4D). Rarely, a third staminode is present which is always smaller. The bracts are recurved giving the inflorescence a ‘wispy’ appearance (Fig. 4A) and the calyx, in contrast with other species of Stenosiphonium, has narrowly lanceolate lobes fused for no more than half of their length at anthesis (Fig. 4J).

S. setosum has here been lectotypified and a specimen in the Hooker Herbarium at Kew (G. Thomson, Strobilanthes sp. no. 67) chosen as lectotype. Anderson worked on the Kew collections prior to publication of the protologue of this species (Anderson, 1867: 425) and he annotated this specimen with the name Stenosiphonium setosum. Whilst upon his arrival at Calcutta in 1861 Anderson found that “examination of all the Indian species [of Acanthaceae] had to be undertaken again” (Anderson, 1867: 425), the epithet had already been applied to the G. Thomson specimen at Kew which has therefore been chosen as lectotype.

S. parviflorum has also been lectotypified and a specimen at CAL (G. Thomson, Strobilanthes sp. no. 68) chosen as lectotype. Two specimens were cited by Anderson (1867) in the protologue of S. parviflorum: G. Thomson, Strobilanthes sp. no. 68 and Wight, s.n. pp. Herb. Wall. n.2334. However, the Wight specimen is not conspecific with the Thomson specimen which represents the current usage of this name and the Wight specimen is therefore inappropriate for designation as a lectotype. Whilst Anderson worked on the Kew duplicate of the Thomson collection prior to publication of the protologue, he annotated this specimen with the unpublished epithet Stenosiphonium nigricans. The Calcutta duplicate whilst similarly labelled with this epithet was later corrected to S. parviflorum by Anderson, and this specimen is therefore the most suitable as lectotype.

The distribution of S. setosum is shown in Figure 7. Santhosh Kumar 15546 (TBGT) and Vencoba Rao 2754 (TBGT) were collected from the evergreen forests of Pathanamthitta District of Kerala, to the north of the Sengottai Pass. The collection at the Herbarium of the University of Kerala (Valsala Divi Kubot-16-45) is indicated separately, as the locality details for this specimen are uncertain. Collecting number and locality details were only attached to the specimen during the visit by M.A.C. to the herbarium 8 years after its collection. Inclusion of this locality extends the range of an otherwise very restricted endemic by 70 km southwards, to include Upper Kodayar, Tamil Nadu.

Irrespective of problems in accurately assessing the distribution of this species, the data show S. setosum to be endemic to the southern Western Ghats and known from very few collections (six). Following the IUCN criteria for assessment of conservation status, S. setosum should be categorized as rare.

Strobilanthes consanguinea C. B. Clarke is often confused with this species on account of the narrowly triangular and acuminate bracts and flowers possessing two stamens (e.g. Rani and Matthew, 1985). However, the two species can be easily distinguished using the following characters: in S. setosum there are six seeds (although up to three
may not mature) (Fig. 4K) whereas in *S. consanguinea* there are four; the stamens of *S. consanguinea* are included, whereas in *S. setosum*, they are strongly exserted (Fig. 4D); in *S. consanguinea* there are no staminodes whereas in *S. setosum* there are two or rarely three staminodes; the style in *S. consanguinea* is retained against the corolla by a row of simple hairs, whereas in *S. setosum* the style is retained against the corolla by hairs borne on two papillae (Fig. 4D); *S. consanguinea* lacks the sessile or subsessile leaves subtending the inflorescence found in *S. setosum* (Fig. 4A).

*Stenosiphonium wightii*

(Fig. 5)


Plietesial shrub. LEAVES, isophyllous to strongly anisophyllous, in which case the smaller leaf in each pair approx 0.4 × length of the longer leaf, lamina ovate, 35–100mm × 22–50 mm, lower surface glabrous or with stout tapering hairs along the vascular tissue, upper surface glabrous or rarely with few simple hairs; cystoliths prominent on both surfaces, sometimes arranged radially around the base of hairs.
Figure 8. Distribution of *Stenosiphonium wightii* Brernek. A, region. B, detail of southern Western Ghats showing collecting localities. Robert Wight’s Courtallum locality is not shown because of the imprecise nature of this locality (see text). The location of the settlement Courtallum is however indicated (▲). 1000 m contour line shown.

