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KEW BULLETIN 58: 679 – 702 (2003)

Strobilanthes: panicled species from East Asia

J. R. I. WOOD[1] & R. W. SCOTLAND[1]

Summary. The species of *Strobilanthes* from East Asia with a paniculate inflorescence form a readily identifiable cluster of species, which reaches its greatest diversity on the Indonesian Island of Sumatra. The 16 species are enumerated, described and discussed. Three new species, *Strobilanthes ramosissima* (from Sumatra), *S. tenuiflora* (from Thailand) and *S. euantha* (from the China-Burma (Myanmar) border region) are described, a new name, *S. bunnemeyeri* is provided for *Diflugossa glandulosa*, and the new combinations *S. ovatifolia* and *S. pubescens* are made. A key is provided to facilitate identification. Several species are illustrated for the first time and maps show the distribution of all species discussed in this paper.

The inflorescence in *Strobilanthes* is very variable with flowers arranged mostly in heads or spikes. These are often aggregated into panicles, but true open panicles with separate flowers are rare. Panicles are found in the cluster of species from Sri Lanka and South India placed by Nees (1832, 1847) and Bremekamp (1944) in the genus *Leptacanthus*, and also in East Asia in a group which was mostly included in Bremekamp's genus *Diflugossa* (1944: 237ff.). This latter group of about 17 species is the subject of this paper.

The species cluster under discussion here is readily recognised by the paniculate inflorescence. All species have the commonest pollen type found in *Strobilanthes*, ellipsoid, ribbed and scalariform, but there are some anomalies in the pollen of two species, *Strobilanthes panichanga* and *S. pedunculosa*. Most species have a small, subequally 5-lobed calyx, the lobes with a distinct dark midrib lying between broad, pale margins and with prominent cystoliths. The tips of the calyx lobes are commonly obtuse and emarginate. Other features common to most species are the very pale, usually white, pale lilac or pale pink, straight corollas, and the caducous bracts and bracteoles, which are often absent by the time the flowers are fully open. None of these characters are restricted to the paniculate group and even the defining paniculate inflorescence intergrades with other inflorescence types where the arrangement is more obviously spicate, and particularly with the three following groups:

- Those in which the flowers are in lax terminal spikes, particularly *Strobilanthes collina* Nees and *S. tonkinensis* Lindau.
- Those in which the inflorescences are clearly of axillary spikes, which are sometimes compounded and paniculate, as in *Strobilanthes lancifolia* T. Anderson and *S. denticulata* (Nees) T. Anderson and its allies, in which the bracts and bracteoles are persistent.

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- Those where the flowers are clustered towards the tips of the inflorescence branches, and are thus intermediate with *Strobilanthes pentstemonoides*. These include *Strobilanthes filiformis* Blume from Java, *S. straminea* W. W. Sm. from Burma (Myanmar) and *S. discolor* Nees, *S. thomsonii* T. Anderson and several others from NE India. Species 15 – 17 below are transitional to these species.

  All these groups are excluded from the following account.

Nevertheless despite the somewhat imprecise nature of the group included in this revision, the species are easily recognised. Species delimitation depends to a considerable extent and perhaps uniquely within *Strobilanthes* on the mode of panicle branching. Although this character is not easy to observe at first glance, once appreciated it facilitates identification of species in a group that is otherwise taxonomically difficult. It is hoped that the following key, which makes use of this character, will help identify specimens from Sumatra and the East Himalayas where the group is most diverse.

Our understanding of the intraspecific variation in several species is very limited. Three (*Strobilanthes polybotrya, S. pubescens* and *S. tenax*) are only known from the types, and several others require further collection for a full understanding of their variation. In particular more collections from Sumatra are needed.

It should be noted that in several species where the inflorescence is usually glabrous, glandular hairs often develop as the plant ages, sometimes giving older specimens a quite different appearance from younger ones. This is noteworthy in *Strobilanthes bunnemeyeri, S. ramosissima, S. ovatifolia, S. hamiltoniana* and *S. scoriarum,* and may well occur in other, less well-known species. Glandular states of the last two species have been mistakenly described as different species.

1. Inflorescence leafy to the very top, panicles essentially axillary, shorter than or ±equalling the subtending leaves · 2
   Inflorescence essentially terminal and leafless, sometimes leafy towards the base but axillary panicles longer than the subtending leaves · · · · · · · · · · · · · · · 5
2. Some flowers arranged in opposite pairs, the inflorescence at least partially racemose or spicate · 3
   Flowers arranged in axillary panicles, not in opposite pairs, and the branches not appearing racemose/spicate · 4
3. Calyx 14 – 21 mm long with a few hairs at the apex; corolla pubescent · **2. S. pedunculosa**
   Calyx < 6 mm long, glabrous; corolla glabrous · · · · · · · · · · · · · **3. S. polybotrya**
4. Corolla and calyx densely pubescent; corolla >3 cm long · · · · · **1. S. panichanga**
   Corolla and calyx glabrous; corolla <2 cm long · · · · · · · · · · · · · **4. S. multiflora**
5. Fertile stamens 2 · 6
   Fertile stamens 4 · 7
6. Corolla pubescent on lobes; inflorescence finely puberulent with white hairs sometimes mixed with stalked glands · · · · · · · · · · · · · · · · **5. S. bunnemeyeri**
   Corolla glabrous outside; inflorescence glabrous or with long stalked glands but never finely white-puberulent · **6. S. ramosissima**

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7. Flowers arranged in true panicles, typically with branches repeatedly 3-forked or with branchlets arising opposite the flowers · 8
Flowers arranged in paniculate spikes or racemes with opposite flower pairs along the axis · 13
8. Calyx lobes long-acuminate; inflorescence covered in long setae · **11. S. setosa**
Calyx lobes obtuse or recurved and apiculate; inflorescence without long setae but sometimes glandular pilose · 9
9. Corolla < 1.8 cm long; calyx accrescent to 6 mm, acute and often developing a recurved, apiculate tip, never emarginate · · · · · · · · · · · · · · **8. S. capillipes**
Corolla >2.3 cm long; calyx accrescent to c. 8 mm, commonly obtuse and/or emarginate · 10
10. Corolla arcuate, < 3 cm long; inflorescence with pilose axes, the flowers characteristically solitary opposite each branching point · · · · **12. S. euantha**
Corolla straight, > 3 cm long; inflorescence glabrous or glandular-pilose, not branching as above · 11
11. Inflorescence branches arising at 90° from the axis, the ultimate branches very fine · **7. S. tenuiflora**
Inflorescence branches arising at an acute angle from the axis, the ultimate branches relatively stout and resembling the primary branches · · · · · · · 12
12. Corolla broadly funnel-shaped, gradually widened from the base, < 3.5 cm long; upper leaves commonly cordate at the base · · · · · · · · · · · · · **9. S. ovatifolia**
Corolla ventricose and abruptly dilated above the basal tube, > 3.5 cm long; leaves ovate, cuneate · **10. S. hamiltoniana**
13. Calyx glabrous, lobes obtuse, rounded or emarginate, <6 mm long; leaves ovate, brown-pubescent beneath · **13. S. pubescens**
Calyx glandular-pilose except when very immature, lobes acute or acuminate, >6 mm long; leaves glabrescent or if thinly pubescent, hairs whitish · · · · 14
14. Corolla curved, with glandular hairs at least on the lobes; calyx in fruit with one lobe longer than the others, leaves petiolate · · · · · · · · · · **14. S. microcarpa**
Corolla straight, glabrous; calyx lobes subequal even in fruit, upper leaves sessile · 15
15. Leaves narrowly oblong-elliptic, < 4 cm wide; inflorescence densely glandular-pilose · **16. S. tenax**
Leaves ovate, > 5 cm wide; inflorescence sparsely glandular-pilose · **15. S. scoriarum**

In the following account all cited specimens have been seen except those indicated by a question mark or other device. Question marks have only been employed in the case of a few specimens when there is a strong presumption that they are duplicated in the named herbarium.

- Panicles essentially axillary, equalling or shorter than the subtending leaves, the branch tips leafy but not generally flower bearing (Species 1 – 4)

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1. Strobilanthes panichanga (*Nees*) *T. Anderson*, J. Linn. Soc., Bot. 9: 478 (1867)

Asystasia panichanga Nees in Wall., Pl. Asiat. Rar. 3: 90 (1832). Type: India, Meghalaya, "Silhet", *Buchanan-Hamilton* in *Wallich* 2387a (lectotype K-W, **chosen here**).

This is a very distinct species on account of its clearly axillary panicles, the densely pubescent inflorescence branches, corolla and seeds, the strongly accrescent calyx, the very large, ventricose corolla > 4 cm long and the curious pollen in which some of the longitudinal ribs completely encircle the poles. The axillary panicles and the persistent bracts and bracteoles indicate that this species is marginal to the group. However the inflorescence shows no tendency towards a spicate form; it is repeatedly branched, the flowers are mostly solitary, and the bracts small and inconspicuous as in other species of the group. The corolla is white with purple lobes.

Although *Wallich* 2387a and *Wallich* 2387b represent the same species we have selected *Buchanan-Hamilton* in *Wallich* 2387 (K-W) as a lectotype to avoid any ambiguity. It represents the best material of the original syntypes we have seen.

HABITAT AND DISTRIBUTION. A plant of shaded, often secondary bushland from 300 to 1300 m restricted to two separate areas: the Khasi Hills of Meghalaya in NE India and the Kachin Hill region of Upper Burma (Myanmar). Map 1.

CONSERVATION STATUS. Data insufficient but possibly extinct in the Khasi Hills as there are no records from this area since the 19th century, and presumably vulnerable in the Kachin Hills region.

INDIA. Meghalaya: Above Sylhet, *Buchanan-Hamilton* in *Wallich* 1062 (BM), ibid., *Wallich* 2387 (K-W, BM, OXF); Cachar [25°05'N, 92°55'E], pre 1874, *Keenan* s.n. (K).

BURMA. Kachin Hills region: Theinlon [24°37'N, 97°22'E], Myitkyina Distr., 200 – 950 m, 18 Nov. 1912, *Lace* 6033 (E, K); Kachin Hills, 500 m, 10 Dec. 1930, *Kingdon Ward* 9034 (BM, NY); hills south of Sumprabum, 650 – 950 m, 24 Dec. 1931, *Kingdon Ward* 10224 (BM); Sumprabum [26°33'N, 97°34'E], 1300 m, 27 Jan. 1953, *Kingdon Ward* 20442 (BM); SE of Sumprabum, 300 – 650 m, 18 Dec. 1953, *Kingdon Ward* 21704 (BM).

