Phytotaxa 200 (1): 001–067
www.mapress.com/phytotaxa/

Monograph

ISSN 1179-3155 (print edition)
PHYTOTAXA
ISSN 1179-3163 (online edition)

http://dx.doi.org/10.11646/phytotaxa.200.1.1

PHYTOTAXA

200

A TAXONOMIC REVISION OF *POGOSTEMON* (LAMIACEAE) FROM CHINA

GANG YAO[1, 2], YUN-FEI DENG[1 *]& XUE-JUN GE[1 *]
1Key Laboratory of Plant Resources Conservation and Sustainable Utilization, South China Botanical Garden, Chinese Academy of Sciences, Guangzhou 510650, People's Republic of China
2University of Chinese Academy of Sciences, Beijing 100049, People's Republic of China
**Authors for correspondence. E-mail: yfdeng@scbg.ac.cn; xjge@scbg.ac.cn*

Magnolia Press
Auckland, New Zealand

Accepted by Hajo Esser: 3 Dec. 2014; published: 24 Feb 2015

GANG YAO, YUN-FEI DENG & XUE-JUN GE
A taxonomic revision of *Pogostemon* (Lamiaceae) from China
(*Phytotaxa* 200)

67 pp.; 30 cm.

24 February 2015

ISBN 978-1-77557-649-5 (paperback)

ISBN 978-1-77557-650-1 (Online edition)

FIRST PUBLISHED IN 2015 BY

Magnolia Press

P.O. Box 41-383

Auckland 1346

New Zealand

e-mail: magnolia@mapress.com

http://www.mapress.com/phytotaxa/

ISSN 1179-3155 (Print edition)

ISSN 1179-3163 (Online edition)

Table of content

Abstract

Based on field observation and extensive herbarium studies, a comprehensive taxonomic revision of the genus *Pogostemon* in China was carried out. Twenty-seven species and two varieties are recognized, among of which eleven species and one variety are endemic to China. A new species, *P. henanensis*, is described and illustrated. Two new combinations, *P. glaber* var. *tsingpingensis* and *P. latifolius*, are proposed. Six names are reduced to synonymy, eleven names are lectotypified and a name is neotypified. The record of *P. menthoides* in China is corrected as *P. fraternus*. One species, *P. pressii*, is listed as dubious species in China. In addition, nomenclature, descriptions and distribution maps of each species and variety as well as a key to Chinese *Pogostemon* taxa are presented.

Key words: *Dysophylla*, Labiatae, Lamioideae, Pogostemoneae, taxonomy

Introduction

Pogostemon Desfontaines (1815: 154) belongs to tribe Pogostemoneae (Lamiaceae: Lamioideae) as defined by Bendiksby *et al*. (2011), together with *Achyrospermum* Blume (1826: 840), *Anisomeles* (1810: 503), *Colebrookea* Smith (1805: 111), *Comanthosphace* Moore (1877: 293), *Craniotome* Reichenbach (1825: 39), *Eurysolen* Prain (1898: 43), *Leucosceptrum* Smith (1805: 113), *Microtoena* Prain (1889: t. 1872) and *Rostrinucula* Kudô (1929: 304). It consists of about 80 species distributed mainly in tropical and subtropical regions of Asia, and with five species endemic to Africa (Bhatti & Ingrouille 1997, Wu & Huang 1977, Harley *et al*. 2004, Scheen *et al*. 2010, Bendiksby *et al*. 2011). The highest species diversity is found in the Indian subcontinent (Bhatti & Ingrouille 1997). *Pogostemon* can be distinguished from other Lamiaceae by the presence of exserted stamens bearing moniliform hairs (Hasskarl 1842, Kuntze 1891, Press 1982, Bhatti & Ingrouille 1997).