on the upper surface; veins 5–8 pairs, prominent; petiole 10–35 mm; leaves subtending inflorescence similar to lower leaves but sessile or subsessile, obovate to orbicular 15–55 mm × 15–34 mm, base cordate, apex acuminate or cuspidate, veins 4–6 pairs. Inflorescence spikes 20–70 mm long; flowers packed more densely towards the apex; axis prominently glandular hairy. Bracts ovate, 3–4 mm × 1.5 mm, shorter than the calyx; apex acute; glandular hairy. Bracteoles linear-lanceolate, 3–4 mm × 1 mm; glandular hairy. Calyx lobes linear, 5–7 mm long and connate for more than half their length at anthesis; apex acute; glandular hairy on the outer surface, sparsely pubescent inside the free segments. Corolla pale mauve to white; tube 6–8 mm; throat 10–15 mm; lobes 5–6 mm, with spots darker than the rest of the corolla; outside of the corolla glandular hairy in bud, glabrous at anthesis. Stamens 2, slightly exserted and curving upwards; anthers 2–2.6 mm; filaments 5–8.5 mm; staminodes 2 (rarely 0), c. 0.25 mm long, staminal sheath sparsely hairy towards the base. Ovary 1.75 mm long, apex glandular comose. Style exserted, 25 mm. Stigma hooked, somewhat elaborated, 0.5 mm. Capsule, 8.5–10 mm long. Seeds 6–8, 1.5 mm long.

*Distribution.* Agasthaimalai Hills, Tirunelveli District, Tamil Nadu, India.

*Habitat.* Evergreen forests.

*Phenology.* Flowering January–February; fruiting unknown.

A list of specimens of *S. wightii* examined during the preparation of this revision is provided in the Appendix.

*S. wightii* is distinguished from other species of *Stenosiphonium* by the ovate bracts which are shorter than the calyx (Fig. 5F) and the total or near total suppression of the anterior stamens (Fig. 5E). Hairs confined to the base of the staminal sheath and the orbicular outline of some leaves subtending inflorescences are also confined to this species within the genus.

The distribution of the species is shown in Figure 8. Wight’s Courtallum collections
(E, K) have not been included because 'Courtallum' corresponds to an area in the Agasthaimalai Hills of at least 20 square miles (Wight, 1836) and the precise collection locality for these specimens is therefore uncertain. As can be seen from Figure 8, S. wightii has a restricted distribution with all specimens collected from the Agasthaimalai Hills of the southern Western Ghats. The apparent rarity of this species probably reflects a plietesial life cycle as it was observed flowering gregariously in 1947 (Bowden, 1950) and in 1997 (V. Chellandurai, pers. com.). Whilst this species has a restricted distribution, it occurs in a protected area and is periodically abundant. It meets the criteria for the IUCN status category of Rare.

S. wightii was first collected from the Courtallum area of the Agasthaimalai Hills in 1836 (Wight, sn, (E)). It was collected either by Robert Wight, who made several visits to the area, or by one of the local collectors he employed to collect in the Courtallum Hills at that time (Wight, 1835, 1836; Hooker & Thomson, 1855; Desmond, 1992). Wight subsequently published an illustration and description of the plant in his Icones (Wight, 1850) as S. diandrum Nees. However, Wight’s illustration and specimens were not conspecific with S. diandrum Nees, a Sri Lankan plant described by Nees (1847) which was subsequently transferred to Strobilanthes by Alston (1931) as Strobilanthes diandra (Nees) Alston. Bremekamp (1944) proposed the new name Stenosiphonium wightii for the plant illustrated and described by Wight to clarify the nomenclatural confusion, but failed to designate a type. Wight’s specimens of S. wightii from Courtallum are at K (one in the Hooker Herbarium and two in the General Herbarium) and at E (one sheet). One of the specimens at K has here been designated as lectotype. Whilst none of the four sheets of this species from Wight’s herbarium at K and E have been annotated to indicate that the material was used for the illustration in Icones, no other collections of this species date from the publication of that work. Wight’s Icones were illustrated in India under the supervision of Wight (Desmond, 1992) and it is therefore probable that one of the specimens from his herbarium was used for the illustration. Wight’s specimens were distributed from Kew following his return from India in 1853 (Hooker & Thomson, 1855; Desmond, 1992) and the Kew specimens are therefore taken to be the top set. The specimen selected as lectotype is that which shows the greatest similarity to the illustration in Wight’s Icones (1850).

