EDITORIAL

This part of *Curtis's Botanical Magazine* contains examples of only two genera, both particularly valuable to gardeners for their late flowering. The genus *Salvia* contains over a thousand species, and the central and South American species, which belong to subgenus *Calosphace*, are particularly dramatic in flower, those with large red flowers being adapted to pollination by humming birds. The largest-flowered of all species, the rare *Salvia dombeyi* Epling, is illustrated here.

We are fortunate to have John Wood to write the texts of these *Salvia* species which he has studied in the wild in South America. Some of the South American and Mexican salvias are hardy enough to survive mild winters in Europe, but they are at their best in almost frost-free climates, such as the Mediterranean and parts of California. Forest-dwelling species need some shade and humidity, but most are happy in a sunny place provided they get some summer watering.

The second genus included here is *Strobilanthes*, another large genus, in the family Acanthaceae, but in this case from the forests of Southeast Asia. Most species are subtropical, but a few extend into the Himalayas, and are hardy enough to survive most winters in the British Isles, and Western Europe, though not in eastern North America. John Wood is also familiar with the genus *Strobilanthes*, and as he explains, there are other species which would be worth cultivating outdoors.

We are also fortunate to have paintings of most of the species in this part by Rosemary Wise. Rosemary has been botanical artist in the Department of Plant Sciences in Oxford since 1965, and has contributed to many Oxford-based botanical publications, as well as being a regular, if occasional, artist of species figured in this magazine and other publications from The Royal Botanic Gardens, Kew.

Martyn Rix

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782. SALVIA INVOLUCRATA
Lamiaceae

John R. I. Wood and Lynsey Pink

Summary. *Salvia involucrata* Cav., the Rose-leaf sage, is a species endemic to east Mexico which has been in cultivation since at least the late 18th century. It is little-known as a native species but is widely cultivated and various cultivars and cultivated hybrids are also known. *Salvia puberula* Fern. is treated as belonging to *S. involucrata* but has been subject to different interpretations over the years.

Salvias are found in nearly all parts of the American continent apart from the polar regions and areas of lowland rain forest – the genus is virtually absent from the Amazon basin. It is most diverse in mountainous regions and, in South America, it is principally Andean in distribution with the greatest diversity in Peru, although there is a much smaller secondary area of diversity in the highlands of the Pre-Cambrian Shield of Brazil. However the centre of diversity at a continental level is undoubtedly Mexico from where well over 250 species are found, most unknown elsewhere. *Salvia involucrata* is one of the many endemic *Salvia* species from this country.

Although *Salvia involucrata* is one of the more commonly cultivated sages with recognised medical as well as horticultural value, the details of its discovery are unknown. It was described as long ago as 1793 by the Spanish botanist Antonio José Cavanilles. Cavanilles was one of a long line of Catholic botanical clergymen. Born in Valencia in Spain in 1745, he failed to secure a number of academic posts in his native Valencia and so moved to France. He lived in Paris where he came under the influence of Thouin and de Jussieu but returned to Spain after the outbreak of the French Revolution. He took up a post in the Royal Botanical Garden eventually becoming director from 1801 until his death in 1804. He was one of the first Spanish botanists to adopt the Linnaean system of classification and worked on plants from many parts of the world publishing several works of which the *Icones et descriptiones plantarum* published in parts between 1791 and 1801 was one of the most important. This provides descriptions and illustrations of plants growing wild or in cultivation in Spain. *Salvia involucrata* appears on page 3 of part one of the second volume, which was published in 1793. The

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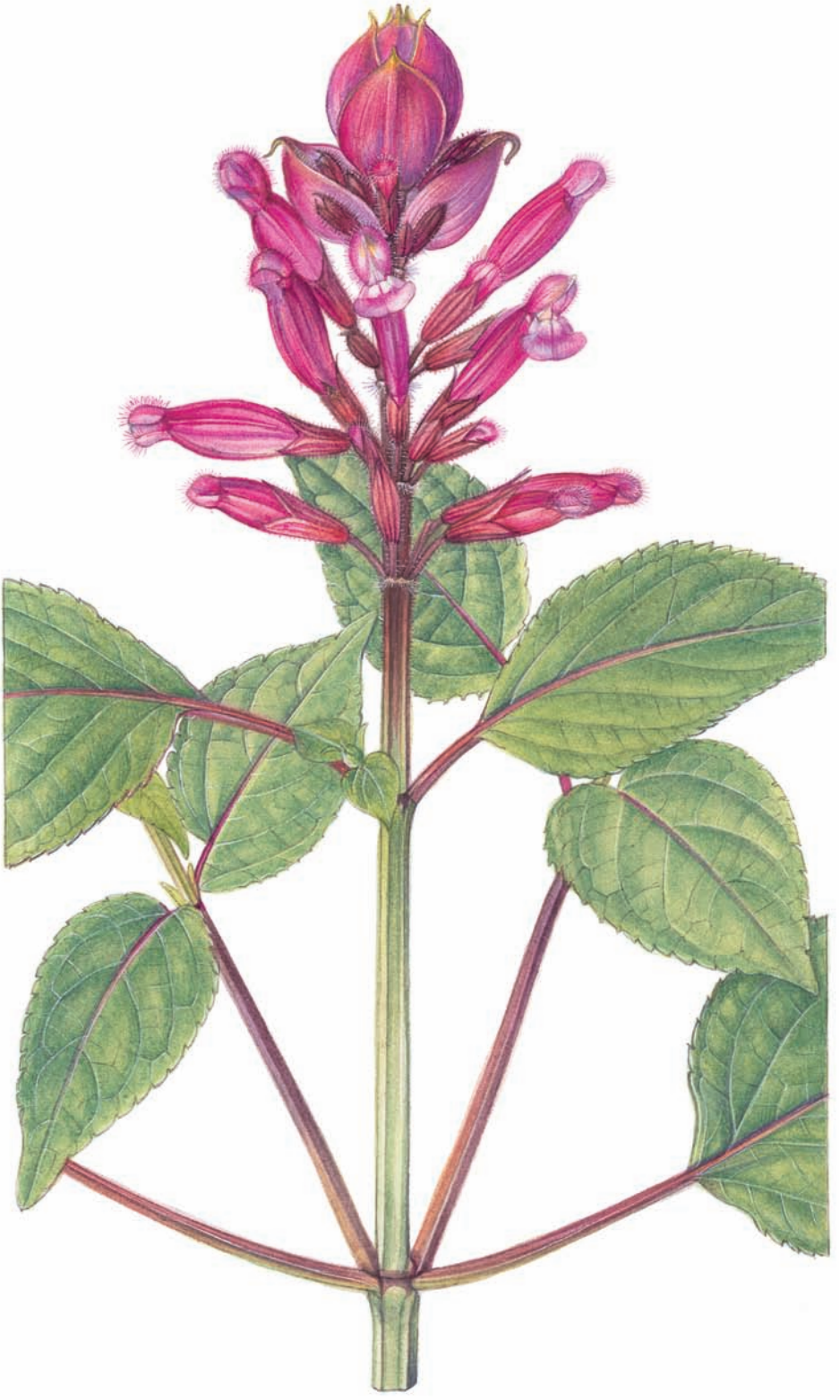

Plate 782 *Salvia involucrata* JOANNA LANGHORNE

illustrations are by Cavanilles himself and, although they have been criticised as being 'stiff mechanical engravings' they are serviceable and in our experience are quite adequate to identify the majority of species without difficulty (Fig. 1). The name *involucrata* refers to the prominent bracteoles which form an involucre around the flowers.

Cavanilles gives no information about how the plant came to be cultivated in the Royal Botanical Garden, but indicates that it originated from Mexico. It was perhaps collected by Luis Neé during the Royal Malaspina Expedition in which Haenke also participated, as described under *Salvia*×*westerae* in this part of Curtis's Botanical Magazine. As a wild plant *Salvia involucrata* is endemic to eastern Mexico where it grows in scattered locations from Nuevo Leon through Tamaulipas. Hidalgo and Vera Cruz south to Puebla with an outlying population in San Luis de Potosí. It does not appear to be very common, there being few collections in the Kew herbarium or records in the Tropicos database. It is an attractive plant with pinkish-purple corollas and leaves with pink-veined undersides. The corolla is notably swollen in the middle and it is presumed to be pollinated by hummingbirds.

Species of *Salvia* frequently appear amongst the pharmacopeia of traditional medicine. The best known and currently most fashionable is *S. divinorum* Epling & Játiva, the Diviner's sage, which can induce visions and other hallucinatory experiences, but many species including the common sage, *S. officinalis* L. are reputed to have health benefits. *S. involucrata* is no exception. In Mexico infusions have been used to treat *mal de aire,* rather vaguely described as a 'folk illness' by Jenks (2009), perhaps a psychological condition. It has also been used as a memory-enhancer and scientific studies have shown that extracts from this and other *Salvia* species contain significant amounts of cerebral cortex-relevant compounds including those with binding affinity to acetylcholine receptors (Wake *et al.*, 2000), which may have some potential use in the treatment of Alzheimer's disease and similar conditions. Research is still at any early stage and it is impossible to say at the moment whether *S. involucrata* will prove useful in the treatment of this increasingly common illness.

There has not been universal agreement about the delimitation of *Salvia involucrata. Salvia laevigata* Kunth, based on a plant collected by Humboldt and Bonpland and *S. ventricosa* Sessé & Moc. are generally

Fig. 1. Plate of *Salvia involucrata* from Cavanilles *Icones et descriptiones plantarum*, reproduced by permission of the Sherardian Library of Plant Taxonomy, one of the Bodleian Libraries of the University of Oxford.

accepted as conspecific with *S. involucrata* but uncertainty has continued over the status of *S. puberula* Fernald. This was collected in San Luis de Potosí in Mexico by the American collectors Parry and Palmer in 1878, described by Fernald in 1900 and was recognised by Epling as a distinct species in his monograph of New World salvias (Epling, 1938–1939). Epling distinguished it on the basis of its slightly larger flowers, more widely spaced whorls of flowers and a tendency towards cordate-based leaves. While Epling clearly had doubts about the distinctness of this species, it is recognised as distinct both in the Tropicos database and the Plant List. However, examination of the type specimen of *Salvia puberula* shows that it does not differ in any significant way from material called *S. involucrata* and none of the distinctions mentioned by Epling seem to be valid. We, therefore concur with Aaron Jenks (2009) in treating *S. puberula* as a synonym of *S. involucrata*.

Amongst horticulturists and *Salvia* growers *S. puberula* is a source of confusion. There are many references in the literature and on the internet to a variety *puberula* of *Salvia involucrata*, a name never apparently formally published. There are also many queries on the internet as to the difference between *Salvia puberula* or *S. involucrata* var *puberula* and true *S. involucrata*. It is difficult to evaluate the material illustrated or distributed under any of these names, but as far as can be judged from the notes and pictures these plants are mostly cultivated varieties of *S. involucrata*. This of course explains the difficulties growers repeatedly find in distinguishing *S. involucrata* from supposed plants of *S. puberula*. The confusion extends to some of the recognised horticultural varieties: 'El Butano' is often offered for sale as a variety of *S. puberula* but Thompson and Morgan, for example, list it under the name of *S. involucrata*. Similarly the variety 'Hidalgo' is offered as a variety of both *S. puberula* and *S. involucrata*, it being, of course, correctly a variety of the latter. The only variety that appears to be genuinely distinct is 'El Cielo', which has deep blue flowers and may be derived from a completely different species.

Despite this nomenclatural confusion, the rose-leaf sage, as *Salvia involucrata* is generally known, is widely grown as a garden plant and there are many named varieties in the gardens of various countries. Obviously the first record of its cultivation is in the Royal Botanical Garden at Madrid in the late 18th century, from where the type

Fig. 2. *Salvia involucrata* 'Bethellii'. Photograph by Robin Middleton.

material was collected. The oldest recognised cultivated variety is 'Deschampsiana', introduced in 1869 and particularly popular in France. It has deep somewhat reddish pink flowers. Another old variety is 'Bethellii' its first literary reference being as *Salvia bethellii* in the *Gardeners' Chronicle* of 1881 (Fig. 2), but as it is stated to be a form of *S. involucrata* the name *Salvia bethellii* is superfluous. 'Bethelii' has soft velvety leaves and distinctive ball-like buds, which open to give pinkish or purplish flowers. It originated in a garden in Suffolk and appears to be particularly popular in the United Kingdom. 'Hidalgo' is another popular cultivated variety described by Digging Dog Nursery as having 'large and rounded, dusky magenta buds that cluster at stem tips and open into brilliant pink, fuzzy tubular flowers toned down by deep purple calyxes. Handsome, dark green nearly heart-shaped leaves are arranged in pairs and complement red petioles on strong straight stalks'. Vincent Gardens describe it as having 'a brilliant rose tubular flower with dusty mauve calyxes with the flower head looking like rosebuds'. Other more recent varieties include 'Hadspen', 'Boutin' (Fig. 3), 'Pink Icicles' (Fig. 4) and 'El Butano'. All these

Fig. 3. *Salvia involucrata* 'Boutin'. Photograph by Robin Middleton.

varieties share similar characteristics and it is difficult to distinguish clearly between them. One or other variety tends to be favoured in a particular country, where it has developed a loyal following and local names may get established, for example *Salvia involucrata* is known as 'Cardenal do México' or 'Segundo Pio Corrêa' in Brazil (Jenks, 2009).

Garden hybrids involving *Salvia involucrata* are also common in the horticultural trade. Three hybrids with *S. microphylla* Kunth are 'Joan', 'Mulberry Jam' and 'Maria Rosa'. The first was grown in Australia and has been commercialised since 1990. 'Mulberry Jam' is very similar and was grown in Betsy Clebsch's garden and has been commercialised since 1995 (Clebsch, 2003). Both are more compact and upright than *S. microphylla* but have the nice pinkish-purple corolla of *S. involucrata*. 'Maria Rosa' is popular in Argentina and is reported to flower throughout the year. Another garden hybrid is that between *S. karwinskii* and *S. involucrata*. This originates from the gardens of the University of Berkeley in California, but is common whenever the two plants grow together. It is very vigorous and grows rapidly commonly reaching 2 m in height but attaining 4 m in tropical

Fig. 4. *Salvia involucrata* 'Pink Icicles'. Photograph by Rolando Uria.

conditions. It has rather brittle leaves with pink veins. Hybrids with *Salvia wagneriana* Polak are also reported and images of this appear on the internet quite frequently (Fig. 5). It is interesting that all the different species involved in these hybrids belong to the 'Fulgentes clade' as defined by Jenks *et al.* (2013) in a paper that demonstrates conclusively that the sections in which Epling (1938–1939) divided the American salvias are largely artificial, something suspected by most students of *Salvia* for many years. This suggests that hybrids

Fig. 5. *Salvia involucrata* × *S. wagneriana*. Photograph by Rolando Uria.

between *S. involucrata* and other members of this clade such as *S. wagneriana* Pol. and *S. cardinalis* Kunth are particularly easy to grow.