2. Strobilanthes pedunculosa *Miq.*, Fl. Ned. Ind. 2: 803 (1858). Type: Indonesia, Java, *Junghuhn* s.n. (lectotype U, chosen by Bennett & Scotland (2003: 27)).

Lissospermum pedunculosum (Miq.) Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41 (1): 302 (1944).

This species resembles *Strobilanthes panichanga* in its essentially axillary inflorescence and pubescent corolla. The pollen is also similar in having the ribs encircling but not coalescing at the poles, but is unique in *Strobilanthes* in having only two apertures. It is also anomalous in our group because of the essentially spicate nature of the inflorescence but fits it well in other ways. The bracts and bracteoles are caducous, the rigid calyx lobes have a prominent dark midrib, and the inflorescence has a tendency to branch repeatedly in older plants, developing fine, capillary branchlets. It can usually be easily recognised by its large calyx and capsule, both up to 21 mm in length.

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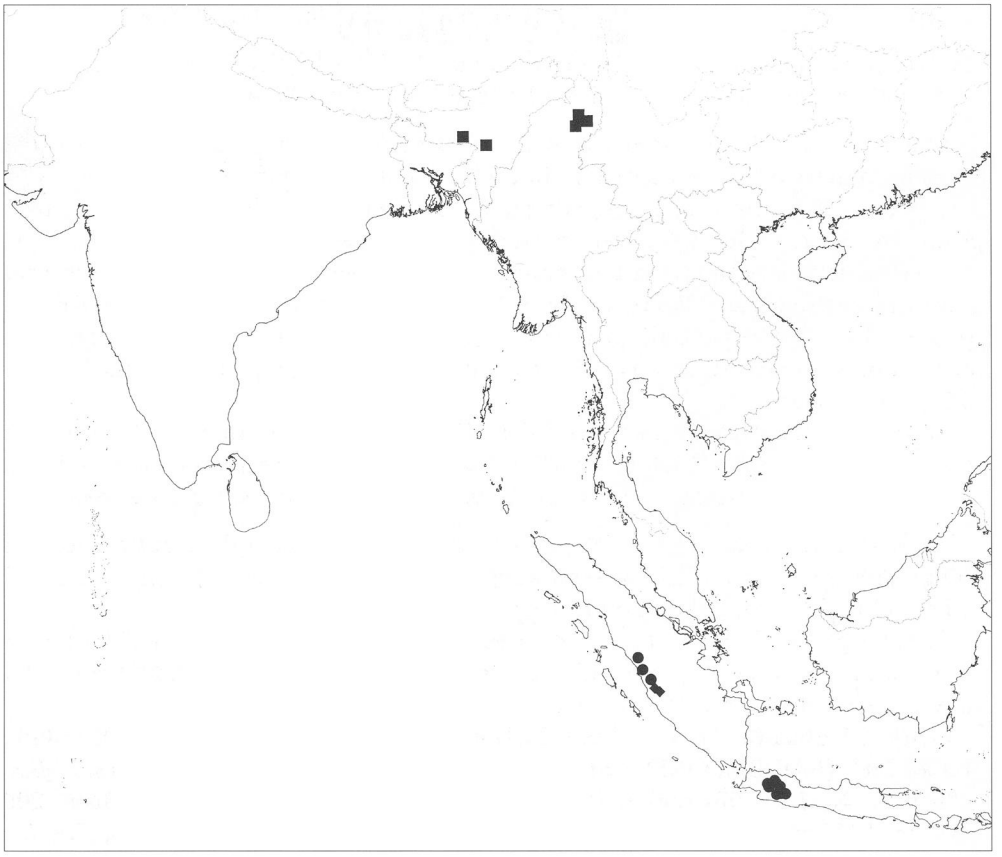

MAP 1. Distribution of *Strobilanthes panichanga* (■), *S. pedunculosa* (●) and *S. ramosissima* (♦).

HABITAT AND DISTRIBUTION. Widespread but scattered in areas of moist hill forest in west Java and on the west coast of Sumatra to 0°24'N (Map 1). Localities are fully cited by Bennett & Scotland (2003: 27) but their map shows the distribution in Sumatra incorrectly.

CONSERVATION STATUS. Insufficient data but probably endangered as we have seen no post-1950 collections.

3. Strobilanthes polybotrya *Miq.*, Fl. Ned. Ind. 2: 803 (1858). Type: Indonesia, Sumatra, *Teysmann* 1188 (U, L, K syntypes).

Diflugossa polybotrya Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41 (1): 239 (1944).

This species is only known with certainty from the type, which is very poor, lacking corollas and capsules. The inflorescence is clearly axillary and appears spicate in nature. The calyx is glabrous and similar in size and shape to that of *Strobilanthes capillipes* and *S. multiflora,* while the buds show the corolla to be glabrous.

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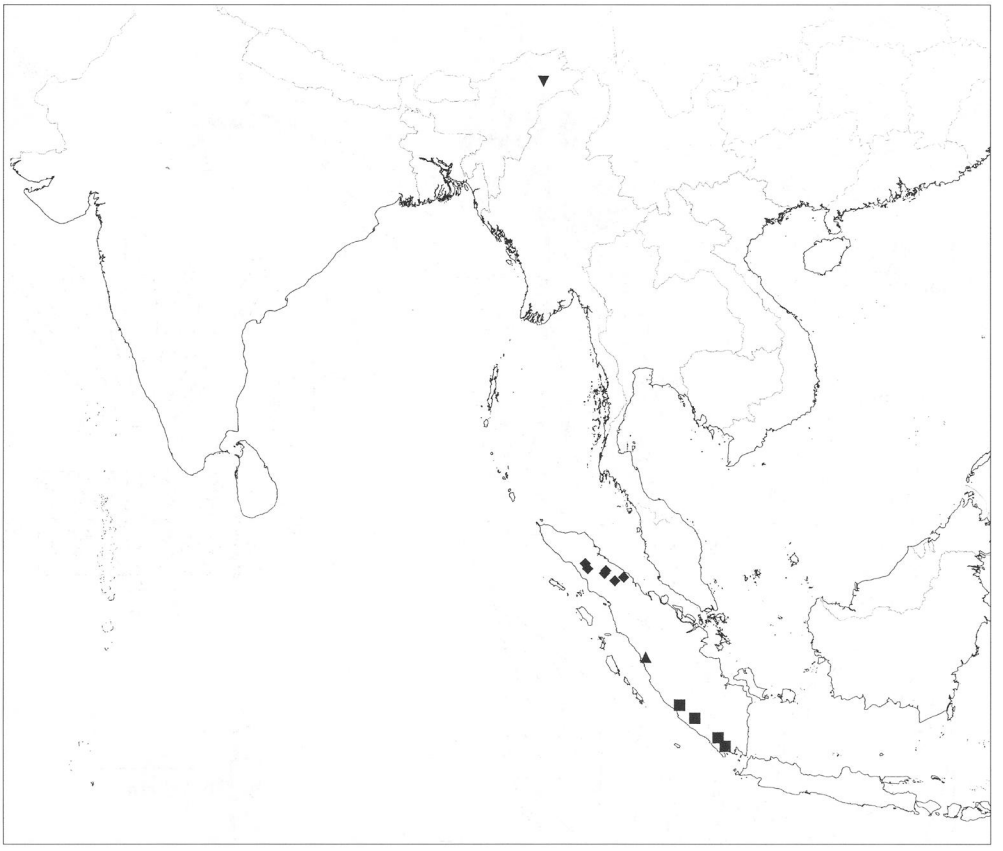

MAP 2. Distribution of *Strobilanthes multiflora* (◆), *S. capillipes* (■), *S. tenax* (▼) and *S. polybotrya* (▲).

HABITAT AND DISTRIBUTION. Known only from the type collection made at Batang Barus [01°00'S, 100°38'E) near Padang in western Sumatra. Map 2.

CONSERVATION STATUS. Insufficient data but possibly extinct.

4. Strobilanthes multiflora *Ridl.*, J. Malayan Branch Roy. Asiat. Soc. 1: 82 (1925). Type: Indonesia, Sumatra, *Ridley* s.n. (K, 2 syntypes).

Diflugossa multiflora (Ridl.) Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41 (1): 240 (1944).

This species is easily confused with others from Sumatra until the essentially axillary nature of the inflorescence is appreciated. The panicles are clearly axillary, relatively short, not exceeding 6 cm in length and very numerous so that the inflorescence is characteristically elongate. The panicle branches arise at an acute angle to the axis and the flowers are quite commonly in opposite pairs although it is difficult to discern any spicate structure. The calyx is about 5 mm long in flower, but