Nomina excludenda


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REFERENCES


APPENDIX: SPECIMENS SEEN

S. cordifolium (Vahl) Alston

INDIA

ANDHRA PRADESH
Chittoor Dist: Kambakkam, 1946, s.c., 431 TNV (PCM); Kambakkam, 1946, s.c., 432 TNV (PCM);

KARNATATA
Mysore Dist: Toppour, Mysore, ii. 1796, Royle, s.n. (K, LIV); Mysore, 1801, Heyne, s.n. (K).

KERA

TAMIL NADU
Chengalpattu Dist: 4 iii. 1703, s.c., n.5 (OXF); 3. xii. 1702, s.c., n.8 (OXF); 1. xii. 1703, s.c., n.10 (OXF); Vandalur, 7. ii. 1915, s.c., 11499 (MH); Tirulliagukkunram, 20 xii. 1916, s.c., 13999 (MH); Vandalur, 3. ii. 1935, E. Barnes, 1006, (K); Vandalur, 3. ii. 1935, E. Barnes, 1007 (K); Tambaram Hills, iii. 1936, E. Barnes, 1462 (K); Tambaram Hills, iii. 1936, E. Barnes, 1463 (K); Vandalur, 13. iii. 1910, A. G. Bourne, 5379 (K); xii. 1703, E. Bulkeley (OXF); Vennanguppatty, scrub jungle near Choonaumbeddu, 10 m, 8. ii. 1986, D. Narasimhann, 978 (MH); Neduungundum, nr Vandalur, 30 m, 28. ii. 1986, D. Narasimhann, 1009 (MH); Palavaram, iv. 1828, R. Wight, pp 1943 (E-GL); Malypurrooty, R. Wight, pp 1943 (E-GL). Coimbatore Dist: Manuthamalai, 600 m, 17. i. 1969, D. B. Deb, 31352 (MH); Manuthamalai, 630 m, 17. i. 1969, D. B. Deb, 31358 (MH); Tholampalaiyan, 1500 ft, C. E. B. Fischer, 1736 (CAL, K); Kundimalai 833 m, 13. xii. 1956, K. Subramanyam, 1749 (CAL, MH); Musswathy, Malay, nr. Coimbatore, R. Wight, pp Wight Cat. 2189 (CAL). Dharmapuri Dist: Harur Taluk, Kolapatty foothill forests, 325 m, 7. i. 1980, K. M. Mathew, RHT 25542 (RHT). Dindigulanna Dist: 45 km to Kodaikanal, 400 m, 23. i. 1979, L. J. G. van der Masen, 3511 (K); Kodaikanal, Laws Ghat Road, 350 m, 1. ii. 1986 K. M. Mathew and N. Rajendran, RHT 43794 (RHT); Dindigul, R. Wight, s.n. Herb. Madras, Wall. Cat. 2334a (K, K-W) Matthew and Dindigul Hills, 21. xii. 1826, R. Wight, s.n. Wall. Cat. 2334b, (Bn, K, K-W); Dindigul Hills, R. Wight, pp 1944 (E, E-GL); Pulney Hills, R. Wight, s.n. (K). Kanniyanakumari Dist: Panagudi, way to Kandaki Estate, 250 m, 4. ii. 1972, B. D. Sharma, 39915 (MH). Madurai Dist: Highways Tea Estate, 23. i. 1969, F. Blasso, HW73 (HIFP); Sirumalais, 7. xii. 1970, Jeyananthan, 12945 (RHT); Sirumalais, 5. ii. 1959, J. Pulliathaman, 4262 (RHT); Sirumalais, 5. ii. 1959, J. Pulliathaman, 4309 (RHT); Sirumalais, 3. iii. 1959, J. Pulliathaman, 4726 (RHT); Sirumalais, 4. i. 1960, J. Pulliathaman, JP 5557 (RHT); eastern slope of Marugumalai, 345 m, 16. vi. 1961, K. M. Sebastine, 12608 (MH); Alagar Hills, 133 m, 17. ii. 1958, K. M. Subramanyam, 5348 (MH). Nagappattinam Dist: Nagappattinam, 1830, R. Wight, pp 1943 (E); Nagpur Hills, 4/1877, R. Wight, pp 1943 (CAL, E); Nagappattinam, 1830, R. Wight, pp 1944 (E); Nagappattinam, R. Wight, s.n. Herb. Graham n.187 (E). Nilgiris Dist: Nilgiris, 1864, R. H. Beddome, s.n. (MH); Nilgiri Hills, v. 1853, Faulkets, s.n. (CAL, K); Kullar, x. 1889, J. S. Gamble, 21440 (K, MH); Burlur-Kallar, 650 m, 7. xii. 1971, N. C. Rathakrishnan, 39191 (MH); Mamaram to Kunjapanadram, 1666 m, 6. i. 1957, K. Subramanyam, 1982 (CAL, MH); Nellithorai Slopes, 400 m, E. Vajrayela, 43574 (MH). North Arcot Dist: Mainandur, 27. ii. 1914, s.n., 10122 (MH). Pudukottai Dist: Nanthamalai, 125 m, 22. iii. 1985, C. Anilappau, 368 (MH). Ramnathapuram Dist: Khasanapuram Bank, of Chittara River, 17. ii. 1979, N. C. Nair, 60912 (MH); Piramalai-Tirupathur, 150 m, 19. xii. 1964, K. Ramamurthy, 22782 (MH); Iyyanakool-Rajapalayam, 7. vii. 1955, J. Sakhrarama Rao, 22474 (MH); Nagariar to Sathkoi, Settur Hills, 500 m, 17. iii. 1980, S. R. Sinivasan, 65981 (MH); Nagariar to Sathkoi, Sathur Hills, 500 m, 16.3.1981, S. R. Sinivasan, 68072 (MH); Aiyankoil Forest, 12. iii. 1970, E. Vajrayela, 33656 (MH). Salem Dist: Attur Taluk, Chinnakalrayans, Mamagiri, Thumbali RF, 6. xii. 1979, K. M. Mathew, RHT 24779 (RHT); Attur Taluk, Chirinakalrayans, Mamagiri, Thumbali RF, 6. xii. 1979, K. M. Mathew, RHT 24781 (RHT); Attur Taluk, Mamalai, Mangapatty-Mamalai
70020127R (K, PDA); Wilpattu National Park, forest at the junction of road leading to Balpan Wila, 23. iii. 1968, T. Koyama and T. R. Herat, 13369 (PDA).