Cultivation. All varieties of *Salvia involucrata* like well-drained soil and flower in late summer. Humus-enriched soil, half to three quarters of the day in sun with deep watering once a week are recommended. Half strength liquid fertilizer should be applied every 2 weeks. In a mild climate *Salvia involucrata* will survive the winter outside but in the United Kingdom it will generally need to be brought inside unless growing in a very protected spot. It can survive cold or wet but not both, so English winters are not favourable. Some protection from the wet can be provided by covering the base of the plant with polythene during the winter. Some varieties appear to be hardier than others. 'Hadspen', for example, usually survives outside in the English winter, whereas the hybrids 'Joan' and 'Mulberry Jam' are much less hardy.

Salvia involucrata Cavanilles, Icon. 2: 3 (1793). Type: Plant cultivated at the Royal Botanical Garden, Madrid, of Mexican origin (syntypes MA 476225, 476226).

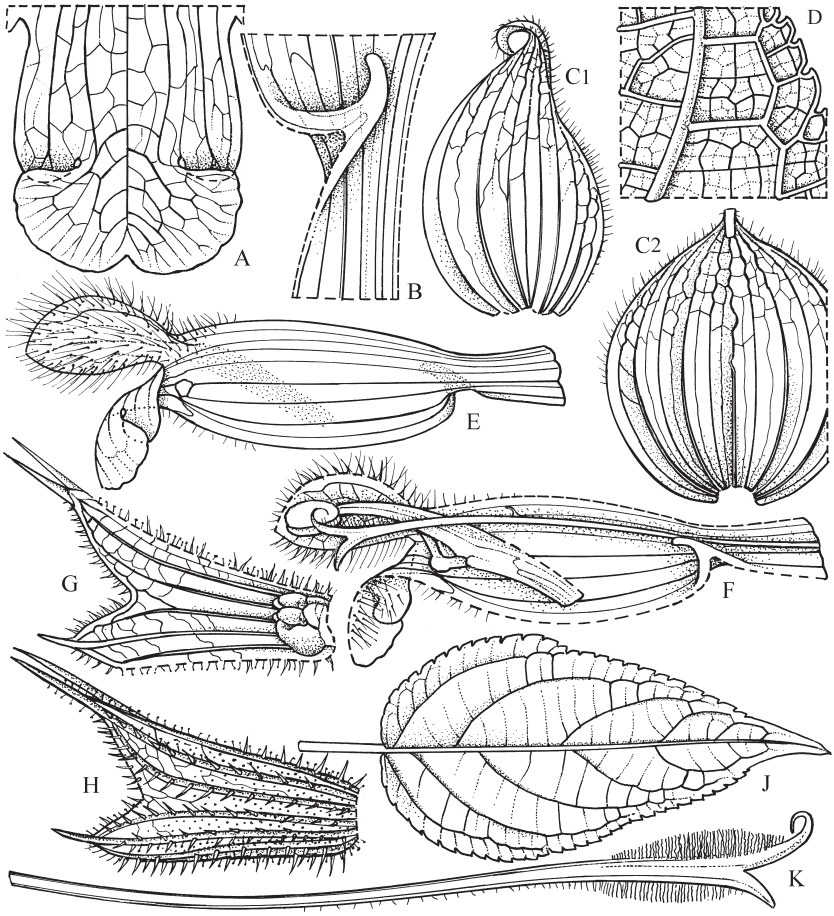

Fig. 6. **Salvia involucrata**. A, lip from above, × 5; B, fold at base of corolla, × 10; C_1 and C_2, bracts, × 1.5; D, margin of leaf, × 10; E, corolla, × 1.5; F, section of corolla, × 1.5; G, section of calyx, × 1.5; H, calyx, showing indumentum, × 1.5; J, leaf, × 0.5; K, style, × 10. Drawn by Joanna Langhorne from a plant growing at Kew.

Salvia laevigata Kunth, Nov. Gen. Sp. 2: 295 & t. 147 (1818). Type: Mexico, near Mexico City, *Humboldt & Bonpland* s.n. (whereabouts unknown, possible type plate 147).

Salvia bethellii nom. superfl. Gard. Chron. 1881 (1): 49 (fig. 10) & 51 (1881).

Salvia palafoxiana Sessé & Mociño, Pl. Nov. Hisp. 8 (1887). Type: Mexico (wherabouts unknown)

Salvia ventricosa Sessé & Mociño, Fl. Mexic. 8 (1892). Type: Mexico (holotype MA 0236, possible type).

Salvia puberula Fernald, Proc. Amer. Acad. Arts 35: 539 (1900). Type: Mexico, San Luis de Potosí, *Charles Parry & Edward Palmer* 755 (holotype GH, isotypes K, MO, NY).

Description. *Perennial* to c. 1.5(−1.8) m, of leaning habit, stem (minutely) puberulent. *Leaves* (7−)10 to 12(−15) × 6−8 cm, ovate-deltoid, shortly acuminate, serrate, base ± truncate to rounded, both surfaces minutely puberulent, beneath densely gland-dotted, paler, minutely reticulate with pale side veins, the main vein pink; petiole pinkish, 3−9 cm long. *Inflorescence* of racemes to 30 cm, the rhachis glandular-pilose; internodes up to 1−2 (6 below) cm long, c. 4 mm wide but constricted at the nodes to 2 mm; the verticillasters with 3−7 flowers; pedicels 2−11 mm; *bracts* 2−3 × 1−1.5 cm, ovate-suborbicular with a long caudate apex, pale pink; *calyx* (12−)17−18 mm long, purplish, thinly pubescent with multicellular hairs, teeth finely acuminate, upper lip 5-veined; *corolla* 4.5−4.7 cm, pubescent with a mix of large-celled hairs of different lengths mixed with short pinkish hairs; tube 20−35 mm long, upper lip c. 10 mm long, slightly exceeding lower lip, lower lip spreading, rose or purplish with a white blotch in the mouth; *style* pubescent, upper arm 4 mm long, the lower arm 2 mm long. Fig. 6.

Distribution. Eastern Mexico: Nuevo León, Tamaulipas, Hidalgo, Vera Cruz, Puebla and San Luis de Potosí.

Habitat. It is found growing between 1300 and 1900 m, almost always in mixed forest of deciduous oak and evergreen pine. Where details are provided there is a strong suggestion that it prefers steep rocky slopes, as cliff sides and ravines are frequently noted.

Flowering time. Flowers in the wild in late summer and autumn, from August to November and exceptionally until February.

Local name. *Mirta Real*.

Conservation status. Data deficient (DD). Clearly this species is widely cultivated and there is no threat to its *ex situ* conservation. However, there appears to be little information about the status of its native populations although it is found in six different states in Mexico and it seems to be easy to find by roadsides in Hidalgo according to internet reports. Nevertheless there are relatively few collections in major herbaria suggesting that the species is rarer in the wild than its relatively wide distribution would suggest.

Acknowledgements. We are very grateful to Robin Middleton (www.robinsalvias.com) and Rolando Uria (www.salvias.com.ar) for images of cultivated varieties of *Salvia involucrata* and for advice on their cultivation, Acknowledgement is also given to the Sherardian Library of Plant Taxonomy, one of the Bodleian Libraries of the University of Oxford for permission to use an image of the original plate by Cavanilles.

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783. SALVIA ATROCYANEA
Lamiaceae

John R. I. Wood

Summary. *Salvia atrocyanea* Epl. (Lamiaceae) is described and illustrated. Its discovery, natural habitat and introduction are discussed. Suggestions for its cultivation and propagation are provided.

The South American Andes are home to well over a hundred species of *Salvia*, many of which have spectacular flowers. It is, of course, a matter of opinion as to which is the most beautiful but *Salvia atrocyanea* has as good a claim as any and has the added advantage that it grows well in borders in southern England and elsewhere in temperate regions with a relatively high rainfall.

Salvia atrocyanea was first discovered in March 1902 by Robert Elias Fries during a Swedish expedition to the chaco and cordillera regions of Bolivia and Argentina. The expedition was led by the ethnographer Erland Mordenskiöld and studied ethnography and archaeology as well as biology. Although Fries came from a family of botanists the expedition seems to have stimulated his interest in botanical research as shortly after the return of the expedition he embarked on a doctorate about the alpine flora of northern Argentina and started publishing a series of botanical papers. In later life Fries travelled widely in East Africa and Europe and worked on plant geography and the taxonomy of the family Annonaceae. However, he was primarily a mycologist and his collection of this spectacular *Salvia* languished unnoticed in the herbarium of the Swedish Museum of Natural History in Stockholm until 1936 when it was described as a new species by Carl Epling, the epithet *atrocyanea* being chosen to describe the dark blue corollas, which are distinctive for this species.

In his monograph of Salvias (1938–9), Epling placed *Salvia atrocyanea* in section Coeruleae together with two other blue-flowered species, which are widely cultivated, *Salvia ianthina* Otto & A. Dietr.and *Salvia guaranitica* A. St.-Hil ex Benth. – two that may well represent the same species under different names, the former not being known in the wild. This group is characterised by the blue corolla, calyx with seven veins on its upper lip, included stamens and pilose style.

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However the broad persistent bracts of *S. atrocyanea* are so different from those of *S. guaranitica* that it is difficult to believe the two species are closely related. However, Epling's classification of the American Salvias is very out of date and recent molecular studies (Jenks *et al.*, 2013, show that his sections are nearly all artificial. *Salvia atrocyanea* comes out in a clade with many other South American species but the resolution is not sufficient to be certain of its precise relationships. In any case it is clear that a comprehensive modern infrageneric classification of American *Salvia* is still somewhat distant.

Fries discovered *Salvia atrocyanea* near the small village of Narvaez, which lies to the east of Tarija in the southern Bolivian Department of the same name. Although we now know that *Salvia atrocyanea* is widely distributed along the eastern slopes of the Andes from about the latitude of Santa Cruz in Bolivia into northern Argentina, it does not appear to have been collected again in Bolivia for nearly a hundred years despite its spectacular inflorescence. This reflects the almost complete neglect of southern Bolivia by botanists until quite recent times. The only botanist to collect extensively in this region until the late 20th century was Karl Fiebrig and he unaccountably missed this species even though he visited areas where it is now known to grow. I myself first saw *Salvia atrocyanea* in late January 1994 growing in dense scrub beside a stream below a wet meadow on a ridge between the small towns of Padilla and Monteagudo, which lie to the east of Sucre. The area is quite prosperous because of its potato production which here depends on rainfall rather than irrigation, a fact which gives an idea of the sort of climate favoured by *Salvia atrocyanea*. The *Salvia* seems to flourish where potatoes do well. Once I had got my eye in. I kept finding it in every scrubby gully in the zone wherever there were damp forest relics.

Despite its description as a new species in 1936 and its very distinctive inflorescence, *Salvia atrocyanea* remained poorly known so when it was collected in northern Argentina in the Los Toldos region close to the Bolivian border it was described again as *Salvia meyeri* by Pablo Legname (1962), who named it after the botanist who accompanied him when they made the type collection. Unfortunately this name appears to be being used on the internet for a quite different Argentinian species and it may be some years before this confusion is resolved. The salvias that grow in the Andes of northwest Argentina

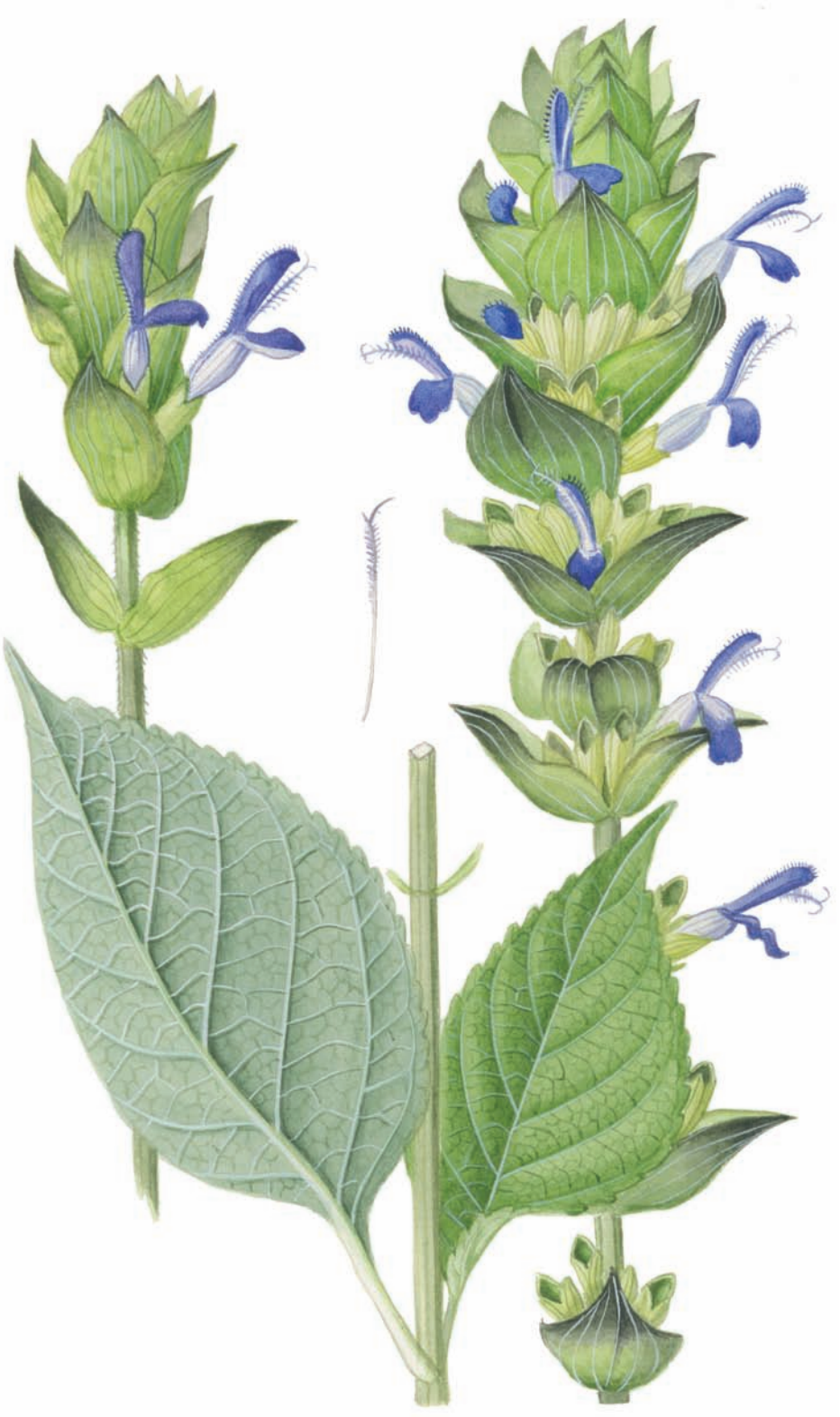

Plate 783 *Salvia atrocyanea* ROSEMARY WISE

merit a thorough revision as it is not clear how many species are involved and what names should be applied to them.