The relationship between the genera *Pogostemon* in a narrow sense and *Dysophylla* Blume (1826: 826) has been debated in the past. *Pogostemon* s.s. was usually considered to include terrestrial herbs or subshrubs with opposite, broad and petiolate leaves as well as solid stems, whereas *Dysophylla* was a group from aquatic and marshland habitats, with opposite or verticillate, linear to filiform and sessile leaves as well as hollow stems (El-Gazzar & Watson 1967, Wu *et al*. 1977, Wu & Huang 1977, Li & Hedge 1994, Bhatti & Ingrouille 1997). However, some species in *Dysophylla* including its type, *D. auricularia* (Linnaeus 1767: 81) Blume (1826: 826) exhibit opposite leaves and seem to be intermediate between these two genera (Li 1975, Bhatti & Ingrouille 1997). Some authors (Bentham 1848, Hooker 1885, Briquet 1897, Airy Shaw 1967, Keng 1969, Li 1975, Wu *et al.* 1977, Wu & Huang 1977, Press 1982, Li & Hedge 1994) suggested that those species with opposite leaves in *Dysophylla* should be transferred to *Pogostemon* s.s., and *Dysophylla* then includes only those species with verticillate leaves. Recent molecular phylogenetic studies implied that *Pogostemon* s.l. is strongly supported to be monophyletic and all species sampled included in *Dysophylla* are nested within *Pogostemon* (Bendiksby *et al.* 2011, Yao & Ge unpublished). Therefore, a broad concept of *Pogostemon* including *Dysophylla* is accepted in this study.

When preparing the *Flora Reipublicae Popularis Sinicae*, Chinese taxonomists described a number of new taxa in genus *Pogostemon* s.l. from China, and many taxa were morphologically compared only with related Chinese species (Sun & Hu 1966, Wu *et al*. 1965, Wu *et al*. 1977). In the *Flora Reipublicae Popularis Sinicae*, Wu & Huang (1977) treated the species in *Dysophylla* and *Pogostemon* independently, and twenty-two species and four

varieties were recognized, among which thirteen species and four varieties are recognized to be endemic in China. In the recently published *Flora of China*, Li & Hedge (1994) mostly accepted the treatment by Wu & Huang (1977) in the *Flora Reipublicae Popularis Sinicae* except for treating two varieties as synonyms of *Dysophylla stellata* (Loureiro 1790: 391) Bentham (1830: 30). When Bhatti & Ingrouille (1997) published the revision of genus, they did not treat most of the species published by Chinese taxonomists because no material was available for their studies.

The present study mainly focuses on Chinese *Pogostemon* species, so representative specimens are cited only, constituting only a portion of those collected from China. A detailed morphological description of Chinese *Pogostemon* species is provided in the present study. In addition, information about the synonyms, type, distribution range, occupied habitats, phenology and taxonomic discussion of each species is provided.

Taxonomic history of *Pogostemon* in China

Prior to the studies of Bhatti & Ingrouille (1997), Chinese *Pogostemon* had been treated under two genera, *Pogostemon* and *Dysophylla*, by many authors (Dunn & Tutcher 1912, Dunn 1913, 1915, Sun 1932, Handel-Mazzetti 1936, 1937, 1939, Rehder 1935, Wu *et al*. 1965, 1977, Li 1975, 1994, 1996, Wu & Huang 1977, Fu *et al.* 1981, Fang 1989, Guo 1991, Li & Hedge 1994).

Tenore (1847: 56) was the first to report *Pogostemon* from China and described a new species, *Pogostemon suavis*. This species was later reduced to *Pogostemon cablin* (Blanco 1837: 473) Bentham (1848: 156).

Bentham (1861) recorded two species, *Pogostemon parviflorus* Bentham (1830: 31) and *Dysophylla aruicularia* Blume (Linnaeus 1767: 81) Blume (1826: 825), from Hong Kong. Prain (1908) considered the specimens of Hong Kong previousely identified as *P. parviflorus* to be different from Indian plants and thus described them as a new species, *P. championii* Prain (1908: 254). Oliver (1890: pl. 2440) then described a new species from Taiwan, *Pogostemon formosanus*. When Dunn (1915) revised Chinese Labiatae, he recognized 10 species in *Pogostemon* and *Dysophylla* respectively.

Before the 1950s, Chinese *Pogostemon* was studied mainly by Western taxonomists, and many species were described (Hance 1866, Forbes & Hemsley 1890, Vanot 1904, Dunn & Tutcher 1912, Dunn 1913, 1915, Léveillé 1911, 1914–1915, Merrill 1925, 1927, 1928, Diels 1926, Kudo 1929, Sun 1932, Handel-Mazzetti 1936, 1937, 1939, Rehder 1935).