Locality unknown: Rayawala Dist, Bunsona (nr. Singheraja), s.c., s.n., pp CP2001, (Bm, K, PDA, US); Gardner, sn, pp CP2001 (PDA); Northern Province, 1882, M. Vincent, s.n. (PDA); Northern Province, M. Vincent, s.n. (PDA).

S. setosum T. Anderson

INDIA
Kerala, Pathanomthitta Dist: Thalaparra, Travancore, 18. xi. 1912, M. Rama Rao 665 (CAL, TBGT); Achancovil, 1. i. 1993, E. S. Santhosh Kumar 15546 (TBGT); Naduvantuwayhi, 29. iii. 1915, K. Vencoba Rao 2754 (TBGT).


Locality Uncertain: Maisor (Mysore) and Carnatic, G. Thomson Strobilanthes sp. no. 67 (BM, CAL, K, L); Maisor (Mysore) and Carnatic G. Thomson Strobilanthes sp. no. 68 (BM, CAL, CGE, K, L).

INDIA, in cultivation:
Tropical Botanic Garden and Research Institute, Palode, Trivandrum, Kerala, India, 27. iii. 1996, M. A. Carine 14 (FHO); Tropical Botanic Garden and Research Institute, Palode, Trivandrum, Kerala, India, R. W. Scotland, 208 (FHO).

S. wightii Bremek.

INDIA, Tamil Nadu, Tirunelveli District: Kodamadi, E. Barnes, s.n. (K); Sengaleri, 5. i. 1971, F. Blassen, Semk-48 (HIFP); Dhonavur, i. 1947, E. Bowden, 3 (K); Banatirtam, 8. i. 1958, P. D. Kamath 112 (PCM); Sengaleri, 25. i. 1984, N. P. Parasathathy 653 (MH); Kannikatti, 7. i. 1958, K. Rajasekaram 131 (PCM); Injikkuzhi, 21. i. 1987, M. P. S. Subramanian 4495 (Survey of Medical Plants Unit, Siddha, Palyamkottai); Courtallum, R. Wight s.n. (lecto. K); Courtallum, ii. 1836, R. Wight s.n. (E).