Salvia atrocyanea is a characteristic species of the Andean hill forest formation, which bears the name Bosque Tucumano-Boliviano or variations on this name, depending on the nationality of the author. It is typical of the moister areas that occur at elevations between 2000 and 2500 m and are sometimes described as *bosque montano*. These are quite frequently covered in low cloud and receive periods of drizzle even during the relatively dry winter period. They extend in a north-south direction from west of Santa Cruz at about 18°S to around 30°S in the San Miguel de Tucuman region in Argentina. Although cool in the drier winter season, frosts are rare and not very severe. Even today this region of southern Bolivia remains poorly explored botanically and constitutes one of the more accessible regions where new plant species are to be found relatively easily.

The *bosque montano* formations are not continuous but occur as isolated patches along this north south axis. The best examples that I know in Bolivia are in Chuquisaca Department above the village of Nuevo Mundo in Boeto Province and in the Protected area of El Palmar in Zudañez Province, but there will be other good examples in more inaccessible areas. *Salvia atrocyanea* is common in both these forest areas. Characteristic trees are the conifer *Podocarpus parlatorei* Pilg., *Alnus acuminata* Kunth, both mentioned by Friis on his original label as species associated with *Salvia atrocyanea* (Epling, 1938–9), the 'cedar' *Cedrela lilloi* C.DC. and the southern walnut *Juglans australis* Griseb., while common shrubs include *Crinodendron tucumanum* Lillo and *Myrcianthes pseudomato* (Legrand) McVaugh. *Salvia atrocynanea* usually occurs in moist gullies, often where disturbed and commonly in scrub in partial shade. At El Palmar it is quite common on steep slopes in the understorey under the endemic Palm, *Parajubaea torallyi* (Mart.) Burret (Fig. 1).

Salvia atrocyanea is a very attractive species as it produces long, somewhat one-sided and drooping racemes of large dark blue flowers (Figs 2 & 3). It is extremely distinctive partly because of the very long inflorescence but more particularly because of the broad persistent bracts – in most South American species the bracts are relatively small, caducous and often ephemeral. The corolla is 3–4 cm long, strongly 2-lipped, its deep blue contrasting with the large gaping green

Fig. 1. *Parajubaea torallyi* woodland at El Palmar, Presto, Bolivia; *Salvia atrocyanea* grows in forested gullies in this kind of seasonally moist forest. Photograph Darwin Initiative Project 162/11/010.

calyx. The bracts are large, persistent and often turn dark blue when mature. It is a hummingbird pollinated species and even in cultivation in North America it is reported to be visited by hummingbirds in search of nectar.

Salvia is similar to many South American genera in having flowers that clearly show adaptation to different pollinators. The genus *Ruellia* L., for example, has three different corolla types in Bolivia. There are species like the widespread *Ruellia brevifolia* (Pohl) C. Ezcurra which have tubular red corollas and are pollinated by hummingbirds. There are a small number of species that have white corollas with long tubes and open at night and are presumably moth pollinated. Finally there is a large group of species with blue corollas having a broad mouth and a short basal tube, which are adapted for bee pollination. In *Salvia* there are many species such as the common *Salvia rypara* Briq. with blue corollas having a short basal tube and a broad lower lip which appears to be adapted to function as a platform for bees seeking nectar. There are two forest species with white or

Fig. 2. *Salvia atrocyanea* flowers from El Palmar, Presto, Bolivia. Photograph Darwin Initiative Project 162/11/010.

pallid corollas (*Salvia alba* J.R.I. Wood and *S. amplifrons* Briq.) whose pollinator cannot be confirmed although they are treated as being bee-pollinated by Wester & Claußen-Bockhof (2011), and perhaps the rarity of blue-flowered salvias that grow in woodland is significant in some way. The other large group consists of those species which are bird pollinated. Of these all that grow in Bolivia, except *S. atrocyanea* have tubular red flowers.

The deep blue tubular flowers do crop up in other genera. The closest obvious parallel is the Bolivian endemic *Lepechinia bella* Epl., which is commonly misidentified as a sage but has four stamens. Another common Andean species with similar deep blue flowers is *Brachyotum microdon* (Naudin) Triana in the Melastomataceae. In this case the separate petals are inrolled to form a tube and the calyx is a striking and presumably attractive red colour. It is not clear, however, why deep blue bird-pollinated flowers are so uncommon. Fourteen are listed by Wester & Claußen-Bockhof (2011), approximately 8% of the total. They may attract only a limited number of hummingbird species.

Fig. 3. Hirsute variant of *Salvia atrocyanea* from Nuevo Mundo, Villa Serrano, Bolivia. Photograph Beth Williams.

Cultivation. It is not known when *Salvia atrocyanea* was first taken into cultivation or from what source although this probably took place during the last 25 years as it was scarcely known before 1990. In the United Kingdom it was first offered for sale from a single nursery in the Royal Horticultural Society's Plant Finder 1993/1994 edition, but is now commonly cultivated in North America and Australasia as well as in Europe. In the United Kingdom it is now grown in well-known gardens such as the Oxford Parks and Hinton Ampner in Hampshire and is widely available through the horticultural trade with 16 nurseries stocking it in the 2012/2013 edition of the RHS Plant Finder. However, it is not cultivated in its native Bolivia or Argentina, unlike *Salvia dombeyi* Epl. and *Salvia oxyphora* Briq.

In cultivation *Salvia atrocyanea* appears to flourish in moderately damp, temperate climates where frosts are not very severe. It makes an attractive and successful perennial border plant in southern England and France. It is a large plant reaching about 2 m in height but dies back to the base with the first frosts, something it also does during the winter in its native habitat in the absence of frost. It produces a small

Fig. 4. *Salvia atrocyanea* growing near Vallegrande, Bolivia, in a disturbed gully, derived from Tucuman-Bolivian forest, a common habitat today. Photograph John Wood.

underground tuber from which the plant will sprout the following spring. Some growers recommend it be protected with straw in the first years while the tuber is relatively small; it is vulnerable in unusually cold wet winters but usually overwinters successfully. In dry spells during the growing season it will need watering. It can be propagated by seeds or cuttings and does equally well in sun or partial shade. In cultivation in the northern hemisphere it flowers in late summer from August to October.

Salvia atrocyanea Epling, Synopsis of the South American Labiatae, Rep. Spec. Nov. Reg. Veg. Beih. 85: 98 (1936). Type: Bolivia, Tarija, Narvaez, *R.E. Fries* 1282 (holotype S, isotype B).

Salvia meyeri Legname, Lilloa 31: 245. Type: Argentina, Salta, Los Toldos, *Meyer, Cuezzo & Legname* 20505 (holotype LIL).

Description. Robust leggy *perennial*, 1–2(–3) m high. *Stem* strongly quadrangular, becoming slightly woody below when old, rootstock with small tubers. *Leaves* 5–16 × 3–9 cm, ovate or ovate-elliptic, acute, margin serrate, base

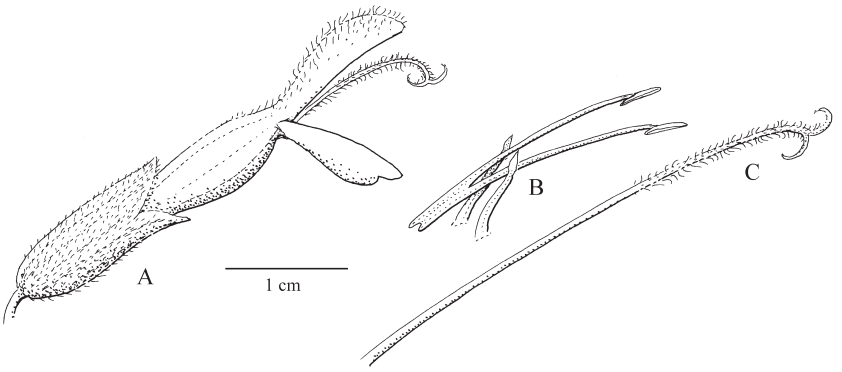

Fig. 5. **Salvia atrocyanea.** A, corolla and calyx, × 2; B, stamens and connective, × 2; C, style, × 2. Drawn by Rosemary Wise from *J.R.I.Wood et al.* 19558 (K).

attenuate onto the petiole or (rarely) ± truncate, thinly to densely pubescent on both surfaces but distinctly paler beneath; petiole 0.3–2 cm. *Inflorescence* of long, simple terminal racemes 5–30 cm long, the vertillasters dense, 6–10-flowered, imbricate and congested, the lowermost separated by up to 2 cm; *bracts* 1.5–2.5 × 1.5–3 cm, persistent, broadly ovate, acute to shortly acuminate, entire, amplexicaul, becoming dull violet in the sun, subglabrous (Fig. 2) to densely and softly pubescent (Fig. 3); *pedicels* 2–5 mm long; calyx 12–18 mm long, pale green, subglabrous to densely and softly pubescent, the upper lip indistinctly 7-veined; *corolla* 3–4 cm long, dark blue with a white throat, densely pubescent upper lip 1.5–1.8 cm long, exceeding the strongly deflexed lower lip; *stamens* included, the staminal connective with a large tooth-like structure on the abaxial side; *style* pilose, shortly exserted, the upper arm longer than the lower. *Nutlets* 3 × 2 mm, oblong-elliptic, smooth, olive-green turning pale brown (Fig. 5).

Distribution. Endemic to the Tucuman-Bolivian forest region of the eastern Andean slopes of southern Bolivia and northern Argentina extending from Vallegrande west of Santa Cruz (18°30′S) to the Los Toldos region of Argentina (23°S).

Habitat. Characteristic of moist montane woodland enjoying frequent cloud cover in Tucuman-Bolivian forest between 2100 and 2700 m. It is most characteristic of woodland gullies with a degree of disturbance and light but also occurring in the understorey of mature woodland.

Flowering time. This species begins to grow in the southern hemisphere spring and usually begins to flower in February continuing until May. There is some variation depending on the date of the onset of the spring rains, flowering being delayed in years when the onset of rain is late.

Conservation status. Least Concern. There are numerous, if somewhat isolated populations and the plant is tolerant of moderate disturbance, possibly even benefitting from the increased light that results (Fig. 4).

Acknowledgements. I would like to thank many Bolivian botanists, particularly those from the herbarium in Sucre (HSB), who accompanied me on various field trips which helped to show the extent of the distribution of this species in southern Bolivia. I am also grateful to my namesake John Wood of Hinton Ampner Garden in Hampshire, who generously discussed the cultivation of *Salvia atrocyanea* with me.

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784. SALVIA × WESTERAE
Lamiaceae

John R. I. Wood

Summary. *Salvia* × *westerae* is described and illustrated, its floral characteristics being contrasted with those of its parents. The characteristics and distribution of the parent species, *Salvia haenkei* and *S. orbignaei*, are discussed and short biographies of their eponymous discoverers, Haenke and D'Orbigny are provided. Pollination syndromes in American *Salvia* are briefly discussed and the rare occurrence of natural hybrids in the Americas is noted.

Salvia haenkei Benth. and *Salvia orbignaei* Benth. occur naturally in the dry inter-Andean valleys in Bolivia. They are locally common and can be conspicuous during the summer rainy season as both often grow gregariously. They occupy slightly different habitats. *Salvia orbignaei* is a Bolivian endemic that grows on open slopes with sparse scrubby vegetation in the central Andean dry valleys. *Salvia haenkei* has a slightly wider distribution extending to southernmost Peru and is more typical of slightly moister, more bushy habitats like the sides of scrubby gullies. In a few places the two species grow together and here hybrids between them may be found.

I first came across these hybrids returning to Bolivia's legal capital, Sucre, from the famous Sunday market at Tarabuco in January 1994. Both *Salvia haenkei* and *S. orbignaei* were flowering on the rocky hillsides, the first conspicuous with its red flowers and the second with its large pink flowers. Then I noticed some plants apparently intermediate in colour and on closer examination found that the leaves too were intermediate in size and indumentum. I collected some samples (*Wood* 7878) and, on returning to Sucre where I lived at the time, I was able to see that these intermediates had a sparsely pilose style. This is a useful diagnostic character because *S. haenkei* has a glabrous style, whereas in *S. orbignaei* the style is densely pilose. The sparsely pilose style served to convince me that I had indeed found the hybrid between the two species.

Over the next 10 years I found hybrids in other locations where the two species grew together both in a number of places near Sucre (Fig. 1) and in a number of locations in the neighbouring department of Cochabamba. It appeared that the hybrid occurred in any

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Plate 784 *Salvia* × *westerae* (right), with *S. haenkei* (upper left), and *S. orbignaei* (lower left) ROSEMARY WISE

place where *Salvia haenkei* and *S. orbignaei* grew together. It was also obvious that there were hybrid swarms in some locations, as plants both intermediate and relatively close to one or other of the parents were present. Finally in March 2002 I went with Petra Wester to a mixed population above Arani in Cochabamba Department, where she made some of the studies which led to a series of publications on *Salvia haenkei* and the hybrids with *S. orbignaei* (Wester & Claßen-Bockhoff, 2002; 2006a). The type of *Salvia* × *westerae* was collected at the same time.