In the treatment of *Pogostemon* in the *Flora Reipublicae Popularis Sinicae* (Wu & Huang 1977), twenty-two species and four varieties were recognized under *Pogostemon* and *Dysophylla*. Before this treatment was published, Wu *et al*. (1965) described a new species, *Dysophylla falcata* C.Y. Wu in Wu *et al*. (1965: 237), and two varieties, *D. benthamiana* Hance (1866: 234) var. *hainanensis* C.Y. Wu & S.J. Hsuan in Wu *et al*. (1965: 238) and *D. benthamiana* var. *intermedia* C.Y. Wu & S.J. Hsuan in Wu *et al*. (1965: 237). Later, when Li (1975) discussed the boundary between *Dysophylla* and *Pogostemon*, *Dysophylla falcata* was transferred to *Pogostemon* because of its "opposite leaves", and the two above mentioned varieties were transferred to *D. stellata* (Loureiro 1790: 361) Bentham (1830: 30); he also followed the reduction of *D. benthamiana* to *D. stellata* proposed by Keng (1969). Wu *et al*. (1977) recognized 17 species and two varieties including four new species from Yunnan. The treatment of Wu *&* Huang (1977) in the *Flora Reipublicae Popularis Sinicae* was followed by Li & Hedge (1997) in the English edition of the *Flora of China* with only minor changes. This treatment was also followed by many recent Chinese regional floras (Fu *et al.* 1981, Fang 1989, Guo 1991, Li 1994, 1996, Li & Hedge 1994, Li *et al*. 2000, Fu 2002, Shui 2003, Mu & Dong 2001, Hu 2009, 2012).

Infrageneric classification

Many taxonomists tried to propose an infrageneric system for the genus *Pogostemon*. Bentham (1833) treated species of *Pogostemon* as *Pogostemon* and *Dysophylla*. He divided the genus *Dysophylla* into two sections, sect. *Oppositifoliae* Bentham (1833: 157) and sect. *Verticillatae* Bentham (1833: 158), based on phyllotaxy, and divided *Pogostemon* into two sections, sect. *Racemosae* Bentham (1833: 155) and sect. *Paniculatae* Bentham (1833: 153), based on the morphology of inflorescence. This division was adopted by many subsequent authors (Bentham 1848, Briquet 1897). *Dysophylla* section *Oppositifoliae* was transferred to *Pogostemon* by some authors (Airy Shaw 1967, Li 1975, Wu & Huang 1977) and left *Dysophylla* to accommodate *D.* section *Verticillatae* with several leaves in verticillate whorls.

Hasskarl (1842) was the first one to merge *Dysophylla* with *Pogostemon* because they shared the similar

character of hairy stamens. The treatment of Hasskarl (1842) was accepted by some authors (Miquel 1856, Kuntze 1891, Keng 1978, Bhatti & Ingrouille 1997, Mabberley 2008). Miquel (1856) divided the genus into three unnamed sections. Bhatti & Ingrouille (1997) separated the genus into to three subgenera, i.e., subgen. *Pogostemon*, subgen. *Allopogostemon* Bhatti & Ingrouille (1997: 97) and subgen. *Dysophylla* (Blume 1826: 826) Bhatti & Ingrouille (1997: 107). They further divided subgen. *Allopogostemon* into sect. *Zygocalyx* Bhatti & Ingrouille (1997: 104) and sect. *Racemosus* (Benth.) Bhatti & Ingrouille (1997: 97), and subgen. *Dysophylla* was divided into sect. *Dysophylla* and sect. *Verticillati* (Benth.) Bhatti & Ingrouille (1997: 111).

Material and methods

This paper is a taxonomic revision on the genus *Pogostemon* for Chinese species based mainly on morphological characters. The authors examined all collections from China in the herbaria A, BM, CAL, E, G, HHBG, HITBC, IBK, IBSC, IFP, K, KUN, L, LBG, MO, NAS, NEFI, NY, P, PE, SYS, TAI, and US. Herarium abbreviations follow the Index Herbarium (Thiers 2013, continuously updated). Some species were also observed in the field during 2010 and 2011.

In total, over 3000 specimens were examined. All published names from China are covered in the present work. Nomenclature and typification follow the International Code of Nomenclature for algae, fungi, and plants (McNeill *et al.* 2012).