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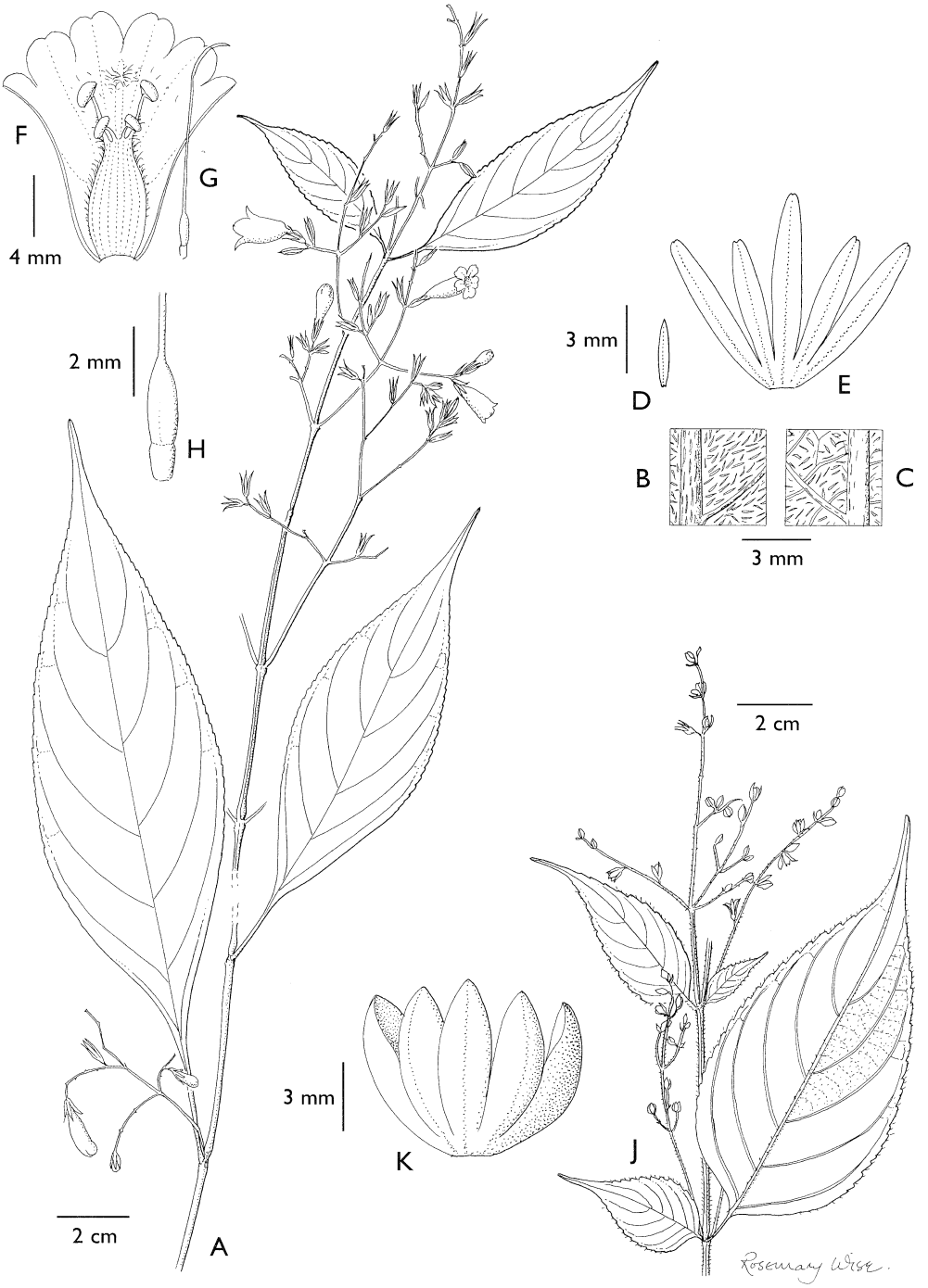

FIG. 1. **A – H** *Strobilanthes multiflora*. **A** habit; **B** adaxial leaf surface; **C** abaxial leaf surface; **D** bract; **E** calyx; **F** corolla; **G** style; **H** ovary. **J – K** *S. pubescens*. **J** habit; **K** calyx. **A – H** drawn from *Ridley* s.n., **J – K** from *de Voogd* 1437 by Rosemary Wise.

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accrescent in fruit with one lobe much longer than the others. The corolla is pure white, glabrous, ventricose from the basal tube and relatively small, not exceeding 2 cm in length. Although we have seen a large number of specimens a curious feature is the absence of fully developed capsules and seeds. It is difficult to believe that such a common species is infertile and it has to be presumed that good seed is only formed under unusual circumstances. Fig. 1A – H.

HABITAT AND DISTRIBUTION. Endemic to highland forest between 800 and 2000 m around Lake Toba and in the Gunung Leuser area of northern Sumatra. Map 2.

CONSERVATION STATUS. Probably low risk

INDONESIA. Sumatra: Bandar Baroe [3°16'N, 98°33'E], 1000 m, 15 July 1917, *Loerzing* 5201 (L); Sibolangit [3°19'N, 98°35'E], E of Bandar Baroe, 900 m, 9 July 1918, *Loerzing* 5792 (L); Berastagi [3°11'N, 98°31'E], Feb. 1921, *Ridley* s.n. (K); Petjeren, Karoland, 22 June 1928, *Carel Hamel & Rahmat Si Toroes* 784 (A, MICH, NY); Near Tigadolok [2°49'N, 99°03'E], above Pematang in gorge of Bah-Kesat, 800 m, 16 July 1933, *Loerzing* 16771 (K, L); Dolok Sopo Raso, headwaters of Aek Mandosi, Toba, Oct. – Dec. 1936, *Rahmat Si Boeea* 10568 (A, L, MICH, NY); Aek Oessim, Asahan [3°00'N, 99°30'E], Oct. 1936, *Rahmat Si Boeea* 10611 (A, L, MICH, NY, US); Dolok Parhorosan, Asahan, near Lake Toba, Oct. – Nov. 1936, *Rahmat Si Boeea* 10675 (A, G, L, MICH, NY, US); Taloen na Oeli, near headwaters of Aek Mandosi, Toba, Oct. 1936, *Rahmat Si Boeea* 10551 (A, G, L, MICH, NY); ibid., Nov. 1936, *Rahmat Si Boeea* 10860 (A, L, MICH); Gunung Ketambe, c. 40 km NW of Kutatjane, Gunung Leuser Nature Reserve, 1700 – 1900 m, 19 July 1972, *de Wilde & de Wilde-Duyfjes* 13784 (K, L); Gunung Ketambe, c. 40 km NW of Kutatjane, 1700 – 2000 m, 6 Aug. 1972, *de Wilde & de Wilde-Duyfjes* 14070 (K, L); Gunung Mamas, 30 km NW of Katatjane, Gunung Leuser Nature Reserve, 1500 – 1800 m, 7 May 1975, *de Wilde & de Wilde-Duyfjes* 16684 (K, L, MO, US).

- Panicles essentially terminal, the branches trifurcate, arising at or close to 90° to the axis (Species 5 – 7)

5. Strobilanthes bunnemeyeri *J. R. I. Wood,* **nom. nov.**

Diflugossa glandulosa Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41 (1): 242 (1944), non *Strobilanthes glandulosa* Blume (1826). Type: Indonesia, Sumatra, *Bunnemeyer* 10256 (holotype L).

The inflorescence of this species is formed of relatively small but distinctly terminal panicles in which the branches spread at a wide angle although not truly at 90°. The corolla is pale lilac, smaller than in related species, reaching only about 1.8 cm in length but rather dilated at the mouth and shortly puberulent on the lips. It is distinguished from all close relatives by the fine, white pubescence that covers all the inflorescence including the calyx. Glandular hairs also commonly develop as the inflorescence matures but the eglandular white hairs are always present. The calyx has lanceolate lobes, which taper to the apex and the leaves at the panicle branching points are often cordate-based. Apart from *Strobilanthes ramosissima* it is the only species with only two fertile stamens. Fig. 2.

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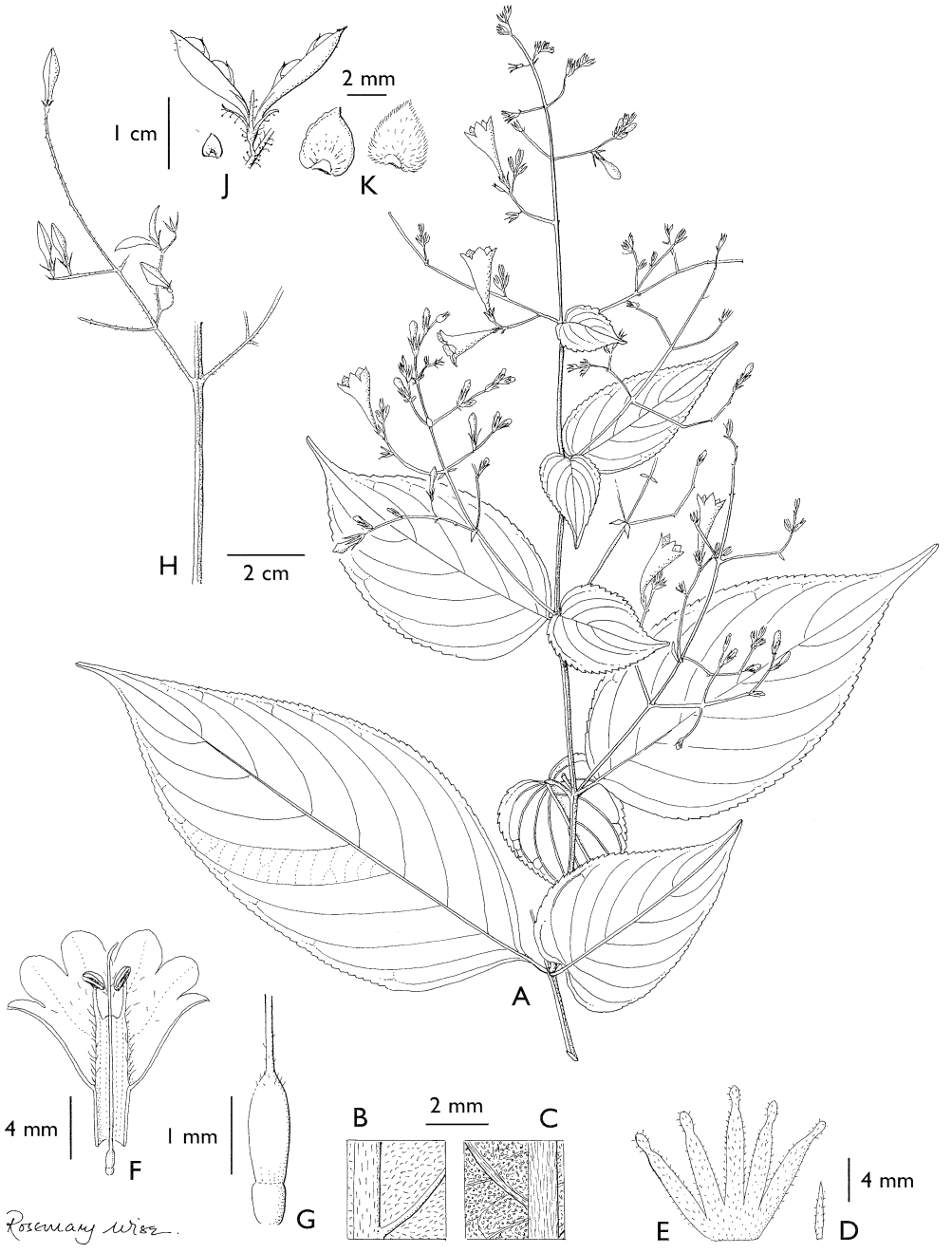

FIG. 2. *Strobilanthes bunnemeyeri*. **A** habit; **B** adaxial leaf surface; **C** abaxial leaf surface; **D** bract; **E** calyx; **F** corolla; **G** ovary; **H** portion of branch in fruit; **J** capsule; **K** seeds, dry and wetted. **A, D – G** drawn from *Rahmat Si Boeea* 11404, **B – C** from *Rahmat Si Boeea* 10648 and **H – K** from *Beccari* 128 by Rosemary Wise.