Before this, naturally occurring hybrids have rarely been reported for *Salvia* in the Americas. Epling (1947) discussed in detail the hybrid between *Salvia apiana* Jeps. and *S. mellifera* Greene in California, but I have seen few other references. As far as I am aware the first report from South America was from Colombia of hybrids between *S. cyanescens* Epling and *S. rubescens* Kunth subsp *colombiana* (Epling) J.R.I. Wood & Harley. Both these species are bird pollinated, the former blue-flowered and the latter red-flowered. The hybrid was growing with the parents and there was some evidence of backcrossing (Wood & Harley, 1989: 222). The only subsequent report of an entirely naturally occurring hybrid was also from Colombia. Fernandez-Alonso (2008) described the natural hybrid between the two bee-pollinated species, *Salvia sagittata* Ruiz & Pavon and *S. scutellariodes* Kunth, naming it *S.* ×*nariniensis* Fern. Alonso. It was found only once near Ipiales on the border of Colombia and Ecuador but was subsequently cultivated in Bogotá. He has also reported other hybrids from Colombia (Fernandez-Alonso, 1991; 2008) but these were not entirely natural. The first, *Salvia* × *rociana* Fern.Alonso, was spontaneous but questionably natural as only one of the parents involved (*S. pauciserrata* Benth.) is native to Colombia whereas the other was the widely cultivated species of Brazilian origin, *S. splendens* Sellow ex Schult. A further hybrid species described in 2008, *Salvia* × *tunicamariae* was also spontaneous, but arose in the unnatural setting of the experimental beds of the Universidad Nacional in Bogotá, although both parents, *S. rubescens* Kunth and *S. chicamochae* J.R.I. Wood & Harley were Colombian natives. These are to some extent less interesting since hybrids between salvias in cultivation are anecdotally reported on the web and amongst growers as occurring frequently. It thus appears that *Salvia* × *westerae* J.R.I. Wood is only the third

Fig. 1. Habitat of *Salvia* × *westerae* near Sucre, where growing in the protection of spiny *Kentrothamnus weddellianus*. Photograph John Wood.

Fig. 2. *Salvia haenkei* showing distinctive red flower colour and short deflexed lower corolla lip. Photograph Darwin Initiative Project 162/11/010.

example of an entirely natural hybrid occurring in the wild in South America.

Two further observations are of more than passing interest. Fernandez-Alonso (2008) noted that the hybrids were generally more vigorous and more attractive than either of the parent species and this appears to be true of *Salvia* × *westerae* as well, several growers having commented on this. It is also worth noting that all the hybrids discussed in the previous paragraph were between species from different sections within Epling's (1938–9) classification. This strongly supports the notion that Epling's classification is unnatural and a modern infrageneric classification of *Salvia,* which makes use of molecular studies, is required. A recent paper by Jenks *et al.* (2013) confirms these observations, although we are clearly some way from having a comprehensive new infrageneric classification of the genus.

The two parent species of *Salvia* × *westerae*, *S. haenkei* and *S. orbignaei*, were named after the first two naturalists to make significant botanical discoveries in Bolivia, Thaddaus Haenke and Alcide D'Orbigny.

Fig. 3. *Salvia orbignaei* showing distinctive pink flower colour and long spreading lower corolla lip. Photograph Darwin Initiative Project 162/11/010.

Haenke was born in 1761 in what is now the Czech Republic, but at that time part of the Austrian Empire. He secured a place on an expedition which was sponsored by the Spanish Government and led by Alessandro Malaspina. Haenke left Spain after the main expedition group and was shipwrecked off Uruguay. He swam ashore near Montevideo before making his way overland to join the expedition in Peru. He then travelled with the expedition around the Pacific Ocean but stayed behind in South America as 'royal botanist' when the rest of the expedition headed back to Spain. When he was eventually ordered back to Spain in 1810 it was too late, as he was trapped in South America by a revolution. He acquired an estate at Yuracaré near Cochabamba in Bolivia where he died in 1816. It seems likely that he found *Salvia haenkei* somewhere near Cochabamba and the specimen made its way to Kew where it was described by Bentham in his monograph of Labiatae.

Haenke is largely forgotten today but D'Aubigny is much better known both in Bolivia and his native France. There are books by and about him, and in Cochabamba the Natural History Museum, a school and a street are named after him, Haenke having to make do with only a street. D'Aubigny was 'naturaliste voyageur de Museum d'Histoire Naturelle' of Paris in South America from 1826 to 1833, during which time he stayed some three years in Bolivia. He was commissioned by the then Bolivian President, Andres de Santa Cruz, to make a survey of Bolivia's natural resources during the course of which he visited nearly all parts of Bolivia including the then almost unknown eastern lowlands. On his return to Europe he published his results in a nine volume work entitled *Relation du Voyage dans l'Amérique Méridional pendent les années 1828–1833* and subsequently became an eminent palaeontologist. Throughout his travels he made plant collections which eventually made their way to the Natural History Museum. Amongst these was the *Salvia* which Bentham described as *Salvia orbignaei*.

Although *Salvia orbignaei* and *S. haenkei* fairly frequently grow together and share many common features they exhibit some fundamental differences particularly in their pollination mechanisms. Both are perennial undershrubs and are locally common in the inter-Andean dry valleys of Bolivia. Flowering in both species is triggered by rain and so they are usually found in flower during the

southern hemisphere summer from December to April, although occasional flowers may be found after any period of unseasonal rain. The calyces of both are similar in size, the upper lip with seven veins, and both have conspicuous brightly-coloured tubular corollas that have evolved for pollination by hummingbirds. There are a number of superficial differences. *Salvia orbignaei* rarely exceeds a metre in height, its leaves are greyish in colour, densely and softly pubescent on both surfaces, narrowly oblong in shape, not much more than a centimetre in width. In contrast *Salvia haenkei* is more robust, commonly being 1–2 m in height and occasionally even more, its leaves are characteristically dark green and nearly glabrous on the upper surface and white-felted beneath, usually with some branched hairs, although the lower surface is often greenish on plants growing in shade. The leaves are commonly 1–4 cm wide and lanceolate or oblong-lanceolate in shape narrowing towards the apex.

The more important differences between the two species lie in the corolla (Wester & Claßen-Bockhoff, 2002). In *Salvia orbignaei* (Fig. 3 & 4) the corolla is pink or pinkish-purple and strongly 2-lipped. At 15–18 mm the upper lip is quite long, while the lower lip is spreading or weakly bent downwards and not much shorter at 10–13 mm in length. The corolla tube has a distinct ventral bulge covering the area where nectar is stored. The anthers are included in the upper lip and there is a distinct tooth on the connective inside the corolla, the sterile extension functioning as a lever to enable the two fertile anthers to deposit pollen on the head of any hummingbird inserting its beak into the corolla in search of nectar. The style is hairy and very shortly exserted, the two arms being relatively long and recurved.

In *Salvia haenkei* the corolla is red and less obviously 2-lipped (Fig. 2 & 4), the upper lip 5–8 mm long and the strongly deflexed lower lip only 1–2 mm in length. The corolla is narrowly tubular and lacks a distinct ventral bulge. The anthers are exserted but there is no tooth on the connective, an absence that led Epling (1938–9) to place *Salvia haenkei* in a different section of the genus from *S. orbignaei*. The staminal extensions are present but cannot function as levers as they are closely attached to the narrow corolla tube. However, as the nectar is present at the base of the corolla tube the hummingbird will pick up pollen on its head feathers as it inserts its beak deep into the narrow corolla tube (Wester & Claßen-Bockhoff, 2006a). In *Salvia*

haenkei the style is glabrous, exserted, the arms filiform and unequal, one being very short.

Salvia × *westerae* is named after Petra Wester, who has made an intensive study of pollination mechanisms in *Salvia* (Wester & Claßen-Bockhoff, 2002; 2006a, 2006b; 2007), which has done much to enhance our understanding of pollination in *Salvia* and in particular pollination in new world species. Early in 2002 she accompanied me on a field trip in which she studied a population of *Salvia haenkei*, *S. orbignaei* and their hybrids above Arani near the community of Kewiñal on the road to Mizque in Cochabamba Department (Wester & Claßen-Bockhoff, 2002; 2006a). At the present time Petra is continuing her studies of pollination syndromes but in South Africa where she has worked for several years.

Introduction And Cultivation. *Salvia haenkei* is fairly easy to grow and has been quite widely cultivated. I saw excellent examples, for example, in the borders at the Paris Natural History Museum in 2012. However, it is not the most attractive Salvia as the flowers are somewhat hidden by the very leafy stems. *Salvia orbignaei* appears to be rarely cultivated and flowers late in cultivation in cooler countries and dies early. There are very few offers of this plant in the horticultural trade. The hybrid *Salvia* × *westerae*, however, seems to combine the best features of its two parents. It is reported to be easy to cultivate like *S. haenkei* but is 'nicer than either parent … with large dark pink flowers ….. profuse and long blooming' (http://www.fbts.salvia-x-westerae.html, retrieved January 20, 2013) and 'the flower colour is really beautiful, better than either parent. Its hardiness is borderline (in England) but it does set a few seeds and cuttings can be overwintered' (http://www.robibssalvias.com/htms/westerae.htm, retrieved January 20, 2013). It appears to be easy to propagate from cuttings and thrives best in well-drained soil, which should be kept moist during the flowering season. It has a tendency to flop over and is best grown with some kind of support.

Salvia × **westerae** J.R.I. Wood, Kew Bulletin, 62: 195 (2007). Type: Bolivia, Cochabamba, Arani, *J.R.I.Wood* 17171 (holotype K, isotypes BOLV, LPB).

Description. Aromatic *undershrub* 0.5–1.25 m, growing in the presence of parents; *stem* quadrangular, when old brown and bifariously pubescent, when young grey-green and densely glandular pubescent. *Leaves* petiolate,

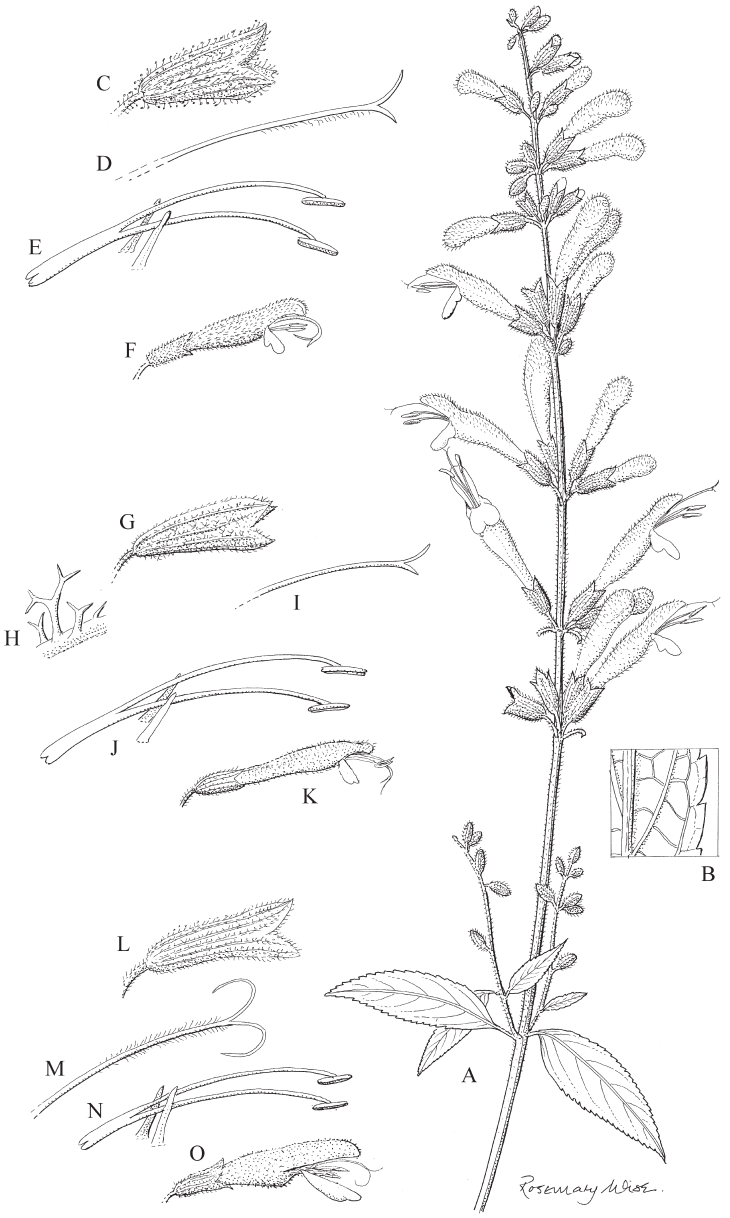

Fig. 4. **Salvia × westerae:** A, habit × 1; B, lower surface of leaf × 5; C, calyx × 3; D, style × 3; E, anthers and connective × 3; F, corolla × 3. **Salvia haenkei:** G, calyx × 3; H, branched hairs × 60; I, style × 3; J, anthers and connective × 3; K, corolla × 3. **Salvia orbignaei:** L, calyx × 3; M, style × 3; N, anthers and connective × 3; O, corolla × 3. Drawn by Rosemary Wise. A–F from *J.R.I.Wood* 7878 (K), G–K from *J. Solomon* 5099 (K), L–O from *J.R.I.Wood* 7721 (K).

2.5–6.5 × 0.5–2 cm, ovate, acute, serrate, base cuneate, adaxially green, shortly pubescent, abaxially white-tomentose to whitish-puberulent, venation ± reticulate; petioles 1–10 mm. *Inflorescence* of terminal racemes up to 15 cm in length, all parts glandular-pubescent; verticillasters up to 5-flowered, up to 2.5 cm apart below, c. 5 mm apart and somewhat congested above, pedicels 3–4 mm, persistent after the flowers have fallen; *calyx* 2–lipped, 9–11 mm long in flower, accrescent to 11–13 mm and purplish in fruit, upper lip 7-veined, pubescent; *corolla* tubular, pinkish-red, 3.3–4 cm long from base to apex of upper lip; tube c. 2.5 mm wide at base, widened from mouth of calyx to 6 mm at division into lips, upper lip straight 7–10 mm long, lower lip deflexed 0.5–0.7 mm long; *filaments* glabrous, anthers strongly exserted, 2 mm long; *style* thinly pilose, strongly exserted, arms unequal, the longer 2 mm, the shorter half its length. Fig. 4.

Distribution. Occurs spontaneously in the presence of both parents in suitable locations in the two Andean Departments of Chuquisaca and Cochabamba in the central region of Bolivia (Wood, 2007). It might be expected in a few places in neighbouring Potosi Department where both parents occur.

Habitat. On open stony hillsides between 2600 and 2800 m in the inter-Andean dry valleys of Bolivia. Common associates include *Baccharis* spp., *Kentrothamnus weddellianus* (Miers) M.C. Johnst., *Lycianthes lycioides* Hassl. and *Vassobia fasciculata* (Miers) Hunz (Fig. 1).

Flowering Time. Flowers during the summer rainy season from December to March.

Conservation Status. Data deficient. The hybrid is relatively uncommon only occurring in places where both parents are present. There are some five known populations but there is no reason to believe that others do not occur and it may prove to be of frequent occurrence. Certainly I have never failed to find it in places where both parents are present.

Acknowledgements. I would like to thank Petra Wester for accompanying me in the field and generously sharing her expertise on *Salvia* pollination.