Taxonomic treatment

Pogostemon Desfontaines (1815: 154). Type: *Pogostemon plectranthoides* Desf.

Dysophylla Blume (1826: 826). Type: *Dysophylla auricularia* (L.) Blume [=*Pogostemon auricularius* (L.) Hassk.]
Eusteralis Rafinesque (1837: 95). *Anuragia* Raizada (1976: 219), *nom. illeg. superfl.* Type: *Eusteralis pumila* Raf. [= *Pogostemon stellatus* (Lour.) Kuntze]

Subshrubs or herbs, perennial or annual. Stems solid or hollow, strong or weak, erect or decumbent and sometimes root at the nodes basally, branched or unbranched, hairy, rarely glabrous. Leaves opposite, or in whorls of 3–12; opposite leaves petiolate, or verticillate leaves subsessile; blade ovate, narrowly ovate, lanceolate, linear or rarely falcate, margin crenate, dentate, serrate, incised, double crenate, double dentate, double serrate, remotely dentate, or entire and sometimes revolute. Inflorescence thyrsoid, thyrses usually arranged in spikes, continuous or interrupted, hairy. Bracts and bracteoles broad ovate, ovate-lanceolate, lanceolate, linear, or filiform, usually ciliate. Calyx ovoid-tubular, tubular, infundibular, or campanulate, 5- or 10-veined, usually glandular outside; teeth 5, subequal, triangular or narrowly triangular, rarely subulate, usually ciliate. Corolla white, pink, purplish, or rarely bluish, usually exserted from calyx; limb 2-lipped, upper lip 3-lobed, lower lip entire, or subequally 4-lobed, exserted from the calyx. Stamens 4, erect, usually much exserted, subequal or anterior pair longer, straight or declinate; filaments usually bearded at middle, bearded portion exserted; anthers unilocular, thecae apex dehiscent. Style exserted; stigma deeply bifid, lobes subulate, equal or subequal. Nutlets 4, ellipsoid to subglobose, slightly flattened, usually smooth, glossy. Chromosomes 2n = 12, 32, 34, 40, 60, 64, 72.

About eighty species: distributed in Africa, Asia, and a species extending to Australia. Twenty-seven species and two varieties in China.

Key to the infrageneric groups of Chinese *Pogostemon*

1. Perennial herbs or subshrubs; stem strong; inflorescence of spikes with more than two lateral branches; bracts large, ovate, rarely lanceolate or linear ..... subgen. *Pogostemon*
- Annual herbs; stem slim; inflorescence a single terminal spike, or sometimes with two lateral branches in tall plant; bracts small, linear, filiform, or rarely spathulate 2
2. Spikes of inflorescence very loose, sometimes with two lateral spikes in tall plant; calyx 10- veined; calyx teeth usually awl-shaped in fruit; throat of calyx tube ringed by hairs ..... subgen. *Allopogostemon*
- Inflorescence a single terminal spike, spike compact; calyx 5-veined; calyx teeth triangular or broadly triangular; throat of calyx tube not ringed by hairs (subgen. *Dysophylla*) 3

3. Leaves opposite or simultaneously opposite and verticillate in whorls of 3, blades ovate to ovate-lanceolate, or rarely falcate, petiolate ..... sect. *Dysophylla*
- Leaves completely verticillate (usually in whorls of 3–4, rarely up to 8), blades linear to linear-lanceolate, sessile ..... sect. *Verticillati*