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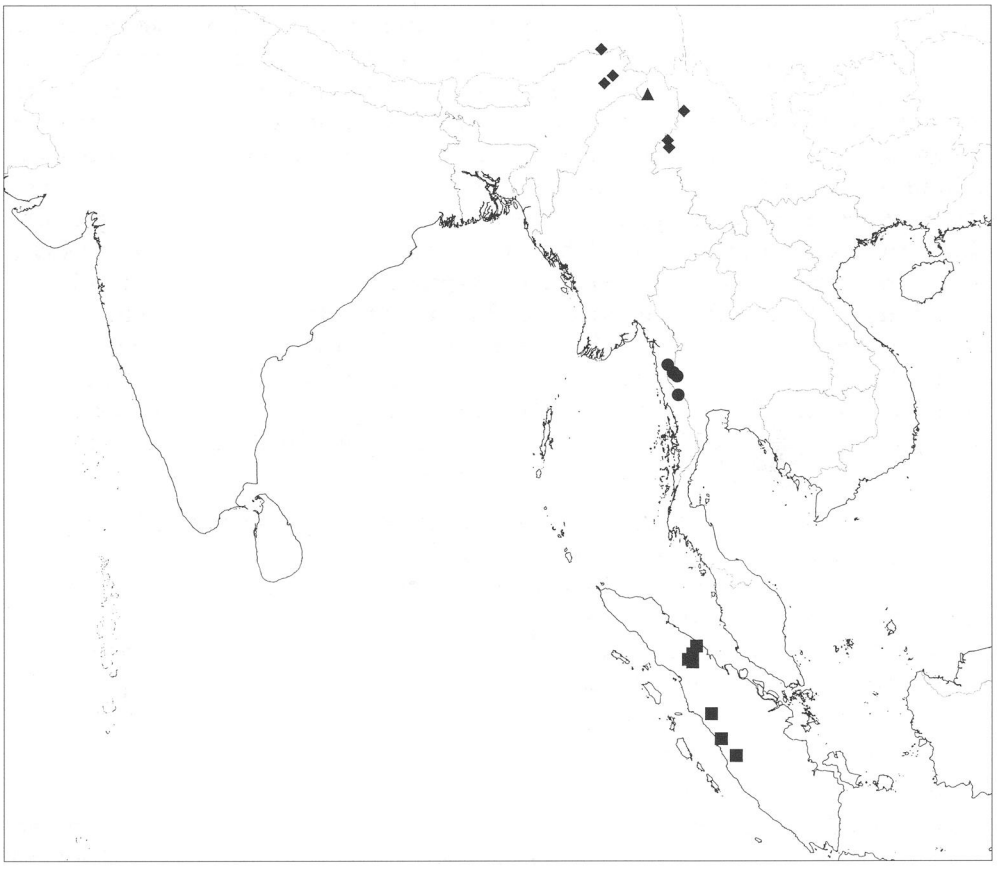
HABITAT AND DISTRIBUTION. Endemic to the mountains east of Padang and to the Lake Toba area in central/northern Sumatra. Map 3.

CONSERVATION STATUS. Insufficient data but probably low risk.

INDONESIA. Sumatra: West coast: Gunung Singalan, Padang highlands [0°08'N, 100°10'E], June – July 1878, *Beccari* 128 (BM, K, L); Gunung Singalan, 1400 m, 26 July 1894, *Schiffner* 2611 (L); Gunung Kerintje [1°42'S, 101°16'E], 2200 m, 7 May 1920, *Bunnemeyer* 10256 (L); Lubuk Sulasih [0°58'N 100°36'E], Padang, 1200 m, 30 June 1953, *Borssum* 2763 (K). Northern highlands: Taloen na Oeli, near headwaters of Aek Mandosi, Toba, 29 July 1936, *Rahmat Si Boeea* 9730 (A, MICH); Loemban Loboe [2°31'N, 99°08'E], km 142, Porsea-Prapat road, July 1936, *Rahmat Si Boeea* 9828 (A, MICH); ibid., Oct. – Nov. 1936, *Rahmat Si Boeea* 10421 (A, MICH, NY); ibid., *Rahmat Si Boeea* 10868 (A, MICH, US); Aek Garoenggang, Asahan [3°02'N, 99° 2'E], 16 Nov. 1936, *Rahmat Si Boeea* 10331 (A, MICH); Aek Si Tamboerak, Asahan, 28 Oct. 1936, *Rahmat Si Boeea* 10648 (A, MICH, US); Dolok Ri da Bolak, Loemban Loboe to Taloen na Oeli, Toba, Oct. – Dec. 1936, *Rahmat Si Boeea* 11249 (A, G, MICH, NY); Aek Riman, E of Loemban Loboe, Toba, Nov. – Dec. 1936, *Rahmat Si Boeea* 11404 (A, MICH).



MAP 3. Distribution of *Strobilanthes bunnemeyeri* (■), *S. microcarpa* (●), *S. scoriarum* (♦) and *S. setosa* (▲).

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All the specimens from the west coast around Padang including the type have stalked glands on the inflorescence, and fruiting specimens in particular look rather different from the mostly eglandular collections from the Lake Toba area. The differences merit investigation but may not be significant.

6. Strobilanthes ramosissima *J. R. I. Wood*, **sp. nov.** habitu et calyce glabro ad *S. capillipem* C. B. Clarke ex Ridl. accedens sed floribus diandris, non tetrandris, paniculae trichomatibus glandulosis indutis ab ea recedens. Speciebus affinibus omnibus calyce parvo (usque 3.5 mm) et corolla parva (usque 1.6 cm) dignoscenda. Typus: Indonesia, Sumatra, *Robinson & Kloss* s.n. ex Scolak Dras (holotypus BM, isotypi K, SING).

Anisophyllous perennial herb of unknown height; stems glabrous or very obscurely bifariously hirtellous. Leaves petiolate, unequal in each pair, the smaller about two thirds the larger; petioles 0.5 – 4.5 cm long; blades 2 – 16 × 0.5 – 8 cm, narrowly elliptic, ovate above, acuminate, at the base cuneate to rounded or (above) cordate, serrate, glabrous and with prominent cystoliths on both surfaces. Inflorescence a large, much-branched, terminal panicle, the branches spreading at right angles to the axis, glabrous except for scattered, long, glandular trichomes which develop as the inflorescence matures; bracts at panicle branching points resembling reduced leaves, diminishing in size upwards and absent from the upper branches; flowers solitary at the apex of small capillary branchlets; floral bracts 1 × 0.5 mm, oblong-obovate, rounded, glabrous, caducous; bracteoles similar; calyx 2.5 – 3.5 mm long, glabrous, cup-shaped, the lobes 2 – 2.5 × 0.3 – 0.5 mm, oblong, obtuse, subequal, cystoliths prominent; corolla 1.3 – 1.6 cm long, white or pinkish-white, outside glabrous, inside glabrous except for the hairs retaining the style, weakly ventricose from a short relatively stout tube c. 3 mm long, c. 5 mm wide at the mouth, lobes broadly ovate, rounded, 3 × 3 mm; fertile stamens 2, included, the two inner reduced to staminodes 0.5 – 1 mm long, outer filaments often unequal in length, 3 – 5 mm long, glabrous, anther cells 1.25 × 1 mm, ellipsoid, glabrous; pollen ellipsoid, ribbed, scalariform, tricolporate; style c. 11 mm long, glabrous; ovary glabrous. Capsule 11.5 – 13 mm long, narrowly fusiform, glabrous, 4-seeded; seeds 2.5 × 1.5 mm, lenticular, minutely puberulent. Fig. 3A – H.

HABITAT AND DISTRIBUTION. Endemic to the area around Gunung Kerintje in Western Sumatra, where it grows around 1000 m. Map 1.

CONSERVATION STATUS. Insufficient data but possibly endangered or extinct as we have seen no collection since 1954.

INDONESIA. Sumatra: Mount Kerinche area: Scolak Dras area, Kerintje valley, 950 m, 14 March 1914, *Robinson & Kloss* s.n. (BM, K, SING); Barong Baru, Japan, 1250 m, 4 June 1914, *Robinson & Kloss* 33 (BM); Kota Limo Manis, Sungai Tanduk, Kayoe Aro Estate, 7 March 1954, *Alston* 14303 (BM, ?BO).

This species resembles *Strobilanthes bunnemeyeri* in having only two fertile stamens but is immediately distinguished by the absence of short, white hairs on the inflorescence branches, calyx and corolla. Ridley originally included the type specimen among the syntypes of *Strobilanthes capillipes* but it differs in having only 2