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785. SALVIA DOMBEYI
Lamiaceae

John R. I. Wood

Summary. *Salvia dombeyi* Epl. is described and illustrated. Biographical information is provided about the adventurous life of Joseph Dombey after which this species is named. It is remarkable for having the largest corolla of any *Salvia* and is mysterious for being unknown in the wild. It has uses in traditional medicine as well as potential in the treatment of a variety of ailments. Unverifiable myths associate it with religious uses in areas formerly ruled by the Incas.

Salvia dombeyi is a remarkable plant. It has the largest flowers of any species of *Salvia*. It is one of the very few species that is scrambling in habit and it does not appear to set seed. It was first found in Peru in the late 18th century by Joseph Dombey on steep slopes between Tarma and Huichay in the Peruvian Andes some 50 km north east of Lima in what is now the province of Junin, but it has never certainly been found growing in the wild.

Dombey had the kind of adventurous life which makes that of a 21st century botanist look very tame; however, his experience of getting permission to collect plants, difficulties in transporting his collections back to Paris, the obstacles thrown in his way by government authorities and the professional jealousies of colleagues may not be quite so unfamiliar today. He was born in France in 1742 and acquired a good knowledge of botany at Montpellier before graduating in medicine. He then moved to Paris becoming assistant to de Jussieu and working in the Jardin des Plantes. In 1777 he left France on an expedition to South America reaching Peru in 1778 having secured permission to collect from the Spanish authorities on condition that half of his collections went to Spain. In 1780 he sent part of his collections back to France, but the vessel in which they were being transported was captured by the British so the specimens ended up in the Natural History Museum in London. A further set of specimens and drawings was seized by the Spanish colonial authorities and eventually made their way into the hands of Ruiz and Pavon. Dombey then travelled to Chile using his expertise to help mining projects, before returning to Europe in 1785. On arrival at Cadiz his specimens were impounded by the Spanish authorities and

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he was imprisoned, only being released on promising not to publish his discoveries before Ruiz and Pavon. He eventually succeeded in escaping to France but controversy continued dogging his steps as the Spanish authorities made a legal claim for those of his collections that had finally reached France. The courts decided against him, but his friend L'Héritier de Brutelle took the specimens to England before they could be impounded and only returned with them to France once the coast was clear. Never one for a dull life Dombey set out on a mission to the United States but was captured by privateers, dying in captivity on Montserrat in 1795. His collections today can be found partly in the Natural History Museum in London (BM), partly in Paris (P) and partly in the Real Jardin Botanico de Madrid (MA).

Dombey never published his results and never formally described his new species. Specimens of the big-flowered *Salvia* he had found passed into the hands of Hipolito Ruiz and Jose Antonio Pavon, who described and illustrated it as a new species in their *Flora Peruviana et Chilensis* in 1798 as *Salvia longiflora*. Ruiz and Pavon were Spanish botanists who enjoyed the patronage and sponsorship of the Spanish King, Carlos III. They were sent to Peru and Chile, where they lived and worked between 1779 and 1788. Their names are linked in botanical history because of this expedition and their subsequent publications, the most important of which is the *Flora Peruviana et Chilensis*, which came out in three volumes of text between 1798 and 1802. This work contained descriptions of new genera and species from the former viceroyalty of Peru and additional volumes provided plates, including one of *Salvia longiflora*, as was customary with works at that time. In all some 150 new genera and 500 species were described as new. Additionally they brought back a considerable amount of ethnobotanical and pharmacological information including information about the efficacy of cinchona bark in treating malaria. After their return to Spain, Ruiz and Pavon passed essentially uneventful lives and never experienced the frustrations and adventures of Dombey.

Salvia longiflora was in fact an illegitimate name, as it had been used the previous year by Willdenow for a quite different species. This passed unnoticed for well-over a century and it was not until 1937 that Carl Epling realized that the name *Salvia longiflora* had already been used. He then very appropriately renamed this spectacular species

Plate 785 *Salvia dombeyi* ROSEMARY WISE

Salvia dombeyi after the person who had originally found it, providing some belated recognition for Dombey's efforts. Epling (1938–1939) included the species in Sect. Longiflorae (Benth.) Epling in his monograph of American salvias but it is, in fact, quite outstanding as its flowers are twice the length of any other species in the section. In any case Sect. Longiflorae has no support from molecular studies, which suggest *Salvia dombeyi* is most closely related to *S. formosa* L'Hérit and an apparently heterogeneous clade of blue and red-flowered South American species which include *S. exserta* Griseb., *S. rypara* Briq. and *S. grewiifolia* S. Moore (Jenks *et al.*, 2013).

Salvia dombeyi is a mysterious plant. It was apparently a sacred flower of the Incas, but I have been unable to trace a reliable source for this assertion (for example in Perez de Barradas, 1957) or any explanation of why it was sacred, certainly nothing is mentioned by Ruiz & Pavon (1798) or Macbride (1960). One internet source suggests that the flowers were used to cover the body of a person being offered for sacrifice to the volcano god, but this seems to be the result of confusion with Aztec customs as there are no active volcanoes in Peru and the Incas did not practise human sacrifice. This fantasy may derive from the authenticated reports that the red flowers are wound around the arms of the figure of Christ during Semana Santa processions (Franquemont *et al.,* 1990) presumably to symbolise the blood of Christ. There are also reports of medicinal uses (Jenks, 2009). A tea made from its leaves is used for respiratory ailments and this infusion is also said to be good for a variety of ailments including chills, urine retention, liver disease and epilepsy (Roersch, 1994). A liniment of leaves macerated in alcohol is reported to stop bleeding and treat rheumatism. Chewing the leaves is reputed to clean the teeth and freshen the breath. (De Lucca & Zalles, 1992).

Another curiosity is that *Salvia dombeyi* appears always to be sterile as ripe seeds are unknown and this may explain the apparent absence of wild populations, propagation today being by cuttings. Although not certainly known in the wild, all collections originate from southern Peru (Junin, Cusco and Puno) or the very north of Bolivia (La Paz Department) so it must be presumed to be native in this region (Epling, 1937; Wood, 2007). The old collections give minimal information and more recent collections are not always much more informative. However, no botanist active in northern

Bolivia or southern Peru has seen the plant in a natural habitat and those collection labels that give adequate information usually indicate it was found in a garden, usually in an old established garden of a monastery or similar institution (Fig. 1). The type collection that cites the habitat as 'in praeruptis profundis' suggests that Junin might be the best place to look for a natural population. The only other clues lie in the scrambling habit and the facts that the species is shade-loving and quite tender – it does not survive outside in England but requires planting in a greenhouse or warm conservatory. These characteristics suggest that it would be native in forest or at least on scrubby slopes in the Yungas where the scrambling habit would be an advantage, humidity would keep frost at bay and the near permanent cloud cover would prevent burning by the sun. This is not a common habitat for salvias and it might be dismissed as a *Fuchsia* or a species of Acanthaceae at a superficial glance by an inexperienced observer, so it is just possible that it remains unnoticed in its natural habitat.

Cultivation. *Salvia dombeyi* is rarely obtainable through the horticultural trade despite its obvious attractions. It is notoriously difficult to grow successfully and even when it survives it may produce only a few flowers after a long wait. Propagation has to be by cuttings as no seeds are produced. It does not tolerate frost so in northern Europe it has to be grown in a greenhouse where it is vulnerable to spider mite. Equally it needs protection from full sun and grows best in partial shade. The stems are also easily broken. However, in frost-free zones it can grow to about six metres and produce plentiful flowers (Fig. 2). I cannot improve on the following description of both its striking beauty and of the cultivation methods used by a successful grower in California:

> *Salvia dombeyi* is a perennial species with slender, vining branches that grow over 8 feet long here in San Francisco. The heart-shaped leaves can get 5 inches long, and some of them are dropped each winter. The plant has a somewhat lanky appearance, so it's not the most attractive *Salvia* when it's not flowering. But when it's flowering - OH MY GOSH. The huge clusters dangle like party ornaments right around eye-level. The blooms are an intense shade of scarlet-red, and emerge a few at a time, for a prolonged show. Hummingbirds go crazy over this plant!

Fig. 1. *Salvia dombeyi* growing in a cottage garden, Pelechuco Bolivia. Photograph Alfredo Fuentes.

Fig. 2. *Salvia dombeyi* cultivated in California. Photograph by Jeff Hirsch at http://StrangeWonderfulThings.com.

> This *Salvia* does best between 40° and 75°F. I don't recommend it for areas that regularly get over 85°, particularly if nights are warm. The plant must be protected from frost, as it may perish below 31–32°F (i.e. zero centigrade). It seems to prefer being grown in the shade of another plant so that it gets around 50% sun. Shade it from strong afternoon sun, and also keep the roots shaded. Give the plant some support with a trellis, arbor, or another plant. Prune it each spring to give it a bushier, tidy look. The plant likes well-draining soil and regular, light feedings. It prefers consistently moist soil – avoid letting the soil dry out. Over 40–50% humidity is recommended. It's been an easy plant for me.
>
> (Quoted with permission from www.StrangeWonderfulThings.com).

Although the scrambling habit of *Salvia dombeyi* can easily deceive a casual observer into thinking it belongs to some other plant family, once its genus is recognised it is quite unmistakeable. The long

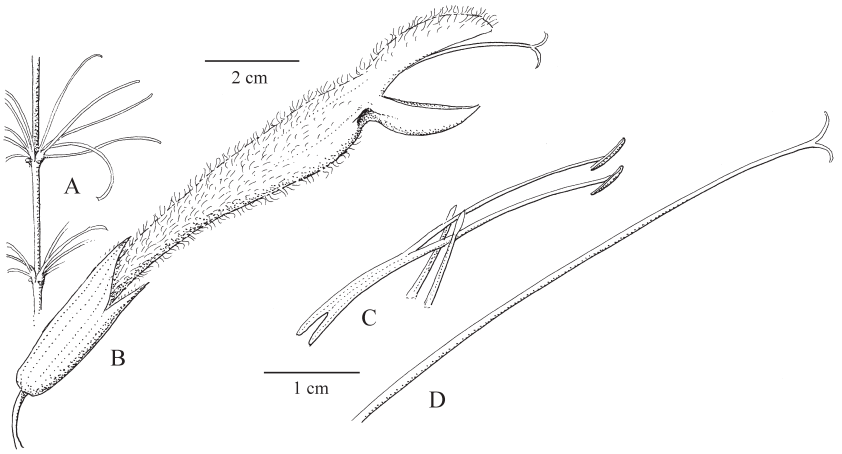

Fig. 3. **Salvia dombeyi**. A, inflorescence rhachis showing persistent pedicels × 3/4; B, corolla and calyx, × 3/4; C, stamens and connective, × 1 1/2; D, style, × 1 1/2. Drawn by Rosemary Wise from *Rudall & Kenton* 77622 (K).

drooping flowers, the large glabrous calyx and the habit are all highly distinctive. It is, of course, a hummingbird pollinated species (Wester & Claußen-Bockhof, 2011) but there are few hummingbirds with a long enough bill to reach into the corolla and find the nectar. Although no information is available on specific pollinators a possible candidate is the Sword-billed hummingbird, which has a bill up to 10 cm long and is found above about 2500 m in the Andes from Bolivia north to Colombia and Venezuela. However this hummingbird is relatively common and there is no obvious explanation for *Salvia dombeyi*'s failure to produce viable seed or its apparent disappearance from natural habitats.

Salvia dombeyi Epling, Rev. Sudam. Bot. 4: 47 (1937), nom. nov. based on *S. longiflora* Ruiz & Pavon.

Salvia longiflora Ruiz & Pavon, Fl. Peruviana 1: 23 (1798), nom. illeg., non *S. longiflora* Willd. (1797). Type: Peru, Junin, *Dombey* s.n. (syntypes B, G, P, UCLA).

Description. Scrambling *undershrub* to 2 m; *stem* quadrangular, with spreading white, gland-tipped hairs. *Leaves* 6–18 × 2–7.5 cm, ovate, acuminate and slightly falcate, serrate, base cordate, both surfaces puberulent to pubescent with hairs most prominent on the veins, the lower surface paler and more densely pubescent to subtomentose; petioles 1–4 cm long, pubescent. *Inflorescence* of short, lax, terminal and often axillary racemes up to 20 cm long,

verticillasters with 5–20 flowers, very lax; pedicels 1.5–3.4 cm long, filiform, often somewhat bent near the apex, persistent after the flowers have fallen (Fig 3A); *bracts* 2.8 × 0.8 cm, ovate, acuminate, concave, purplish, glabrous, caducous but the base persistent at the juncture with the rhachis; *calyx* 3–5 cm long, brownish-purple, glabrous, obscurely veined, teeth acuminate; *corolla* 9–11 cm long, red, pilose, upper lip 2.5–3 cm long, exceeding the lower lip, which is weakly deflexed; anthers included; *style* long-exserted, glabrous, arms very short, almost equal; *nutlets* not seen. Fig. 3, B–D.

Distribution. A rare plant of southern Peru and La Paz Department in Bolivia found between 2700 and 3700 m.

Habitat. No certainly natural population has been traced. It is cultivated in villages in areas that were once Yungas cloud forest but is generally uncommon. It is not frost tolerant and favours forest with cool moist air and frequent cloud cover.

Flowering time. This is not accurately known but it certainly flowers during the summer rains from January to April.

Local names. Ñucchu Real, sacha ñucchu, Llagas-ñucchu, ñuqchu, chenchelcoma.

Conservation status. As this plant is not certainly known in the wild, it is impossible to assess the conservation status of wild populations. They may be extinct, but careful investigation is necessary before this species can be formally categorised. As a first step it would be highly desirable to confirm that there really are no wild populations. All populations I have traced in Bolivia are reported to be cultivated so efforts need to be concentrated on Peru. Clearly *ex situ* conservation is already effective but it would be reassuring if this could be put on a permanent basis with nominated institutions giving a formal undertaking to conserve this species *in perpetuo*. In particular it is important that Bolivia and Peru, where this species is, or was, probably native, take steps to conserve plants descended from wild populations. At present there are worryingly few gardens in these two countries where the plant is grown and no evidence that growers, governments or conservation organisations are aware of its rarity and distinction.

Acknowledgements. Thanks are due to Lynsey and John Pink for generous hospitality and access to their living collection of Salvias, from which the plate of *Salvia dombeyi* was prepared. I am also very grateful to Alfredo Fuentes for the photograph used in Fig. 1 and to Jeff Hirsch for the photo used for Fig. 2 as well as the quote from www.StrangeWonderfulThings.com. The biographical information included here is taken from Stafleu, F.A. & Cowan, R.S. Taxonomic Literature second edition (1976–1988) Utrecht Bohn, Scheltema & Holkema and various sites on the Internet, especially Wikipedia.