Key to the species of Pogostemon in China

1. Leaves opposite 2
- Leaves in whorls of 3 or more, or sometimes opposite simultaneously 18
2. Perennial herbs or subshrubs; inflorescence a terminal spike, with more than two lateral branches 3
- Annual herbs; inflorescence a single terminal spike, or sometimes with two lateral branches 14
3. Calyx < 3 mm long; corolla shorter or slightly longer than the calyx ..... *P. amaranthoides*
- Calyx ≥ 3mm long; corolla much longer than calyx and exserted evidently from calyx 4
4. Cultivated plant; calyx 6–8 mm long ..... *P. cablin*
- Wild plant; calyx 3–5 mm long 5
5. Leaf blade narrowly elliptic, or lanceolate 6
- Leaf blade ovate, elliptic, or broadly ovate 7
6. Calyx tubular, 3.5–4.5 mm long, teeth 1/5–1/4 as long as the calyx tube; corolla to 7–8 mm long ..... *P. dielsianus*
- Calyx campanulate, 3–3.5 mm long, teeth 1/3–1/2 as long as the calyx tube; corolla ca. 4.5 mm long ..... *P. elsholtzioides*
7. Leaf margin incised-serrate or double incised-serrate 8
- Leaf margin double serrate, double crenate-serrate, or double dentate 9
8. Stems pubescent, glabrescent; leaves glabrous or sparsely strigulose; bracts and bracteoles linear-lanceolate to linear; calyx teeth ca. 1/2 as long as the calyx tube ..... *P. formosanus*
- Stems and leaves evidently setose; bracts and bracteoles oblong-lanceolate to broadly lanceolate; calyx teeth ca. 1/3 as long as the calyx tube ..... *P. xanthiiphyllus*
9. Spikes of inflorescence very short, 0.7–3.5 cm long ..... *P. parviflorus*
- Spikes of inflorescence usually longer than 5 cm, and sometimes longer than 10 cm 10
10. Calyx tube glandular in flower 11
- Calyx tube without glands in flower 12
11. Calyx subtubular, teeth narrowly triangular, subequal or 2 shorter, ca. 1/3 as long as calyx tube ..... *P. chinensis*
- Calyx infundibuliform, teeth triangular, equal, 1/3–1/2 as long as calyx tube ..... *P. septentrionalis*
12. Lateral veins of leaves 3 pairs; flowers bluish; calyx teeth 1/3–1/2 as long as the calyx tube; stigma lobes 2–2.5 mm long ..... *P. latifolius*
- Lateral veins of leaves 4–6 pairs; flowers white, pink or purplish; calyx teeth 1/3 as long as the calyx tube; stigma lobes less than 1.5 mm long 13
13. Stems, abaxial leaf surface, bracteoles, and outer part of calyx subglabrous or sparsely pubescent ..... *P. glaber* var. *glaber*
- Stems, abaxial leaf surface, bracteoles, and outer part of calyx villous ..... *P. glaber* var. *tsingpingensis*
14. Spike very loose, unbranched or sometimes with two lateral branches; calyx longer than 2 mm, 10-veined; calyx teeth usually awl-shaped in fruit; throat of calyx tube ringed by hairs 15
- Spike compact, simple; calyx less than 2 mm long, 5-veined; calyx teeth triangular or broadly triangular in fruit; throat of calyx tube not ringed by hairs 17
15. Calyx 4–6 mm long; corolla to 7.5 mm long ..... *P. fraternus*
- Calyx ≤ 4 mm long; corolla less than 5 mm long 16
16. Lateral veins 3–5 pairs; calyx 3–4 mm long; calyx tubular-campanulate in fruit; stamens and style much exserted from corolla; filaments sparsely bearded at middle ..... *P. brachystachyus*
- Lateral veins 5–9 pairs; calyx 2–3 mm long; calyx urceolate-campulate in fruit; stamens and style not exserted from corolla; filaments glabrous ..... *P. hispidocalyx*
17. Stems and leaves yellow strigose; petiole of leaves usually longer than 1 cm, and up to 2 cm long; leaf margin crenate to double crenate; base of leaves broadly cuneate to cuneate ..... *P. barbatus*
- Stems and leaves black or dark brown strigose; petiole of leaves subsessile or less than 1 cm long; leaf margin serrate or double serrate; base of leaves rounded to shallowly cordate, rarely cuneate ..... *P. auricularius*
18. Leaves opposite or verticillate, with a short petiole 19
- Leaves verticillate, sessile 20
19. Leaf blade falcate ..... *P. falcatus*
- Leaf blade linear or lanceolate ..... *P. quadrifolius*
20. Stem and leaf blade hairy evidently 21
- Stem and leaf blade glabrous 23
21. Stems pubescent, rust colored; calyx 2.5–2.8 mm long; corolla 4–4.2 mm long ..... *P. linearis*
- Stems strigose; calyx < 2mm long; corolla < 3 mm long 22
22. Leaf margin entire; blade yellow or brown strigose ..... *P. cruciatus*
- Leaf margin with remotely shallow serrate; blade grey ciliate ..... *P. szemaoensis*