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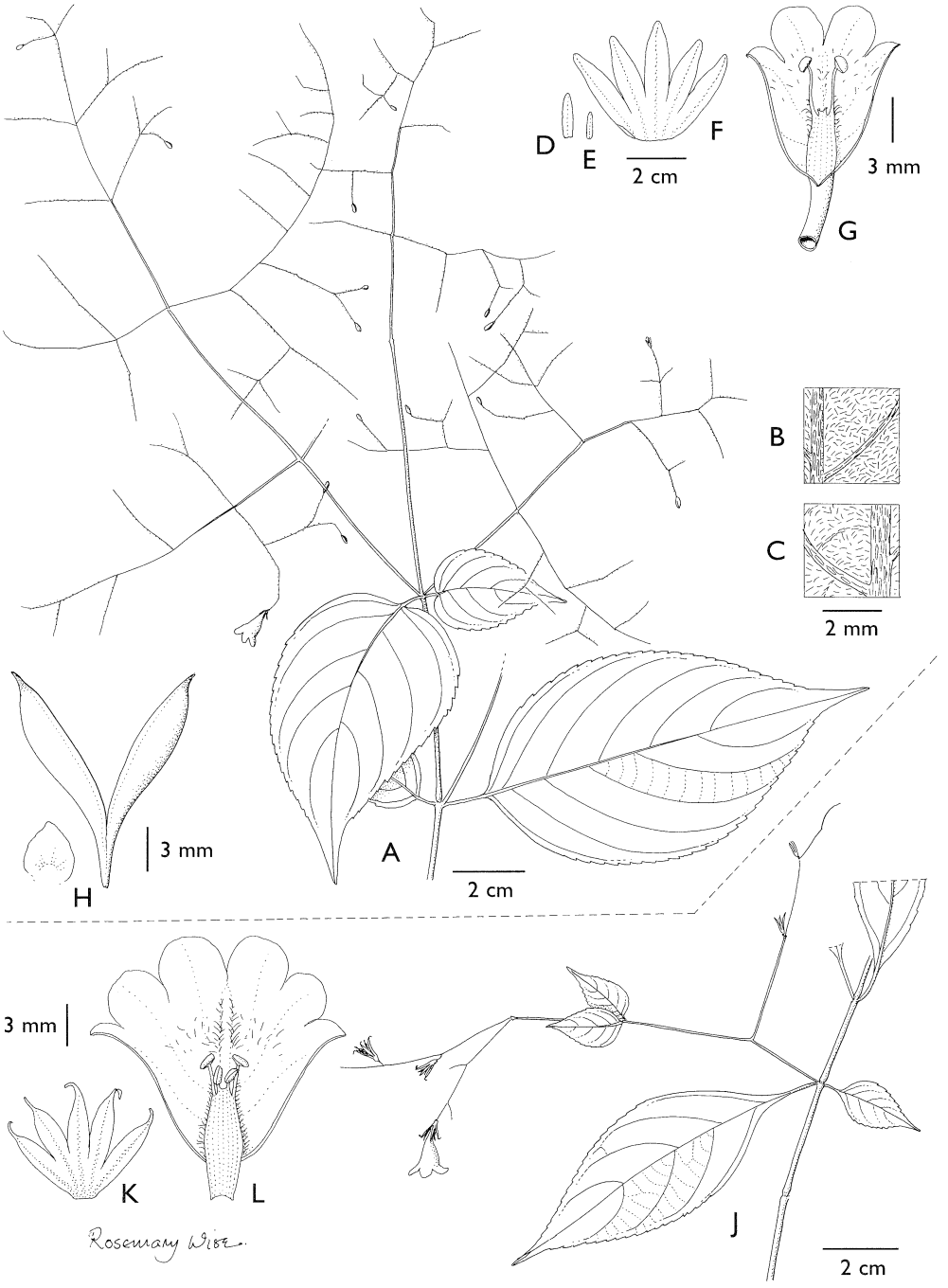

FIG. 3. **A – H** *Strobilanthes ramosissima*. **A** habit; **B** adaxial leaf surface; **C** abaxial leaf surface; **D** bract; **E** bracteole; **F** calyx; **G** corolla; **H** capsule and seed. **J – L** *S. capillipes*. **J** habit; **K** calyx; **L** corolla. **A – J** drawn from *Robinson & Kloss* s.n.; **J – L** from *Forbes* 1867 by Rosemary Wise.

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fertile stamens and in the much-branched and strongly divaricate inflorescence. The unusually small calyx and corolla serve to distinguish it from all related species and the stiff glandular hairs found on ageing panicles resemble only the setae found on *Strobilanthes setosa.*

7. Strobilanthes tenuiflora *J. R. I. Wood*, **sp. nov.** corolla alba, glabra ad *S. hamiltonianam* accedens sed ramis inflorescenciae gracilibus ad angulum 90° patentibus, lobis calycis brevioribus, usque 6 mm longis ab ea recedens. Typus: Thailand, Chiangmai, *Garrett* 488 (holotypus K, isotypus KYO).

Anisophyllous undershrub c. 1 m high. Stems sulcate, glabrous. Leaves in unequal pairs, the smaller about a third to a quarter the size of the larger one, petiolate; petioles 0.1 – 3.4 cm long, usually very short on the smaller leaf, often sulcate, glabrous; blades 1 – 13 × 0.5 – 8 cm wide, ovate or ovate-elliptic, acuminate at the apex, broadly cuneate, rounded or, most commonly cordate to an asymmetric base, weakly serrate to subentire, glabrous except for an occasional multicellular hair in the sinuses of the leaf teeth, veins raised beneath, cystoliths prominent especially above. Inflorescence a glabrous, terminal panicle, the branches repeatedly 3-forked at almost 90° and the ultimate branchlets very delicate, 1-flowered; bracts subtending the panicle branches resembling reduced leaves, diminishing in size upwards; bracts and bracteoles c. 1 mm long, subulate, caducous before the flowers open, their presence usually evident only by scars; calyx 4 – 6 mm long at anthesis, accrescent to c. 8 mm, 5-lobed to just above the base with one lobe slightly longer than the others, glabrous, lobes oblong or oblong-lanceolate, pale-margined, the apex emarginate, the teeth becoming apiculate; corolla 3.2 – 4 cm long, white, glabrous, straight, basal tube 6 – 10 mm long, then weakly ventricose and gradually widened to 1.5 cm at the mouth, lobes ovate, acute, c. 5 × 5 mm; fertile stamens 4, didynamous, included; filaments glabrous, the longer pair 4 – 5 mm long, the shorter pair c. 0.5 mm long; anthers rounded, c. 1 mm wide; style 2.5 – 3.2 cm long, glabrous; ovary glabrous. Capsule 1.4 – 1.5 cm long, oblong in outline, acuminate, glabrous, 4-seeded; seeds c. 2 × 1.5 mm, lenticular, pubescent with mucilagineous hairs. Fig. 4A – H.

HABITAT & DISTRIBUTION. Endemic to NW Thailand where it grows near mountain waterfalls between 600 and 1400 m. Map 4.

CONSERVATION STATUS. Insufficient data but probably low risk.

THAILAND. Chiangmai: Doi Angka (Inthanon], east slope, Mae Ka Pak above waterfall, 1400 m, 22 Oct. 1927, *Garrett* 488 (K, KYO); Doi Inthanon, Chan (?Chom) Thong Dist, Mae Pau Waterfall, 1100 m, 18 Oct. 1979, *Shimizu et al.* 18945 (K); Doi Inthanon, Wachiratharn Waterfall, 800 m, 9 Jan. 1983, *Koyama, Terao & Wangpresert* 32190 (BKF, K). Kanchanaburi: Wangka [15°08'N, 98°30'E], 600 m, 30 Jan. 1926, *Kerr* 10346 (BM, K); ibid., 1200 m, *Kerr* 10451 (BM, K).

Strobilanthes tenuiflora is related to *S. hamiltoniana* but differs principally in the different shape of its inflorescence, whose branchlets are repeatedly divided into three at angles of about 90°, with the ultimate branches very delicate and bearing only a single flower. Additionally it is strongly anisophyllous with leaves cordate or

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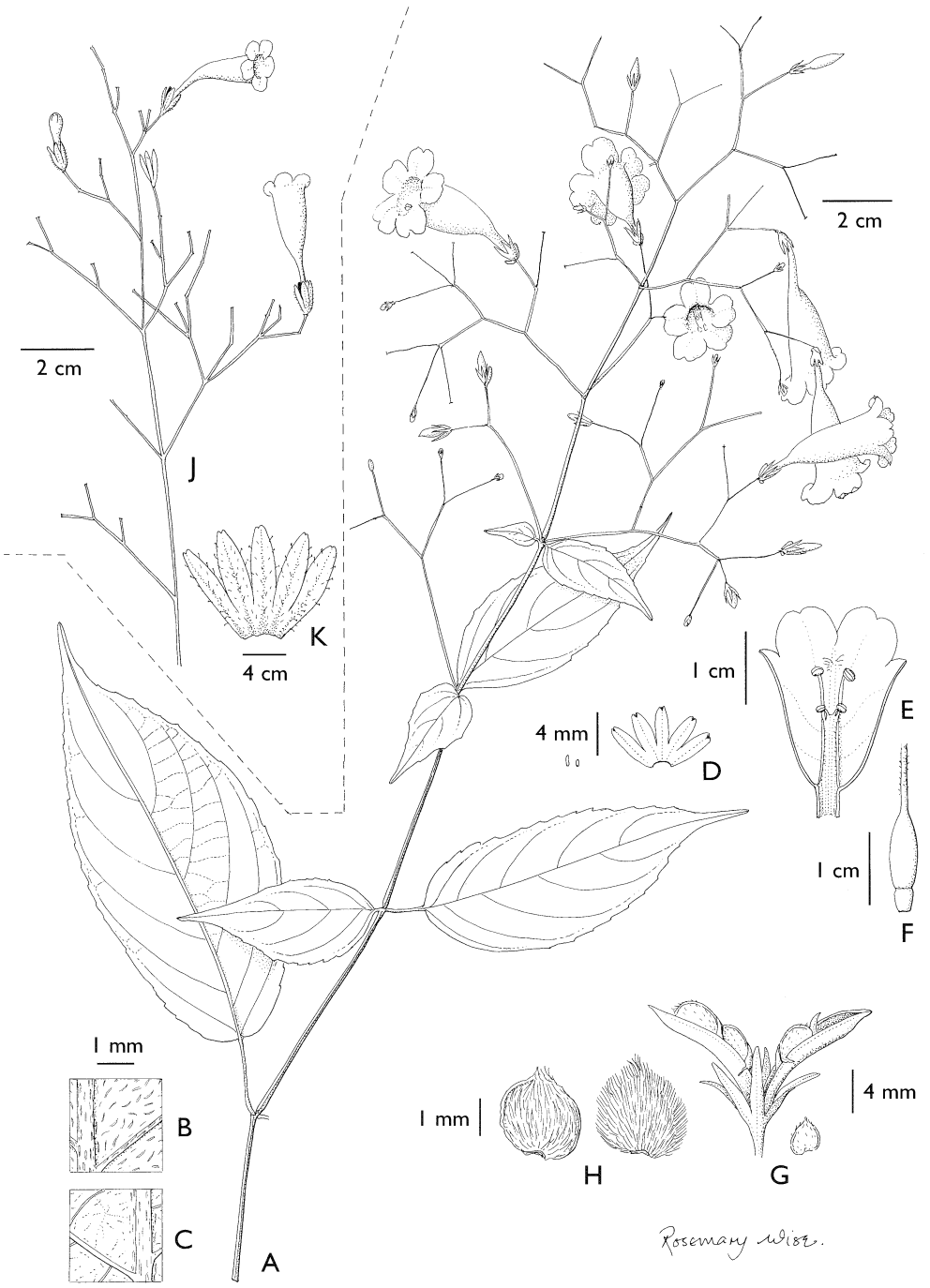

FIG. 4. **A – H** *Strobilanthes tenuiflora*. **A** habit; **B** adaxial leaf surface; **C** abaxial leaf surface; **D** calyx; **E** corolla; **F** ovary; **G** fruit and seed; **H** seed. **J – K** *S. hamiltoniana*. **J** portion of inflorescence; **K** calyx. **A – F** drawn from *Garrett* 488, **G – H** from *Kerr* 10346 and **J – K** from *Stainton* 6067 by Rosemary Wise.