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786. STROBILANTHES ATTENUATA
Acanthaceae

John R. I. Wood

Summary. *Strobilanthes attenuata* (Nees) Nees is described and illustrated. Its extensive synonomy is discussed and its principal characteristics are highlighted. Its introduction to countries with a temperate climate is chronicled and successful experience of its cultivation in England is described.

It is not known who first collected *Strobilanthes attenuata* (Nees) Nees or where exactly it was found. The type and oldest known collection is in the Wallich Herbarium at Kew and the only annotation is 'Pundua' with an interrogation mark. No clue is given as to the collector and the queried location (Pundua) must be an error as it lies in the Khasi Hills of Meghalaya State in Eastern India, a region in which *Strobilanthes attenuata* has never been found, nor is likely to be found. It is almost certain that the collection originates from north India where *Strobilanthes attenuata* is known to be common.

The Wallich Herbarium is more correctly termed the East India Company Herbarium, but was put together by Nathaniel Wallich in the 1820s and follows the order of a numerical list prepared by Wallich. Wallich was a Dane who served as superintendent of the Calcutta Botanical Garden from 1817 to 1846. The collection that bears his name is his most lasting achievement and forms the most important historical plant collection from the Indian subcontinent and surrounding areas. However, it has been subject to various misunderstandings over the years. In the first place the numbers are not collection numbers but correspond to the numerical list or catalogue prepared by Wallich. Each number represents what Wallich thought to be a single species and may contain several distinct collections from different places. As well as his own collections, the Wallich herbarium contains plants collected by Buchanan Hamilton, Roxburgh, Gomez, da Silva, Wight and others, and it is often, but not always, indicated who made the collection. Inevitably, of course, some of the numbers represent mixed collections of different species. Wallich ascribed names, many new, to the plants in the collection but most of these were never published by Wallich himself. In the case of Acanthaceae, the collection was examined by

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Plate 786 *Strobilanthes attenuata* ROSEMARY WISE

Christian Gottfried Nees ab Esenbeck, who published an account of Wallich's Acanthaceae (1832), in which *Strobilanthes attenuata* was first published under the name *Ruellia attenuata* Nees.

Nees was a very active systematic botanist and entomologist in the first half of the 19th century who published prolifically in a wide range of plant groups making important contributions to our knowledge of fungi, liverworts, grasses, Lauraceae and Acanthaceae amongst others. Like many prolific authors Nees often made errors and in later years often described the same species repeatedly under different names. During the 1840s he became involved in politics and was dogged by controversy, eventually losing his university post in Breslau on the grounds of immorality – he was living with a woman to whom he was not married – but in reality because of his support for liberal movements in contemporary Germany. In dealing with *Strobilanthes attenuata* Nees' first mistake was to mix Wallich's numbers 2345 and 2346, citing two different collections under the number 2345, giving both the epithet *attenuata*. Number 2345 was correctly described as a new genus with a single species, *Echinacanthus attenuatus* Nees. Our plant, No 2346, was described as *Ruellia attenuata* but cited as no. 2345, thus ignoring the very appropriate manuscript name *Ruellia urticifolia* for 2346 – *Strobilanthes attenuata* has leaves which in shape resemble those of the common nettle. Fifteen years later, writing in De Candolle's *Prodromus*, Nees corrected one of his earlier mistakes by transferring *Ruellia attenuata* to *Strobilanthes* as *S. attenuata* (Nees) Nees, but added to the confusion by describing the same species twice more on the same page under the names *Strobilanthes reflexa* Nees and *S. alata* Nees, the latter additionally erroneous because the name *Strobilanthes alata* had already been used by Blume to describe a Javanese plant.

Bremekamp (1944) published a monograph of the Strobilanthinae and divided *Strobilanthes* and its near allies into 54 genera, basing his decisions principally on pollen morphology. Bremekamp's classification of the group was never wholly accepted partly because it did not account for a significant number of species which he never assigned to a genus. Within Bremekamp's classification *Strobilanthes attenuata* was placed in the genus *Pteracanthus* on account of its ellipsoid pollen, elongate, erect anthers and deciduous bracteoles. From the 1980s onwards Bremekamp's classification was criticised on various

grounds, for example by Terao (1983), Wood (1995) and Wood & Scotland (2009) as neither the pollen nor floral morphology were as distinctive as he had supposed. More recently it has been clearly shown that his genera cannot be maintained on molecular grounds (Moylan *et al.*, 2004) and a single broad genus *Strobilanthes* is now generally accepted.

Strobilanthes is a large genus restricted to east Asia consisting of over 400 species. It is probably most diverse in north-east India and the adjacent parts of Myanmar and China. *Strobilanthes attenuata* occurs further west than any other species and is probably the most hardy. The vast majority of *Strobilanthes* species are plants of seasonally moist hill forest growing from the foothills to around 3000 m although a few species occur in the subalpine meadows of the Himalayas and a few others on the lowland plains away from the mountains. *Strobilanthes* is a remarkable genus on many counts. Its pollen is certainly the most diverse in the Acanthaceae, a family noted for its pollen diversity, and thus probably the genus with the most diverse pollen in the plant kingdom. The pollen of *Strobilanthes attenuata*, however, is unremarkable being the commonest type, ellipsoid (prolate) in shape, with three pores, ridges (colpi) running vertically from the poles and horizontal 'crossbars' so giving a ladder effect. *Strobilanthe*s is also remarkable for its monocarpy. The majority of species flower gregariously after a considerable period (usually around 10 years) and then die. *Strobilanthes attenuata*, however, like most species of *Strobilanthes* taken into cultivation and like most herbaceous species, flowers annually. Another unusual feature of many *Strobilanthes* species is anisophylly, that is the leaves in each pair are unequal in size. In some species such as *Strobilanthes anisophylla* (Hook.) T. Anderson the differences are dramatic so the leaves appear opposite and the stem zigzag in form. *Strobilanthes attenuata* is peculiar as it appears to be isophyllous with the leaves equal in each pair, but the bracts at the inflorescence branching points are strongly anisophyllous, one being much smaller than its pair.

There are other interesting features of *Strobilanthes attenuata*. As in most other species of the genus the seeds are covered in inconspicuous appressed hairs. However, these hairs are hygrosopic so when they are moistened they spread out so giving the seeds a furry appearance (Fig. 4). Whether this helps germination or dispersal is unclear.

However another characteristic does help seed dispersal. As the inflorescence matures and the seed capsules develop, the glandular hairs on the inflorescence elongate and become markedly sticky (Fig. 1) so portions of the inflorescence and the capsules themselves adhere to clothing or passing animals so facilitating seed dispersal. This feature is not unique to *Strobilanthes attenuata* but is common in other species of *Strobilanthes* including *Strobilanthes nutans* (Nees) T. Anderson described elsewhere in this number and indeed in Acanthaceae in general.

Although *Strobilanthes* is generally regarded as a difficult genus, whose species are hard to distinguish from each other, *S. attenuata* is usually readily recognised by the distinctive ovate, cordate leaves with a fine attenuate (Fig. 3) apex and somewhat winged petioles combined with an open, lax inflorescence of panicled racemes. The upper leaves intergrade with the bracts subtending the inflorescence branches as occurs in other species with this type of inflorescence. The bracts diminish in size upwards so the uppermost are narrowly oblong and they are quite persistent. *Strobilanthes attenuata* is not certainly known from Nepal and plants I treated as subsp. *nepalensis* (Wood, 1994) fit *S. lachenensis* C.B. Clarke better although it is just possible some may represent a hybrid between these two species. Careful field observation may or may not confirm this.

Although we do not know when or where *Strobilanthes attenuata* was first found, it was well known from the northern Himalayas by the middle of the 19th century. It appears to be common in what is now Uttaranchal, Himachal Pradesh, Kashmir and northern Pakistan extending at its westward limit to Nuristan in Afghanistan. Although it has been reported from Nepal (Hara *et al.*, 1982) and might be expected near its western frontier I have seen no good example from that country. It is reported to grow from 4000 to 9000 feet (approximately 1300–2700 m) being most common around 2100 m and is frequently found around a number of the hill stations in the northern Himalayas including Dehra Dun, Simla, Mussoorie, Lahul and the Murree Hills as well as on the approach to the famous Valley of Flowers (Fig. 2). There are collections by various luminaries of the British Raj including Lady Dalhousie, wife of the commander in chief and mother of the future governor-general and John Stuart Mill, the philosopher, as well as well-known botanists from the same era like

Fig. 1. Corolla and calyx of *Strobilanthes attenuata*. Photograph Prashant Awale.

Royle, Gamble and the French traveller Jacquemont. Indeed it is easy to imagine visitors to Simla at the beginning of the 20th century setting out with General Collett's *Flora of Simla* for walks or picnics to 'Snow View' or 'the Glen', from where they made collections of this species which eventually ended up at Kew. A Miss E.M. Saunders notes that it was 'common in the Murree woods . . . . The flower spikes (are) sticky, flowers vary in colour from all mauve to mauve (with a) white throat and even to pink (with a) white throat. I found one that was pure white.' It is reported to be a 'gregarious herbaceous shrub (sic) in fairly open spruce forest' and 'to be very common in shaded moist situations'. It was reported to flower from July to September.

Just as we do not know who first found *Strobilanthes attenuata*, so we do not know who first brought it into cultivation or when. The first record of it in cultivation that I can find is in the German gardeners' journal, *Gartenflora* (Regel, 1887). Although this does indicate correctly where

Fig. 2. Disturbed Himalayan shrubberies where *Strobilanthes attenuata* grows in the Valley of Flowers National Park, Uttarkhand, Indian Himalaya. Photograph Prashant Awale.

it grows as a native species, it does not tell us how the author obtained the plant and it implies that it was not hardy as it must be grown in a 'Warmhaus-'. There is no reference to this species in standard 19th century horticultural works such as *The Illustrated Dictionary of Gardening* (Nicholson, 1887) but it is mentioned in the supplement to this work (Nicholson, 1901) but as 'a recent introduction' and 'a handsome greenhouse plant'. Johnson's *Gardeners' Dictionary* (Wright, 1894) mentions it only with reference to it being a hothouse plant introduced in 1887, presumably a reference to Regel (1887). There is no mention in *The Standard Cyclopedia of Horticulture* (Bailey, 1939), even though it lists various other species of *Strobilathes*, none of which were regarded as hardy. The first clear evidence of its cultivation outdoors is in a note on a herbarium specimen at Kew of its being grown in a border at Wakehurst Place in 1974.

The oldest literature reference to its cultivation outside a greenhouse that I have found is in New York Botanical Garden's *Illustrated*

Encyclopedia of Horticulture, where under the name of *Strobilanthes 'atropurpureus'* it is said to 'grow well outdoors' (Everett, 1982). References from this time onwards are frequent, usually under the name *Strobilanthes atropurpureus*. It is the only *Strobilanthes* species offered for sale in the first edition of the RHS Plant Finder and is illustrated in the RHS *Encyclopedia of Plants and Flowers* (Brickell, 2010), in both cases under the name *Strobilanthes atropurpurea*. It is now widely available in the horticultural trade in Europe and North America although the correct name *Strobilanthes attenuata* has only recently been adopted and it is still commonly offered for sale under the name *Strobilanthes atropurpurea*.

There remains the curious case of *Strobilanthes newii*. This is supposed to have been collected in 'jungle' in 'Western Mysore' in South India by a Mr New in 1871. The only specimen is very clearly an example of *Strobilanthes attenuata* but its collection locality has led to all sorts of misinterpretations. The collection originally came to the attention of Colonel Beddome (1868–1872: plate 202) who illustrated it under the name *Strobilanthes extensa* Nees, a species from north-east India. In the *Flora of British India* C. B. Clarke dismissed Beddome's identification on geographical grounds and, realizing that it was quite different from other South Indian species, described it as a new species, *Strobilanthes newii*, but failed to note its identity with *S. attenuata*, a species with which he was familiar. Bremekamp never saw the collections of this plant but nevertheless transferred it to his exclusively South Indian genus, *Mackenzia*. More recently it has been maintained as a distinct species of the Indian peninsular by Venu (2007). Needless to say no further collection from Mysore nor other evidence of its presence in south India has emerged. What then is the explanation for Mr New's collection? There is no other evidence of *Strobilanthes attenuata*'s cultivation in South India or indeed in any tropical country and there is no suggestion on the specimen label that it was cultivated, rather the reverse. It might, of course, be a case of wrong labelling but this seems unlikely as New was not a prolific collector and the original label is attached to the specimen at Kew. The remaining possibility is that it was a deception, in which a specimen was deliberately mislabelled. If this was the case, it was eminently successful but we will probably never know the truth.

Fig. 3. **Strobilanthes attenuata**: cultivated in Hampshire. Note distinct leaf shape. Photograph John Wood.

Despite the different colouring of flowers recorded in wild populations, the flowers of all cultivated plants I have seen are a rich dark blue as are most photographs I have seen on the internet (Fig. 3). Other colour forms are only occasionally offered in the horticultural trade, one is 'Blue Lips', a form in which the corolla tube is white but the lips blue. The flowers are open in the morning and generally fall after midday although they stay open longer on a dull day. Plants grow easily in southern England and can be propagated by dividing the roots, by cuttings and by seed. They usually form fruit easily but late in the season and young seedlings appear the following year. I have heard reports that seedlings are sometimes so numerous as to be a pest in gardens but this is not my experience. The plants in my garden, do not set seed successfully every year, perhaps because of the occurrence of early frosts and seedlings are never very numerous. Flowering begins in August and is at its best in early September when borders are often looking somewhat jaded. It is not a particularly tall plant being usually about 50–70 cm in height so needs to be planted

towards the front of a border. It does best in half shade and will need watering during dry periods. Winters can be quite harsh in its native habitat and *Strobilanthes attenuata* is hardy in British winter despite suggestions to the contrary when it was first introduced to Europe (Fig. 4).

Strobilanthes attenuata (Nees) Nees in de Candolle, A. (ed.) Prod. Syst. Nat. Reg. Veg. 11: 193 (1847).

Ruellia attenuata Nees in Wallich, Plantae Asiaticae Rariores 3: 83 (1832). Type: ? India, *Wallich* 2346 (lectotype K-W, chosen by Wood in Ed. J. Botany 51: 230 (1994).

Pteracanthus attenuatus (Nees) Bremek., Verh. Nederl. Akad. Wetensch. Afd. Nat., sect 2, 41(1): 199 (1944).

Strobilanthes alata Nees in de Candolle, A. (ed.) Prod. Syst. Nat. Reg. Veg. 11: 194 (1847), nom. illeg., non Blume (1826).