23. Calyx ≥ 2 mm long; corolla ≥ 3 mm long 24
- Calyx <2 mm long; corolla < 3 mm long 25
24. Leaf blade 1–3.5 cm long; spike 2.8–7 cm long, ca. 1.5 cm wide ..... *P. yatabeanus*
- Leaf blade 3.5–7 cm long; spike 0.8–2.5 cm long, less than 1 cm wide ..... *P. fauriei*
25. Leaf blade ca. ≤ 3 cm long; leaf margin entire, slightly revolute; spike ≤4 cm long ..... *P. pentagonus*
- Leaf blade usually >3 cm long; leaf margin serrulate, or rarely entire and revolute; spikes to 7–9 cm long 26
26. Leaf blade obovate-oblong to oblanceolate or linear-lanceolate, margin conspicuously serrate except basal 1/3 entire ..... *P. sampsonii*
- Leaf blade linear, margin remote serrate, serrulate or entire 27
27. Leaves in whorls of 4–8; calyx ca. 1 mm long; corolla 1.5–1.8 mm long ..... *P. stellatus*
- Leaves in whorls of 3; calyx ca. 1.6 mm long; corolla ca. 2.5 mm long ..... *P. henanensis*

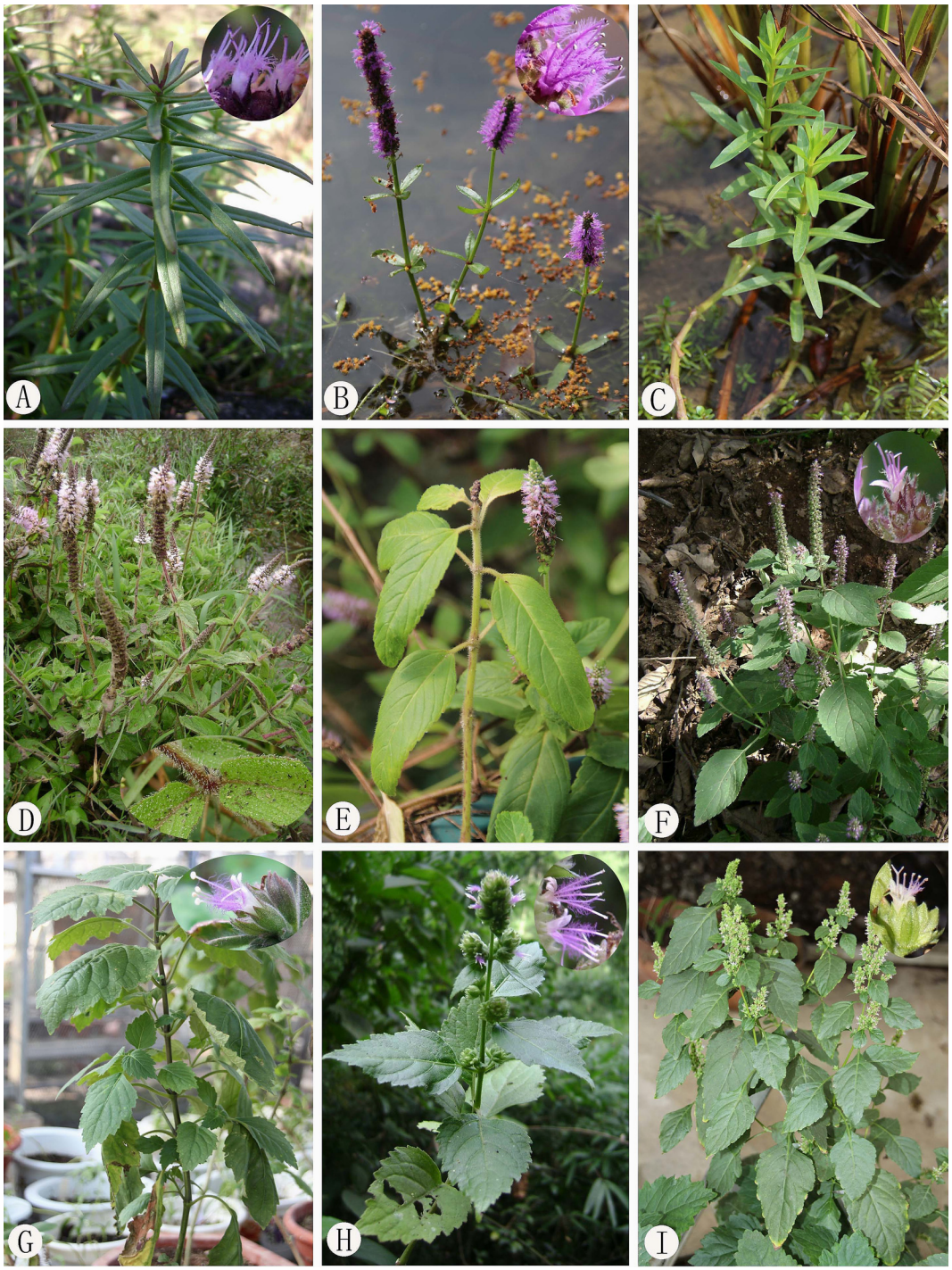

FIGURE 1. A–I. *Pogostemon* species. A. *P. linearis*; B. *P. sampsonii*; C. *P. yatabeanus*; D. *P. auricularius*; E. *P. barbatus*; F. *P. brachystachyus*; G. *P. cablin*; H. *P. parviflorus*; I. *P. septentrionalis* (Photoed by Gang Yao).

I. ***Pogostemon*** subgen. ***Pogostemon***

Pogostemon sect. *Paniculatae* Bentham (1833: 153), *nom. inval*. Type: *Pogostemon paniculatus* (Willdenow 1800: 59) Bentham (1830: 30).

According to Article 22.2 of the ICN (McNeill *et al*. 2012), the name *Pogostemon* sect. *Paniculatae* Benth. is not validly published because it included the type of the generic name *Pogostemon*, *P. plectranthoides* Desfontaines (1815: 155).

1. ***Pogostemon amaranthoides*** Bentham (1848: 153). Lectotype (here designated):—INDIA. Himachal Pradesh: near Simla, no date, *J.D. Hooker s.n.* (K!, isolectotypes MPU!, P!).