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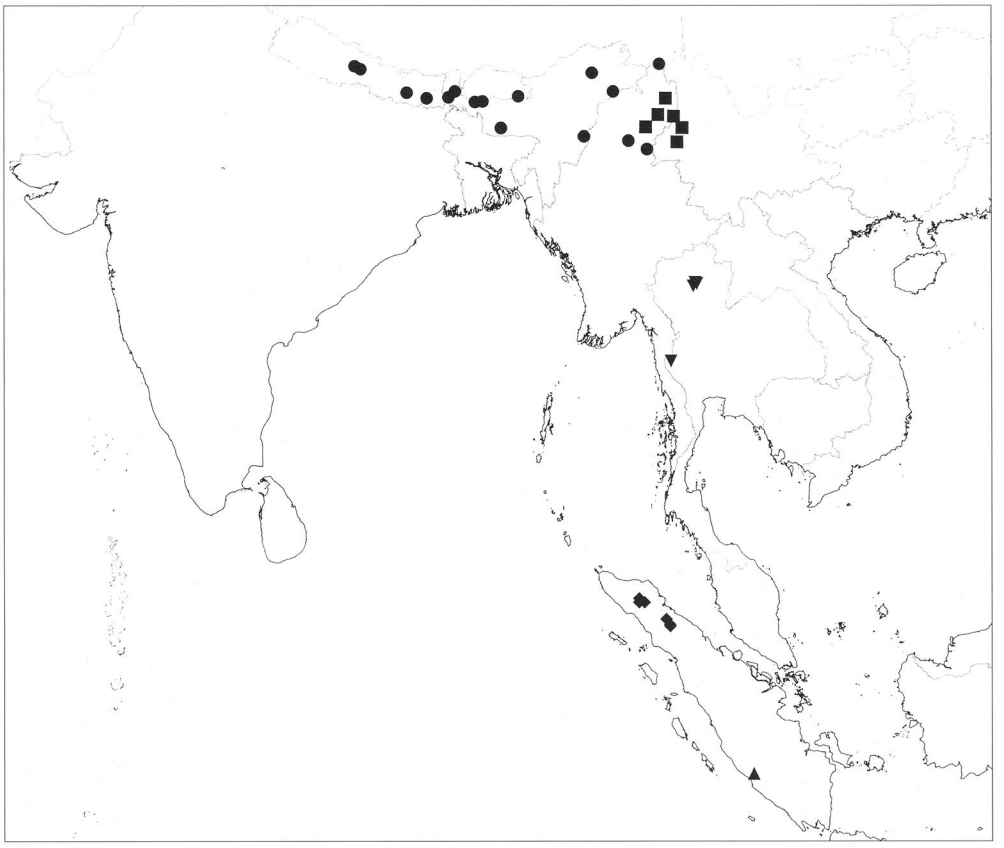

MAP 4. Distribution of *Strobilanthes ovatifolia* (♦), *S. hamiltoniana* (●), *S. euantha* (■), *S. tenuiflora* (▼) and *S. pubescens* (▲).

truncate at the base. The calyx lobes are narrowly oblong, usually emarginate and slightly shorter than in *Strobilanthes hamiltoniana*. Of the specimens cited above *Kerr* 10346 lacks all flower parts and might not belong here.

- Panicles essentially terminal, trifurcate, the branches arising at a wide but acute angle from the axis (Species 8 – 10)

8. Strobilanthes capillipes [*C. B. Clarke ex*] *Ridl.*, J. Fed. Malay States Mus. 8: 71 (1917). Type: Indonesia, Sumatra, *Forbes* 1867 (lectotype K, **chosen here**, isolectotypes A, BM, L, ? CAL).

Diflugossa capillipes ([C. B. Clarke ex] Ridl.) Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41 (1): 239 (1944).

This species develops small axillary panicles similar to those of *S. multiflora* but goes on to produce terminal panicles as well. The branches arise at a wide angle but never at 90° as characteristically in the three previous species. The inflorescence

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branches, calyx and corolla are glabrous. The calyx is about 5 – 6 mm long, pale-bordered with a dark green midrib, oblong-lanceolate with an acute or apiculate tip, which is commonly recurved. The corolla is funnel-shaped as in other Sumatran species and c. 1.7 – 2 cm long. Fig. 3J – L.

When describing *S. capillipes*, Ridley cited *Robinson & Kloss* s.n. from Scolak Dras as a syntype together with the Forbes collections listed below, which Clarke had annotated with the name *Strobilanthes capillipes*. He thus included two different species under the same name and lectotypification is clearly needed. Ridley's description is in many ways unsatisfactory as it does not mention a number of the important characters and could fit either species. In choosing a lectotype we have selected the Kew specimen of *Forbes* 1867 to conserve Clarke's original species concept, which coincides with Bremekamp's (1944: 239) redefinition of the species. Isolectotypes are quite widely distributed in important herbaria.

HABITAT AND DISTRIBUTION. Restricted to hill forest, between 700 and 1500 m in SW Sumatra. Endemic to SW Sumatra. Map 2.

CONSERVATION STATUS. Insufficient data but recorded as common in the most recent collection and probably low risk.

INDONESIA. Sumatra (SW): without data, *Forbes* 1857c (BM); Gunong Tanggamus ("Kaiser's Peak") [5°25'S, 104°42'E], Lampong Range, 700 – 1500 m, 10 Oct. 1880, *Forbes* 1867 (A, BM, K, L, ?CAL); ibid., 11 July 1918, *de Voogd* 162 (L); Mount Dempo [4°02'N, 103°09'E], 1150 m, 1881, *Forbes* 2166 (BM, K, ? CAL); Bukit Palelawan Natural Reserve, 400 – 1450 m, 10 – 14 Feb. 1983, *Afriastini* 769 (K, ? BO); Rimbo Pengadang near Gunong Daun [3°23'S, 102°22'E], *Jacobson* 113 (L, n.v. *fide* Bremekamp (1944): 239).

9. **Strobilanthes ovatifolia** (*Bremek.*) *J. R. I. Wood*, **comb. nov.**

Diflugossa ovatifolia Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41 (1): 241 (1944). Type: Indonesia, Sumatra, *Pringo Atmodjo* 22 (holotype L).

This species has a large, open, lax terminal panicle, the branches repeatedly 3-forked at an acute angle (in "triads" in Bremekamp's (1944: 242) phrase) in a very similar way to the inflorescence branching of *Strobilanthes hamiltoniana*. The calyx lobes are broadly oblong and obtuse and the upper leaves and bracts at the inflorescence branching points are subsessile and usually cordate. As in *Strobilanthes hamiltoniana* the inflorescence branches are usually glabrous but sometimes glandular-pilose. Indeed, the only real distinction between the two species lies in the shape of the corolla. In *Strobilanthes hamiltoniana* it is ventricose and abruptly widened from a short basal tube while in *S. ovatifolia* it is gradually widened from a very short basal tube. Additionally, in *Strobilanthes ovatifolia* the corolla is usually less than 3 cm long and the ultimate branchlets are commonly shorter. The flowers appear to be always white.

HABITAT AND DISTRIBUTION. Endemic to but widespread in mountain forest in northern Sumatra between 1100 and 1800 m. Map 4.

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CONSERVATION STATUS. Data insufficient but probably low risk.

INDONESIA. Sumatra (N): Gajo Luas, *Boer ni Paja* (*fide* Bremekamp 1944: 242), Gajoland [4°15'N, 97°05'E approx], 1904, *Pringo Atmodjo* 22 (L); Boer ni Bias, Aceh, 1300 m, 1934, *van Steenis* 6176 (A, L); confluence of Rivers Kapi and Aoenan, Gajoland, Aceh, 1100 m, 20 March 1937, *van Steenis* 9885 (K, SING); ibid., 1100 – 1250 m, 21 March 1937, *van Steenis* 9916 (A, K, SING). Sumatra (Toba): NW of Berastagi, 21 April 1919, *Loerzing* 6793 (K, L); Deleng Singkoet, Karo Highlands, 8 June 1928, *Carel Hamat & Rahmat Si Toroes* 527 (A, MICH, NY); Barastagi [3°11'N, 98°31'E], Dec. 1930, *Symington* 23976 (SING); Trail from Goodyear Bungalow to Sibayak Volcano [3°15'N, 98° 0'E], 1500 – 1800 m, 14 Feb. 1932, *W. & C. Bangham* 1005 (A, NY).

10. Strobilanthes hamiltoniana (*Steud.*) *Bosser & Heine*, Bull. Mus. Natl. Hist. Nat., B, Adansonia 10 (2): 148 (1988).

Goldfussia colorata Nees in Wall., Pl. Asiat. Rar. 3: 89 (1832). Type: India, Borjora, *Buchanan-Hamilton* in *Wallich* 2388 (syntype K-W).

Ruellia hamiltoniana Steud., Nomencl. Bot., Ed. 2: 481 (1840). Type as for *Goldfussia colorata.*

Strobilanthes colorata auct. *sensu* T. Anderson (1867) et Clarke (1884), non *S. colorata* Nees (1836).

Diflugossa colorata (Nees) Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41 (1): 237 (1944).

Goldfussia crinita Nees in DC., Prodr. 11: 176 (1847). Type: India, Assam, *Griffith* s.n. (holotype K ex Herb. Hook.).

Strobilanthes crinita (Nees) T. Anderson, J. Linn. Soc., Bot. 9: 481 (1867).

Strobilanthes colorata var. *crinita* (Nees) C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 473 (1884).

Diflugossa crinita (Nees) Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41 (1): 246 (1944).

This is a well-known species both in the wild and in cultivation. The inflorescence is a large terminal panicle with the branches arising at an acute angle from the rhachis. The calyx is oblong, obtuse or emarginate and with a prominent dark green midrib. The corolla is straight and, at 3.5 – 4 cm in length, large for the group. Fig. 4J – K.

The whole inflorescence is normally glabrous but in older plants becomes glandular-pilose on the inflorescence branches. Although this state was recognised by Nees (1847), Anderson (1867) and Bremekamp (1944) as a distinct species, *Strobilanthes crinita*, and by Clarke (1884) as a variety, we do not believe it is any more than a development stage. It is only seen on older, fruiting plants and never on cultivated plants, which seem to be always sterile and without capsules. Cultivated plants seem also to have been selected for their deep pink corolla, whereas in wild plants the corolla is very pale lilac or white.