Strobilanthes reflexa Nees in de Candolle, A. (ed.) Prod. Syst. Nat. Reg. Veg. 11: 194 1847. Type: India, *Royle* s.n. (syntype LIV, n.v.).

Pteracanthus reflexus (Nees) Bremek., Verh. Nederl. Akad. Wetensch. Afd. Nat., sect 2, 41(1): 199 (1944).

Strobilanthes newii Beddome ex C. B. Clarke in Hooker, J.D. (ed.) Flora of British India 4: 464 (1884). Type: India, Mysore, *New* s.n. (holotype K).

Mackenziea newii (Beddome ex C. B. Clarke) Bremek., Verh. Nederl. Akad. Wetensch. Afd. Nat., sect 2, 41(1): 183 (1944).

Strobilanthes urticifolia Kuntze, Revis. Gen. Pl. 2: 499 (1891). Type: India, *Wallich* 2346 (syntype K-W).

Pteracanthus urticifolius (Kuntze) Bremek. Verh. Nederl. Akad. Wetensch. Afd. Nat., sect 2, 41(1): 199 (1944).

Description. Perennial *herb* to 0.5 m. *Stems* many, quadrangular, thinly pubescent. *Leaves* petiolate, equal in each pair, ovate, acuminate, strongly serrate, base cordate, thinly pubescent on both surfaces, the hairs most prominent on margins and veins beneath, lower surface paler; petioles 3–7.5 cm long, winged. *Inflorescence* a terminal panicle of spikes, the flowers in distant opposite pairs, mostly 6–13 mm apart; branches 5–6 cm long below but shorter above, glandular-pilose; bracts at lower inflorescence branching points, unequal in each pair, ovate, acuminate, serrate, rounded at base and subsessile, resembling small subsessile leaves, diminishing in size upwards; uppermost bracts mostly 2–5(–10) × 0.5–2 mm, lanceolate to oblong-elliptic, caducous, pubescent, not glandular; bracteoles linear, c. 2 × 0.5 mm, early caducous leaving a scar at base of calyx, glandular-pilose; *calyx* 5-lobed to base, c. 6–7 mm long at anthesis, accrescent in fruit to 15 mm with one lobe c. 2–3 mm longer than the others, glandular-pilose and sticky; *corolla* 3.2–3.5 cm long, usually dark blue, rarely pale blue, pinkish or white, curved (Fig. 1), pubescent on the lobes; *stamens* 4, didynamous, filaments glabrous, anthers erect, elongate; *capsule* 13–15 × 3 mm, thinly glandular-pilose, 4–seeded; *seeds* 3 × 2 mm,

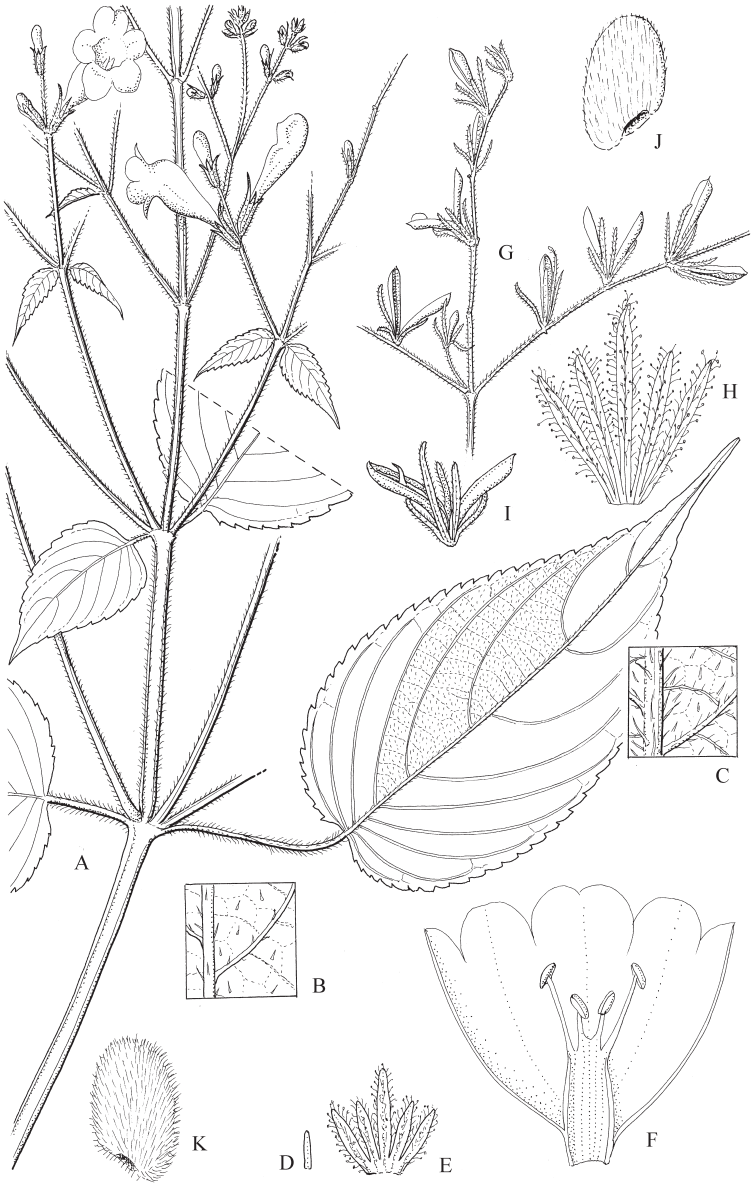

Fig. 4. **Strobilanthes attenuata.** A, habit, × 1; B, upper surface of leaf, × 5; C, lower surface of leaf, × 5; D, bracteole, × 3; E, calyx at anthesis, × 3; F, corolla opened out to show stamens, × 2; G, fruiting inflorescence, ×1; H, calyx in fruit, × 3; I, capsule and calyx, × 2; J, seeds when dry, × 8; K, seed when wetted, × 8. Drawn by Rosemary Wise from cultivated plants, A–F from *Andrews* 1567 (FHO), G–K from *Bennett* s.n. (FHO).

lenticular, appressed pilose with hygroscopic hairs, which spread when moistened. Fig. 4.

Distribution. Endemic to the southern slopes of the northern Himalayas extending from the Kurram Valley in Nuristan in Afghanistan through northern Pakistan, Jammu and Kashmir, Himachal Pradesh east to Uttaranchel. Records from Nepal (Hara *et al.*, 1982) require confirmation and may be misidentifications.

Habitat. Locally frequent in moist areas of coniferous and mixed forest between 1700 and 2700 m approximately. Reported as characteristic of oak forest (Osmaston, 1927).

Flowering time. Flowers in late summer from July to September.

Conservation status. Least Concern. It is known from numerous locations throughout its range although rare and possibly threatened within Afghanistan, 'one of the commonest plants in forest undergrowth in the hills' (Parker, 1924: 389). It is also widely cultivated.

Acknowledgements. I am grateful to Prashant Awale for photographs of *Strobilanthes attenuata* in its natural habitat in India.

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787. STROBILANTHES NUTANS
Acanthaceae

John R. I. Wood and Bhaskar Adhikari

Summary. The history of the discovery and naming of *Strobilanthes nutans* (Nees) T. Anderson is provided. It is described and illustrated. Some of the problems in trying to subdivide the genus *Strobilanthes* are discussed in the context of highlighting the distinctive features of *S. nutans* including the distinctive cone-like inflorescence, the white flowers and the subglobose incurved anthers. The introduction and cultivation of *S. nutans* as well as the possibilities of the introduction of other hardy species of *Strobilanthes* are discussed.

Today Nepal is visited by all kinds of travellers, from those seeking religious experiences to trekkers and mountaineers, those looking to see the dwindling wildlife or even the occasional plant hunter, another vanishing species in the modern world. It is now difficult to believe that it was not always so and that for most of the 19th century and the first half of the 20th century Nepal was a forbidden land rarely visited by any outsider. Nevertheless there was a brief interlude in the early 19th century when Nepal was open to visitors and it was during that time that *Strobilanthes nutans* was found by Nathaniel Wallich in 1821.

Wallich was then superintendent of the Royal Botanical Garden at Calcutta (Kolkata) and during this period carried out a series of expeditions to different parts of India, Burma and Singapore as well as Nepal. Although of Danish origin Wallich was employed by the British East India Company and was the leading figure in promoting the botanical exploration of India following the death of William Roxburgh in 1815. Wallich had, in fact, been preceded to Nepal by Edward Gardner and Francis Buchanan Hamilton and enough information was obtained from these visits to permit the publication of two books on the Flora of Nepal, the *Prodromus Florae Nepalensis* by David Don (1825) and the *Tentamen Florae Napalensis ilustrateae* (1824–1826) by Wallich himself. Neither book, however, mentions *Strobilanthes nutans* and its first appearance is in Wallich's numerical list of the East India Company's herbarium as number 2362 under the name *Ruellia strobilina* but with no more details of its discovery except that it was found in 'Nepalia'. Formal publication had to await the third volume of Wallich's *Plantae Asiaticae Rariores* (1832) where it was described as a new species under the name *Goldfussia nutans*

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Plate 787 *Strobilanthes nutans* ROSEMARY WISE

Fig. 1. *Strobilanthes nutans* inflorescence showing distinct cone-like form. Photograph John Wood.

by Christian Gottfried Nees ab Esenbeck, the then expert on the Acanthaceae.

Nees' publications often contain errors, but in this case the mistake may have been Wallich's as in the case of *Strobilanthes attenuata* (Nees) Nees (Wood, 1994). In this case Nees (1832: 88) was aware that he had received two different collections from Wallich under the number 2361, material of *Ruellia strobilina* being included within material of the previous number (2361), *Goldfussia glomerata*. He recognised this material was a distinct species citing it as number 2361a, but being unaware of Wallich's manuscript name, he noticed the distinctive drooping flowers, so he chose the epithet *nutans*. Although this name is appropriate it is pity the name *Ruellia strobilina* was forgotten as *strobilana* is especially apt, the inflorescence bearing a striking resemblance to a pine cone, the term in Latin for a pine cone being *strobilus*, from the Greek for a spinning top or whirlwind (Fig. 1). Nees placed the species in the genus *Goldfussia* which he described in the same publication. *Goldfussia* Nees is characterised by having its two longer stamens unequal in length and the two shorter stamens very short

and incurved with globose, nodding anthers. Most species described by Nees and placed in *Goldfussia* are Himalayan in distribution.

Many of the genera established by Nees had a short shelf life. The main difficulty lay in the fact that their characteristics tended to intergrade with those of other genera and, as more species were discovered, it became increasingly difficult to justify the genera he had described. In 1867 Thomas Anderson united many of Nees' genera under the oldest name *Strobilanthes* so *Goldfussia nutans* Nees became *Strobilanthes nutans* (Nees) T. Anderson. The name *Strobilanthes* had been coined by the Dutch botanist Blume in 1826, based on the type of inflorescence found in the Javanese species, *Strobilanthes cernua* Blume. A cone-shaped inflorescence is not, however, a feature of most species of *Strobilanthes* including the most frequently cultivated species in temperate countries like *Strobilanthes attenuata* (Nees) Nees and *S. lachenensis* C.B. Clarke or those cultivated in tropical countries such as *Strobilanthes hamiltoniana* (Steud.) Bosser & Heine; however it is most decidedly a feature of *Strobilanthes nutans* (Fig. 1) as originally observed by Wallich.

This was not quite the end of the story. Studies of pollen in the late 19th century showed that the genus *Strobilanthes* was unusually diverse in its pollen morphology and this revived efforts to split it up again. Thus in 1944 Bremekamp used pollen and seed morphology to justify and extend Nees' system of segregate genera dividing *Strobilanthes* into over 50 genera. However, Bremekamp's realignment of the genera suffered from the same problems as Nees' genera and was never wholly completed or accepted. More recently molecular studies (Carine & Scotland, 2002; Moylan *et al.*, 2004) have shown that several characters used by Nees and Bremkamp to divide up *Strobilanthes* have evolved independently and cannot justify the segregate genera so now there is a general acceptance of a broadly circumscribed *Strobilanthes* with around 440 species restricted to tropical and subtropical regions of East and South Asia and including *Strobilanthes nutans*.

Strobilanthes nutans was apparently not collected again after 1821, through the long-period of Nepal's self-imposed isolation, until 1953 when it was recollected by Desirée Proud from the hills north of Nepal valley most probably from today's Shivapuri National Park in the north of Kathmandu valley (Fig. 3). Since then only a handful of collections have emerged from Central Nepal, and

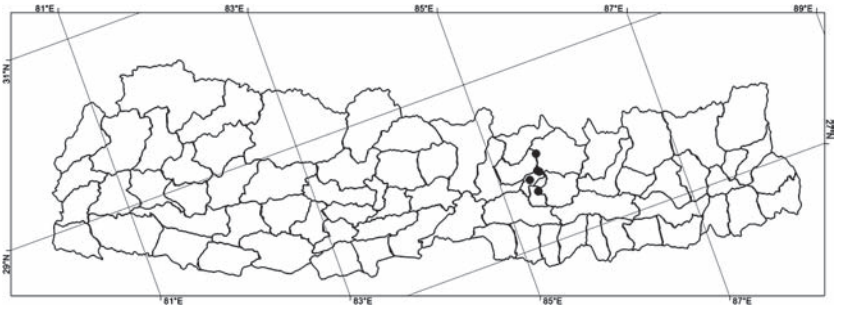

Fig. 2. Map showing native distribution of *Strobilanthes nutans* in Nepal.

there are apparently no collections in the national herbarium at Kathmandu (KATH). *Strobilanthes nutans* prefers moist areas along the forest margins of oak (*Quercus semecarpifolia* Sm.) forest at altitudes between 2100 and 2700 m (Malla *et al.*, 1976) (Fig. 4). It is clearly a rare species, and is still only known as a native species from the vicinity of Kathmandu in Central Nepal (Fig. 2).

Fig. 3. Wooded hills of Shivapuri National Park, Nepal, where *Strobilanthes nutans* is found. Photograph Bhaskar Adhikari.

Fig. 4. Detail of oak forest on Phulchoki hill from where *Strobilanthes nutans* was collected by a Japanese team in 1995. Photograph Ganga Bhatt.

This kind of very localised distribution is common in *Strobilanthes*. Although there are over 400 species, most are rare and narrowly restricted to specific mountain ranges or even individual peaks. However in the Himalayas there are few, if any, pin-point endemics, most species being locally abundant over a restricted area. These restricted areas do not necessarily coincide with national boundaries. *Strobilanthes divaricata*, T. Anderson for example, occurs in local abundance from the extreme east of Nepal (with two isolated records from west Nepal) through Sikkim and Darjeeling to the extreme west of Bhutan. *Strobilanthes cuneata* (Shakya) J.R.I. Wood is nearly endemic to Nepal, but extends across the border into Tibet along one of the valleys penetrating the Himalayas. However there are three species apparently endemic to Nepal, *Strobilanthes bheriensis* (Shakya) J.R.I. Wood, *S. saccata* J.R.I. Wood and *S. nutans*, the latter being the most frequent and perhaps the best-known of the three (Fig. 2).