Pogostemon brevicorollus Y.Z. Sun in Sun & Hu (1966: 49), ***syn. nov.*** Type:—CHINA, Yunnan: Yangbi to Yongping, 1830 m, 12 November 1934, *M. Chen 3206* (holotype PE, isotype NAS!).

Perennial herb or subshrub, to 1 m tall. Stems erect, quadrangular, branched, pubescent, then glabrescent. Leaves opposite; petiole ca. 1–4 cm long, pubescent; blade lanceolate to ovate, 6–13 × 1.5–6.5 cm, adaxially sparsely puberulent, abaxially minutely hispid on veins and densely glandular, base cuneate, margin double serrate except for entire at base, apex acuminate, lateral veins 4–6 pairs on each side of the midvein. Spikes 2–9 cm × 6–8 mm, terminal and axillary, interrupted, with more than two lateral spikes, peduncle 0.5–2.5 cm long; verticillasters globose, 6–14-flowered, flowers sessile. Bracts and bracteoles ovate-lanceolate or linear, 1–3.5 mm long, pubescent. Calyx ovoid-tubular or campanulate, 2–2.7 mm long, 5-veined, subglabrous or pubescent along veins outside; teeth 5, triangular, equal, 0.5–0.6 mm long, 0.5–0.6 mm wide at base, margin ciliate, glabrous inside, slightly inflexed in fruit. Corolla white or purplish, 2–2.6 mm long, subequal or slightly shorter than calyx in length, glabrous outside; tube 1.7–1.9 mm long; corolla limb 2-lipped, upper lip 3-lobed, lobes subequal, apex obtuse, lower lip entire, apex acute. Stamens 4, exserted; filaments 1.4–1.7 mm long, inserted at middle or slightly upper of middle in the tube, bearded at middle, bearded portion slightly exserted; anthers 1-locular, cell apex dehiscent. Style 2.4–3 mm long; stigma bifid, subequal, 0.5–0.7 mm long; disc. ca. 1/8 as long as calyx tube. Nutlets 4, ca. 0.8 mm long, obovoid or subglobose, abaxially slightly flat, adaxially ribbed, black or dark brown.