When Anderson (1867) published his account of Indian *Acanthaceae* he rejected many of the smaller genera established by Nees and included them in *Strobilanthes.* He placed Nees' *Goldfussia colorata* in *Strobilanthes*, ignoring the fact that Nees had

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earlier described another species from Sri Lanka under this name. Clarke followed Anderson in misapplying the name *Strobilanthes colorata* and this misapplication persisted well into the 20th century.

Both Bremekamp (1944: 237) and Wood (1994: 223) have mistakenly treated *Strobilanthes laevigata* C. B. Clarke as a synonym of *S. hamiltoniana*. Recent examination of the type of *Strobilanthes laevigata* shows that it is either a distinct species or a very odd form of *S. multidens* C. B. Clarke. It is not related to *S. hamiltoniana*.

HABITAT AND DISTRIBUTION. Locally frequent in moist places in hill forest from 200 – 1400 m along the Himalayas from Central Nepal to the Brahmaputra bend; also in the hills on the Indo-Burmese border and, very locally, in Upper Burma. Also widely cultivated in warm countries. Map 4.

CONSERVATION STATUS. Low risk

Representative specimens, with glandular forms corresponding to *Goldfussia crinita* Nees noted:

NEPAL. Pokhara [28°14'N, 83°59'E], 1200 m, 7 Sept. 1954, *Stainton, Sykes & Williams* 7141 (BM) — eglandular; Phusri-Sanguri Bhanjang-Dhar Pani, 16 Oct. 1963, *Hara et al.* 6303719 (TO, BM) — eglandular; Sisaghat, Mardi Khola [28°06'N, 84°15'E], 500 m, 18 Oct. 1967, *Stainton* 6067 (BM) — glandular; Sukhchauri [27°04'N, 86°22'E], 1000 m, 7 Nov. 1954, *Zimmermann* 2098 (G, K); N of Dharan [26°49'N, 87°17'E], 1200 m, 20 Oct. 1980, *Schilling* 2452 (BM) — glandular.

BHUTAN. Kalikola [26°42'N, 89°51'E], 700 m, 10 Oct. 1988, *Wood* 6789 (E, FHO, THIM) — glandular and eglandular portions; Satsalor [26°56'N, 91°29'E], 950 m, 13 Nov. 1938, *Ludlow, Sherriff & Taylor* 7256 (BM) — glandular.

INDIA. Darjeeling Distr.: Dumsong [27°08'N, 88°35'E], 700 m, 12 Oct. 1869, *Clarke* 9967 (K) — eglandular; Kurseong [26°52'N, 88°17'E], 1300 m, 26 Oct. 1939, *Biswas* 3749 (A, CAL) — eglandular. West Bengal Duars: Pakihagi, 9 Jan. 1912, *Lister* 23 (BM) — glandular. Arunachal Pradesh: Aka Hills, *fide* Kanjilal *et al.* 1939: 434. Nagaland: Tirap R. [27°10'N, 95°48'E], 7 Sept. 1945, *Juan* 188 (BM, US) — eglandular; Manipur: Sirhoi [25°10'N, 94°29'E], 1300 – 1600 m, 11 Oct. 1948, *Kingdon Ward* 18202 (BM, NY) — glandular. Meghalaya: Nunklao, 21 Oct. 1850, *Hooker & Thomson* (BM, K, W) — eglandular; Nengkhra [25°31'N, 90°42'E], Garo Hills, 400 m, 6 Aug. 1930, *Parry* 1217 (K) — glandular.

BURMA (MYANMAR). Myitkyina Region: Theinlon [24°37'N, 97°22'E], 200 m, 18 Nov. 1912, *Lace* 6036 (K) — eglandular; Hills W of Hopin [24°59'N, 96°31'E], 22 Nov. 1925, *Parkinson* 358 (K) — eglandular.

CHINA. Xizang Ziziqu (Tibet): [28°25'N, 97°55'E], 600 – 950 m, 3 Dec. 1931, *Kingdon Ward* 10196 (BM) — glandular.

- Panicles essentially terminal, the branchlets arising opposite a flower and often flexuose (Species 11 – 12)

11. Strobilanthes setosa *J. R. I. Wood*, Edinburgh J. Bot. 51 (2): 259 (1994). Type: Burma (Myanmar), E of Putao, *Kingdon Ward* 13572 (holotyype BM). Fig. in Wood 1994: 263.

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Readily distinguished by the rigid gland-tipped setae on the inflorescence, the long acuminate calyx lobes, and the flexuous branching of the inflorescence.

HABITAT AND DISTRIBUTION. Endemic to the Kachin Hills in Upper Burma (Myanmar) and known only from two old collections (Wood 1994: 259), one unlocalised (*Toppin* s.n.) and the other (*Kingdon Ward* 13572) from hills east of Putao [27°22'N, 97°24'E]. Map 3.

CONSERVATION STATUS. No data but probably endangered.

12. Strobilanthes euantha *J. R. I. Wood,* **sp. nov.** *S. hamiltonianae* affinis, a qua differt marginibus foliorum pilosis, floribus pendulis, corolla curvata, parviore, usque 3.5 cm longa, solitaria, pedicellata, ramulorum saepe flexuosorum opposita disposita. Typus: China, Yunnan, *Li Heng, Bartholomew & Dao Zhi-Ling* 10336 (holotypus CAS).

Weakly anisophyllous perennial herb 0.5 – 1.5 m high. Stems dark green, glabrous, deeply sulcate and ridged. Leaves petiolate; petioles 0 – 2.6 cm long, glabrous, blades 4 – 20 × 3 – 12 cm, ovate, ovate-elliptic, apex acuminate, base cordate or abruptly narrowed and often somewhat asymmetric, margin strongly to very obscurely serrate, above with prominent cystoliths, below paler and with prominent veins, glabrous on both surfaces but sparsely to densely pilose on the margins and occasionally on some main veins, especially above. Inflorescence a large open terminal panicle, bearing a mixture of fertile flowers and numerous small undeveloped flowers even on fruiting specimens; fertile flowers very shortly pedicellate, pendulous, solitary and commonly arising opposite a small branchlet; axis and branches glandular-pilose, leaf-like bracts at panicle branching points lanceolate or ovate, resembling reduced leaves, ultimate branches very delicate and commonly flexuous; bracts and bracteoles 1 – 2 mm long, obovate, rounded, caducous before the flowers open; their presence usually evident only by scars; calyx 4 mm long in flower, accrescent to c. 7 mm in fruit, glabrous, 5-lobed to c. 1 mm above the base, lobes oblong or oblanceolate, obtuse, truncate or emarginate; corolla 2.2 – 3.5 cm, pale lavender or pale pink, glabrous, arcuate, basal tube 6 – 19 mm long, then ventricose and widened to 8 – 10 mm at the mouth, lobes c. 4 × 4 mm ovate, acute; fertile stamens 4, didynamous, the two longer ± exserted, filaments glabrous, the longer pair 10 – 12 mm long, the shorter pair c. 2 mm long; recurved; anthers rounded, c. 1 mm; style 2.2 – 2.7 cm long, glabrous; ovary glabrous. Capsule 1.4 cm long, oblong-oblanceolate in outline, acuminate, glabrous, 4-seeded; seeds c. 2.5 × 2 mm, lenticular, pubescent with mucilagineous hairs. Fig. 5.

HABITAT & DISTRIBUTION. Apparently locally frequent in moist evergreen forest near streams along the Chinese-Burma border centred on the Gaoligong Shan region between about 1350 – 2300 m. Map 4.

CONSERVATION STATUS. Insufficient data but probably low risk.

BURMA (MYANMAR). NE Upper Burma, 2300 m, Sept. 1924, *Forrest* 24901 (K); Laukhaung [25°45'N, 97°10'E approx.], 950 – 1900 m, 24 Nov. 1938, *Kingdon Ward* 24 (A, ?NY); Mahtum [26°09'N, 97°52'E], 1450 m, 2 Sept. 1939, *Kaulback* 375 (BM); North Triangle, Hkinlum [26°53'N 98°12'E], 1350 m, 25 Aug. 1953, *Kingdon Ward* 21279 (BM).

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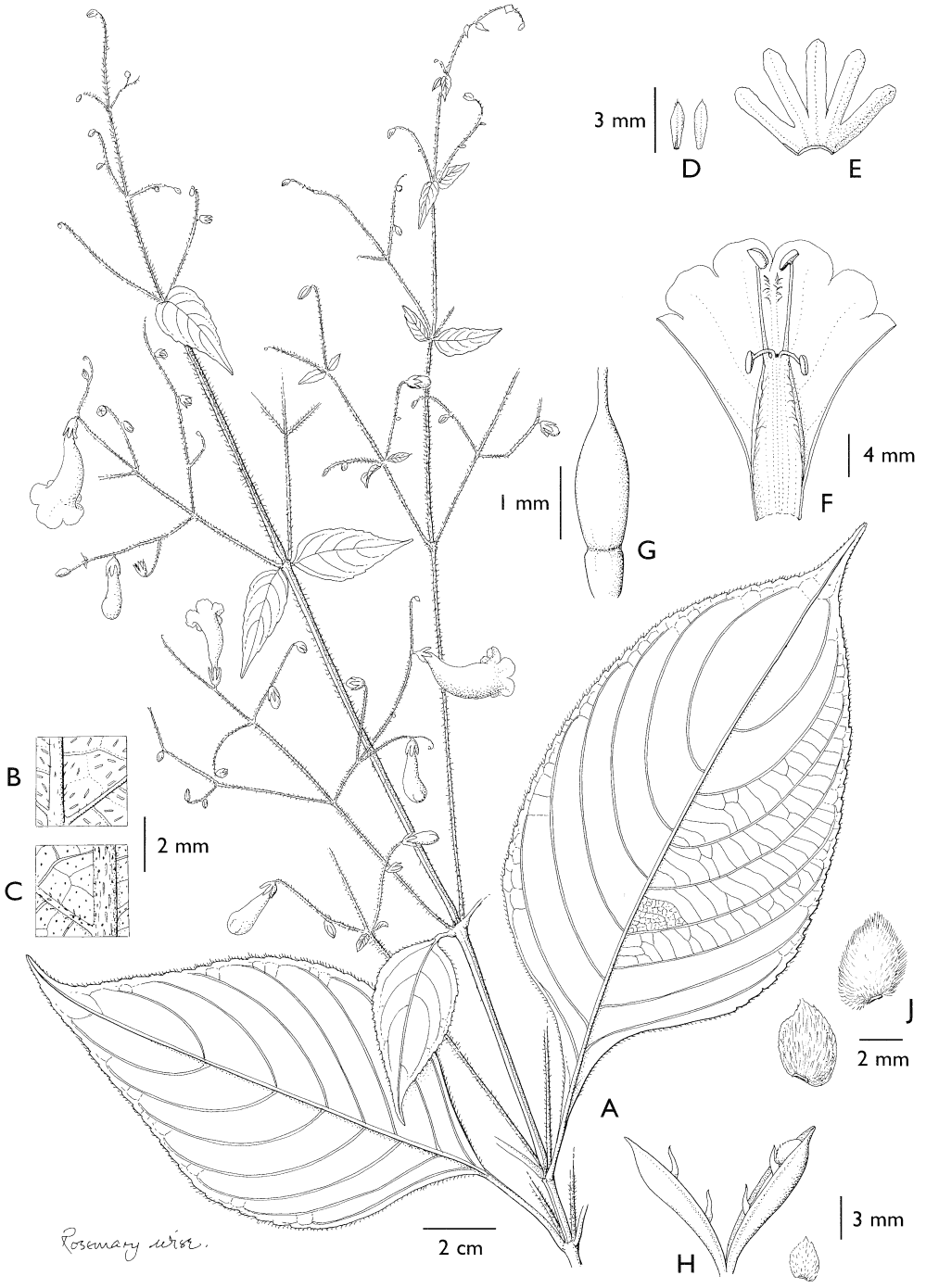