Species of *Strobilanthes* are not often cultivated in European gardens but they have two important qualities for the gardener. In the first

place they flower late in the season when most border perennials are past their best. They come into flower from mid-August onwards and continue until the autumn frosts around the beginning of October. Naturally they are plants of forest and forest margins and consequently thrive in shade and semi-shade, flowering in late summer when temperate shade-loving plants have long ceased to flower. They will thrive in a wet summer which mimics a monsoon climate but will do less well in dry conditions. Like rhododendrons they like copious summer rainfall.

When *Strobilanthes* species were originally introduced to Britain in the 19th century, none of the introduced species was hardy. They all required cultivation in stove houses. They included *Strobilanthes anisophylla* (Hook.) T. Anderson, *S. auriculata* Nees var *dyeriana* (Masters) J.R.I. Wood and *S. hamiltoniana* (as *S. colorata*), all of which are cultivated in the tropics but none of which can be cultivated outside in northern Europe. *Johnson's Gardeners' Dictionary* (Wright & Dewar, 1894) lists nine species including *S. attenuata* but considers all to be 'stove evergreen shrubs'. Hardy species have only become available since the 1970s and the only widely available species are *S. attenuata* (often sold under the name *S. atropurpurea*), *S. lachenensis* and *S. nutans*. Other potential species for introduction include *S. pentstemenoides* (Nees) T. Anderson from Nepal, *S. oligocephal*a C.B. Clarke from Nepal east to China and *S. oresbia* W.W. Smith, *S. forrestii* Diels and *S. versicolor* Diels, from Tibet and Yunnan all of which grow naturally above 2000 m in the Himalayas and should be hardy in Britain. *Strobilanthes oligocephala* was introduced in the 19th century and illustrated in the *Curtis's Botanical Magazine* as *Goldfussia thomsonii* Hook., but was never treated as hardy despite growing at higher altitudes than *S. nutans*. It does not seem to be cultivated today but would merit an attempt at reintroduction like the other Himalayan species mentioned here.

Pollination. In Acanthaceae flower colour and shape often show adaptation to specific pollinators, tubular red flowers for bird pollination, blue flowers for bee pollination and long-tubed white flowers for pollination by night-flying insects such as moths. There are almost no published observations of *Strobilanthes* pollinators and we have little knowledge of why some floral adaptations have taken place. Most species of *Strobilanthes* are blue-flowered with a relatively gaping corolla and are presumably pollinated by bees. At least one

Indian species, *Strobilanthes luridus* Wight, has purple flowers clearly adapted for bird pollination. A few species are yellow flowered, and white flowers are also unusual but occur in a few scattered species including *S. asymmetrica* J.R.I. Wood from eastern India, *S. candida* J.R.I. Wood from Myanmar (Burma) and *S. nutans* from Nepal. Apart from the colour, the corolla shows no other obvious adaptation for night flowering pollinators – most moth-pollinated species have long tubular corollas as well as white flowers. Presumably the white flowers provide some advantage perhaps attracting pollinators in the gloom of cloud covered hill forest (Fig. 5). In England the flowers are visited by ants but whether they play any part in pollination either in Britain or its native Nepal is unknown. In passing it is worth noting that occasional albino forms of normally blue-flowered *Strobilanthes* are of relatively frequent occurrence notably in the Himalayan species *S. attenuata* and the true *S. atropurpurea* Nees. Albino forms of blue flowers seem much more common in nature than albino forms of red or yellow flowers - the sweet violet, *Viola odorata* L. of European gardens being a familiar example.

Fig. 5. *Strobilanthes nutans* in flower in Hampshire. Photograph John Wood.

Another curious feature of *Strobilanthes nutans*, which it shares with other species in the genus is that the sepals grow and change their shape over the course of flowering. When flowers first open they are inconspicuous, linear-lanceolate and terminate in a long fine point. When the fruiting capsules are mature they are linear-oblong, slightly wider at the apex, about 15 mm long and a conspicuous green against the pale brown of the capsule. (Fig. 6 E,F).

Cultivation. The introduction of *Strobilanthes nutans* to cultivation was probably in the 1980s, by Edward Needham to his garden at Tregye in Cornwall. From here it was taken to other West Country gardens, and thrives particularly well at Rosemoor, from which came the specimens for this plate; here it hangs over moist shady rocks near the tunnel, forming a low, spreading bush. It is a modest plant of not more than half a metre in height but the pendulous flower spikes are attractive, particularly so if the plant is grown in a raised tub or pot so the flowers are more visible. Like other species of *Strobilanthes*, *S. nutans* is propagated quite easily by cuttings. John Wood's experience is that cuttings root easily when planted in spring. His plants produced seeds late in the season, the earlier flowers being apparently sterile, a somewhat odd phenomenon shared, at least in his garden, with *Strobilanthes attenuata*. Seeds are available commercially in Britain but we do not know how successful germination is. The plant is hardy and thrives in shade or partial shade on good soils. It is important that it does not dry out in the summer months as in its native Nepal most rain falls during the warm summer months during the monsoon.

Strobilanthes nutans (Nees) T. Anderson, J. Linn. Soc, Bot. 9: 475 (1867).
Goldfussia nutans Nees in Wallich, Plantae Asiaticae Rariores 3: 88 (1832). Type: Nepal, *Wallich* 2362 (Lectotype K-W, designated here, isolectotypes BM, E, K etc.).

Description. Perennial *herb*, stems at first decumbent and rooting at the nodes, then ascending to c. 30 cm, pilose, the hairs slightly deflexed. *Leaves* isophyllous, petiolate; petioles 0.5–5.5 cm, pilose; lamina 5–14 × 3–7 cm, ovate-elliptic, acuminate, narrowed to a cuneate base, margin serrate, densely pilose on both surfaces but more so on the veins beneath, abaxially paler, lateral veins about 8. *Inflorescence* of drooping pedunculate spikes arising from the leaf axils; peduncles simple, (1–)3–5.5 cm long, pubescent, inflorescence bracts 1.5–2.5 cm, narrowly ovate, anisophyllous, long-caudate, often deciduous; spike cone-like, 3–5 cm long, the naked basal part up to 1.5 cm long; *floral bracts* 10–15 × 6–10 mm, oblong to obovate, retuse and minutely mucronate, concave, pale green, glabrous; bracteoles 2, 10–14 × 4–4.5 mm, obovate to

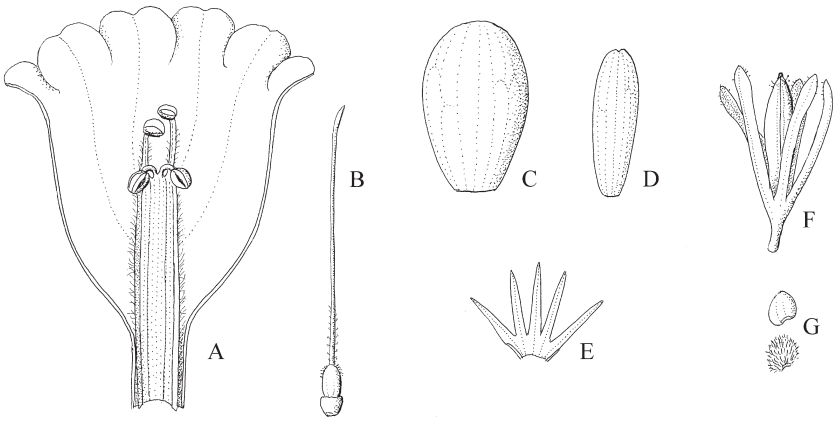

Fig. 6. **Strobilanthes nutans.** A, corolla opened out to show stamens × 1 1/2; B, ovary and style × 1 1/2; C, bract × 2; D, bracteole × 2; E, calyx at anthesis, opened out × 3; F, calyx in fruit with capsule × 1 1/2; G, seeds, dry (above), when wetted (below) × 2. Drawn by Rosemary Wise from cultivated plants grown in the RHS garden, Rosemoor. (A–E) and in Liss (F, G).

oblanceolate, retuse, white except the apex of the green midrib, midrib; *calyx* at anthesis glabrous, 8–9 mm long, in fruit accrescent to 15 mm, divided to c. 1.5 mm above the base into five lobes, lobes c. 1.5 mm wide at base, lanceolate, acute, white with green tips, four equal, one *c.* 1 mm longer, glandular-pilose when in fruit; *corolla* white, straight, 3.5 cm long, pilose on the tube on the exterior, glabrous on the inside except for hairs retaining the style, basal cylindrical tube 6–7 × 2.5 mm, then widened and somewhat ventricose to 10 mm for c. 2 cm, lobes *c.* 5–6 × 5–6 mm, ovate-deltoid, obtuse, glabrous. *Stamens* didynamous, included, two longer filaments slightly unequal, 6 and 7 mm, pilose, shorter pair *c.* 1 mm, recurved 180°, glabrous; *anthers* incurved obliquely elliptic 0.75 × 1 mm; *style* white, glabrous, stigma curved, ovary oblong, glandular at apex, basal disc reddish. *Capsule* 12–14 × 2–3 mm, oblong, sparsely glandular at the apex. *Seeds* 2 × 2 mm, lenticular, almost without an areole but covered in long, thin hygroscopic hairs which stick out when wetted. Fig. 6.

Distribution. Endemic to central Nepal.

Habitat. Recorded as growing at the margins of oak forest between 2100 and 2700 m, so presumably native of seasonally moist evergreen hill forest.

Flowering Time. Flowers in late summer from August to October.

Conservation Status. Strictly speaking this species should be classified as Data Deficient (DD) as we know so little about its natural distribution and frequency. However, it may well be ENDANGERED (EN) given its very restricted distribution and the very few collections that have ever been made. Population growth and pressure on land may well be threatening its existence in the heavily populated middle-altitude Himalayan valleys where it grows.

Acknowledgements. We are grateful to Jonathan Hutchinson at Rosemoor for providing flowering material from which the painting was mostly prepared and to Ganga Bhatt for photographs of its native habitat.

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BOOK REVIEW

The New Sylva. A Discourse of Forest & Orchard Trees by Gabriel Hemery and Sarah Simblet. 2014, Bloomsbury, London. 400 pp. 200 drawings throughout. ISBN: 9781408835449. £50. Available online £45 from Bloomsbury Publishing.

In 1664, the Royal Society published its first book, *Sylva* by John Evelyn, the first comprehensive study of trees in Britain, aimed at the landed gentry and aristocracy to encourage them to replant and manage their forests for the resultant timber. The original book was not illustrated, as it was considered too great an expense and the population at that time could recognise the common tree species.

Move forward 350 years to a changed world and the need to review and update an extraordinarily detailed original work for the modern generation. The combined experience of the two authors Gabriel Hemery and Sarah Simblet has resulted in a beautiful book that seduces you with its good looks and informs you with its contents. *The New Sylva. A Discourse of Forest & Orchard Trees* is compelling reading, with author Gabriel Hemery hugely informative on the social, economic and environmental value of Britain's trees. It is still at its core an instructive manual, detailing modern approaches to planting and forestry which were unknown in 17th century Britain.

Hemery also satisfies the needs of any dendrologist with 44 detailed tree portraits. The whole is exquisitely supported by 200 pen and ink drawings created from life in woodlands across the British Isles by Sarah Simblet, and her account of their creation gives an insider portrait of the artist as a dendrologist. It may seem to be a minor detail, but tying the whole together effortlessly is the Foundry Wilson font (*circa* 1760), easy on the eye and exactly right for a book that owes its origins to John Evelyn's work published 350 years ago.

Co-founder of the Sylva Foundation with Gabriel Hemery in 2008, Sir Martin Wood FRS, states that *The New Sylva* is a 'modern-day clarion call for the creation of a new wood culture that may help to ensure a sustainable and enjoyable future for us all', and I wholeheartedly concur.

Curtis's Botanical Magazine 2014 vol. 31 (2): pp. 180–181

The Woodland Book. 101 Ways to Play, Investigate, Watch Wildlife and Have Adventures in the Woods by Tessa Wardley. 2014, Bloomsbury, London. 200 pp. Colour throughout. ISBN: 9781472900005. £14.99.

This is an inspirational book which does exactly what it says on the cover. Fun activities abound, from truffle hunting to hammock hanging, making art from woodland materials to recognising birds, trees and other woodland flora and fauna. It offers an informative ramble through the science and folklore of Britain's woodlands.

The whole is made far more personal with photographs throughout of Tessa Wardley's family enjoying the aforementioned activities. There is also useful information on access to woodland in Britain, and a Resources section cuts through the often-confusing array of identification guides and equipment suppliers.

Matthew Kopinski

CONTRIBUTORS

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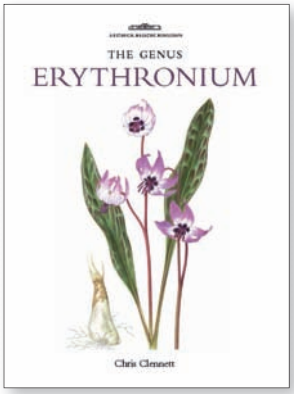

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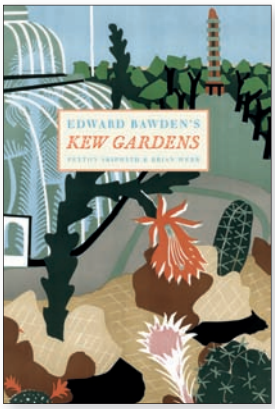

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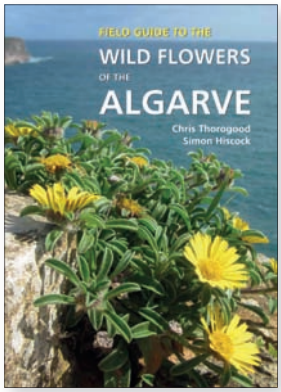

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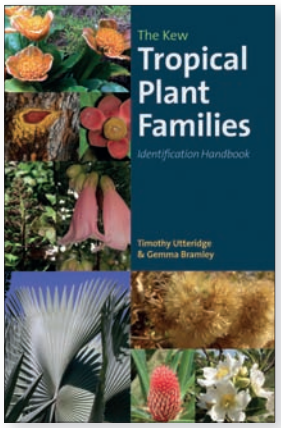

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