FIG. 5. *Strobilanthes euantha*. **A** habit; **B** adaxial leaf surface; **C** abaxial leaf surface; **D** bract, upper and lower surfaces; **E** calyx; **F** corolla; **G** ovary; **H** capsule; **J** seeds. **A – G** drawn from *Li Heng et al.* 10336 and **H – J** from *Li Heng et al.* 11534 by Rosemary Wise.

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CHINA. Yunnan: Shweli-Salween divide [25°35'N, 98°58'E], 2300 m, Nov. 1924, *Forrest* 25332 (E); Lushai Xian, Gulangha, along Gulang Jiang, between Pianna and Gangfang, N of Pianma on W side of Gaoligong Shan [26°05.28'N, 98°35.5'E], 1560 m, 13 Oct. 1998, *Li Heng, Bartholomew & Dao Zi-ling* 10336 (CAS); Tengchong Xian, Sanyun Xiang, Datianpu Cun, on W side of Gaoligong Shan between Daheping and the Irrawaddy-Salween divide by old road from Baoshan to Tengchong [24°57.25'N, 98°44.11'E], 2010 m, 5 Nov. 1998, *Li Heng, Bartholomew & Dao Zi-ling* 11534 (CAS).

Strobilanthes euantha differs from similar species by its inflorescence, in which the ultimate branchlets arise opposite the flowers. Additionally there are frequent non-developing flower buds, which give it a distinct appearance. The inflorescence axes and branches are pilose and some of the ultimate branchlets are flexuous, a very distinctive feature of the closely related species, *Strobilanthes setosa*. The corolla differs from that in both *Strobilanthes hamiltoniana* and *S. tenuiflora* by its pale lavender colour, arcuate shape and shorter length. *Strobilanthes euantha* also grows at higher altitudes than similar species, reaching 2300 m.

- Panicle essentially a panicle of spikes with flowers in opposite pairs along an axis (Species 13 – 16)

13. Strobilanthes pubescens (*Bremek.*) *J. R. I. Wood*, **comb. nov.**

Diflugossa pubescens Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41 (1): 241 (1944). Type: Indonesia, Sumatra, *de Voogd* 1437 (holotype L, isotype K).

Only known from the type specimen, which is distinctive because of the ovate leaves, which are brownish-pubescent beneath. The calyx is similar to that of *Strobilanthes ovatifolia* and *S. hamiltoniana* with broadly oblong, obtuse, glabrous lobes but the inflorescence is different as the flowers are spicately arranged along the branches, which are pilose with rather stiff, large-celled hairs. No mature corolla is known. Fig. 1J – K.

HABITAT AND DISTRIBUTION. Endemic to Gunung Daun [3°23'S, 102°22'E] near Bengkulu, SW Sumatra where it grows at 1600 m. Map 4.

CONSERVATION STATUS. Insufficient data but presumably endangered.

14. Strobilanthes microcarpa *T. Anderson*, J. Linn. Soc., Bot. 9: 482 (1867). Type: Burma (Myanmar), Tenasserim, *Helfer* Kew Distribution No. 6113 (K, lectotype, selected by Terao 1983: 123).

Semnostachya glandulosa Bremek., Dansk Bot. Ark. 23: 203 (1965). Type: Thailand, Kanchanaburi, *Larsen* 8489 (holotype C, isotype E).

Nearly all specimens of this species are leafless or nearly so when collected and it had been impossible to visualise what this plant looked like before one of Maxwell's excellent collections became available (*Maxwell* 94-52). This shows the fully

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developed paniculate inflorescence and large leaves characteristic of the species discussed in this paper. As noted by Clarke (1884: 466) and Bremekamp (1965: 206) the bracts are small and caducous which is also characteristic of the other species with a paniculate inflorescence. *Strobilanthes microcarpa* is easily recognised by its short, rather rigid inflorescence branches, which spread at a very wide angle, by the glandular-pilose indumentum of the inflorescence and by the distinctly spicate form of the panicle with pedicellate flowers in opposite pairs. Most remarkable of all, however, is the calyx, in which one lobe is strongly accrescent in fruit, giving the flowers an auriculate appearance.

The leaves appear to be deciduous at anthesis, possibly indicating that the plant is fully mature and preparing for death. It is, therefore, probably plietesial as with many *Strobilanthes*.

HABITAT AND DISTRIBUTION. Endemic to Kanchanaburi province in Thailand and the adjacent Tenasserim region of Burma (Myanmar), where it grows on limestone rocks at low altitudes of between 200 and 300 m. Map 3.

CONSERVATION STATUS. Insufficient data but certainly vulnerable

BURMA (MYANMAR). Tenasserim, *Helfer* K.D. 6113 (K). THAILAND. Kanchanaburi: Te Kanun [15°00'N, 98°40'E], 300 m, 21 Jan. 1926, *Kerr* 10281 (BM); Wangka [15°08'N, 98°30'E], c. 200 m, 26 Jan. 1926, *Kerr* 10309 (BM, K); Soi Yok [c. 14°10'N, 98°44'E], 200 m, 4 Dec. 1961, *Larsen* 8489 (C, E); Toong Yai Naresuan Wildlife Reserve, Ban Saneh, Pawng, Sangkhlaburi, 250 m, 14 Jan. 1994, *Maxwell* 94 – 52 (CAS, A).

15. Strobilanthes scoriarum *W. W. Sm.*, Notes Roy. Bot. Gard. Edinburgh 10: 199 (1918). Type: China, Yunnan, *Forrest* 8862 (holotype E).

Goldfussia scoriarum (W. W. Sm.) Bremek., Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41 (1): 234 (1944).

Strobilanthes schweliensis W. W. Sm., Notes Roy. Bot. Gard. Edinburgh 12: 224 (1920). Type: China, Yunnan, *Forrest* 16107 (holotype E).

Diflugossa schweliensis (W. W. Sm.) E. Hossain, Notes Roy. Bot. Gard. Edinburgh 32 (3): 406 (1973).

Strobilanthes aborensis Dunn, Bull. Misc. Inform., Kew 1920: 208 (1920). Type: India, Arunachal Pradesh, *Burkhill* 35757 (holotype K, isotype ?CAL).

Goldfussia medogensis H. W. Li in Wu Cheng-yih, Fl. Xixangica 4: 413 (1985). Type: Tibet, *Quinghai-Xixang (Tibet) Complex Exp.* 74-4911 (holotype KUN, n.v.).

This species is marginal to our group as the flowers are definitely in opposite pairs and the inflorescence is essentially a terminal panicle of spikes. However, it has the caducous bracts and bracteoles characteristic of the group. The calyx lobes are lanceolate, acuminate to a blunt tip with prominent cystoliths. The corolla is straight, glabrous and a distinct reddish-purple colour. On the young inflorescence the glands are sessile but rapidly become stalked and prominent as the inflorescence ages. The leaves are distinctive being broadly ovate, long acuminate and subsessile above. Fig. 6J – L.

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HABITAT AND DISTRIBUTION. Found in two distinct areas, one in the area bordering NE India and SE Tibet and the other in western Yunnan. The species has an extraordinarily wide altitudinal range (140 – 3000 m) but all the specimens are strikingly similar. Map 3.

CONSERVATION STATUS. Insufficient data but probably low risk

INDIA. Arunachal Pradesh: Outer Abor Hills, Makum [27°30'N, 95°27'E], 140 m, 21 Nov. 1911, *Burkill* 35757 (K, ?CAL); Dihang Valley, Abor Hills, 350 – 700 m, 12 Feb. 1928, *Kingdon Ward* 7855 (K).

CHINA. Tibet, Medog [29°20'N, 95°19'E], 2400 m, 27 Aug. 1974, *Quinghai-Xixang (Tibet) Complex Exp.* 74-4911 (KUN); Yunnan; Feng Chen Lin Mt, 2150 m, pre 1898, *A. Henry* 11183 (A, E, K); Lava bed W of Tengyueh [25°02'N, 98°20'E], 1600 m, *Forrest* 8862 (E); Shweli-Salween divide, [25°20'N], 3000 m, Sept. 1917, *Forrest* 16107 (E); W of Mekong, from Pingpo to Youngchang and Tengyueh, Salween watershed, Oct. 1922, *Rock* 7044 (E).

16. Strobilanthes tenax *Dunn*, Bull. Misc. Inform., Kew 1920: 208 (1920). Type: India, Arunachal Pradesh, *Burkhill* 36785 (holotype K, isotype ?CAL).

This species is similar to the last species in the form of its inflorescence and corolla but can be distinguished by the oblong-elliptic leaves less than 4 cm wide and the much more densely glandular inflorescence

HABITAT AND DISTRIBUTION. Only known from the type collection. Map 2.

CONSERVATION STATUS. Insufficient data, possibly extinct.

INDIA. Arunachal Pradesh: Outer Abor Hills, Kobo [27°47'N, 95°23'E], 140 m, March 1912, *Burkhill* 36785 (K, ? CAL).

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