Distribution and habitat:—The species is widely distributed in Eastern Himalayan regions and known from Yunnan province in China (Figure 2). This species was reported to be distributed in SW Sichuan province by Wu *et al*. (1977), Wu & Huang (1977) and Li & Hedge (1994), but we did not find any specimens from Sichuan. The species grows in mixed forests, margin of woods, or on open ravine, at the elevation of 1200–2800 m.

Phenology:—Flowering and fruiting from August to the following January.

Taxonomic notes:—*Pogostemon amaranthoides* can be easily distinguished from other species of *Pogostemon* subgen. *Pogostemon* by its calyx and corolla less than 3 mm long and the corolla shorter than or subequal to the calyx.

Pogostemon brevicorollus Y.Z. Sun in Sun & Hu (1966: 49) was described based on a specimen collected from Northwestern Yunnan and considered to be an endemic species in China (Sun & Hu 1966, Wu *et al*. 1977, Wu & Huang 1977, Li & Hedge 1994). Bhatti and Ingrouille (1997) did not treat this species because no specimens were available for their studies. After examining the type material, *P. brevicorollus* is now considered identical with *P. amaranthoides* in all aspects.

In the protologue, Bentham (1848) cited two collections which are syntypes of *Pogostemon amaranthoides*. Both of them are consistent with the original description. Here we choose *Hooker s.n* in K as lectotype because we did not trace the other original syntypes collected by Griffith from Khasia and Assam, India.

2. *Pogostemon cablin* (Blanco) Bentham (1848: 156). *Mentha cablin* Blanco (1837: 473). Neotype (here designated):—PHILIPPINES. Luzon, Antipolo, Rizal Province, November 1914, *E.D. Merrill Species Blancoanae 112* (US!, isoneotypes BM!, K!, NY!, P!). Figure 1 G.

Pogostemon patchouly Pelletier (1845: 277). *P. heyneanus* var. *patchouli* (Pellet.) Kuntze (1891: 529). Type:—INDIA. "In hortis culitur ex India oriental." (ORM?, not traced).

Pogostemon suavis Tenore (1847: 56). *P. patchouli* var. *suavis* (Ten.) Hooker (1885: 634). Type:—CHINA. "Floret martio in calidario, habitat China?" (FI?, not traced).

Pogostemon javanicus Backer ex Adelbert (1954: 150). Type:—INDONESIA. East Java: Besuki, Banjuwangi, no date, *H. Zollinger 4651* (holotype BO, isotype L!).

Perennial subshrubs, to 1.5 m tall, aromatic. Stems erect, terete, branched, tomentose. Leaves opposite; petiole 1–7 cm long, tomentose; blade circular to broadly ovate, 4–11 × 2.5–9 cm, herbaceous, adaxially dark green, tomentose, abaxially tomentose, base cuneat-attenuate, margin double serrate or irregular serrate, apex obtuse to acute, lateral veins 4 or 5 pairs on each side of the midvein. Spikes 3–6.5 × 1.3–1.8 cm, terminal and axillary, continuous, densely tomentose, with more than two lateral branches; peduncle, 1–2 cm long, desenly tomentose; verticillasters several–16-flowered, flowers sessile. Bracts and bracteoles ovate to narrowly lanceolate, 4–8 × 1–3 mm, margin entire, rarely serrate, abaxially densely tomentose and glandular, adaxially pubescent. Calyx tubular, 6–8 mm long, 5-veinded, densely tomentose outside, minutely tomentose inside; teeth 5, narrowly triangular, 1.2–2 mm long, sparsely tomentose inside. Corolla white or purplish, 7–9 mm long, exserted, 2-lipped, upper lip 3-lobed, lower lip entire, lips sparsely pubescent outside. Stamens 4, erect, exserted; filaments 5–7 mm long, inserted at middle or slightly upper of middle in the tube, bearded at middle, bearded portions exserted; anther 1-locular, cell apex dehiscent. Style 7.5–8 mm long, stigma bilobed, equal, lobes 2.5–3 mm long. Nutlets 4, ca. 0.8 × 0.6 mm, ellipsoid to ellipsoid-oblong, reticulate-foveate.

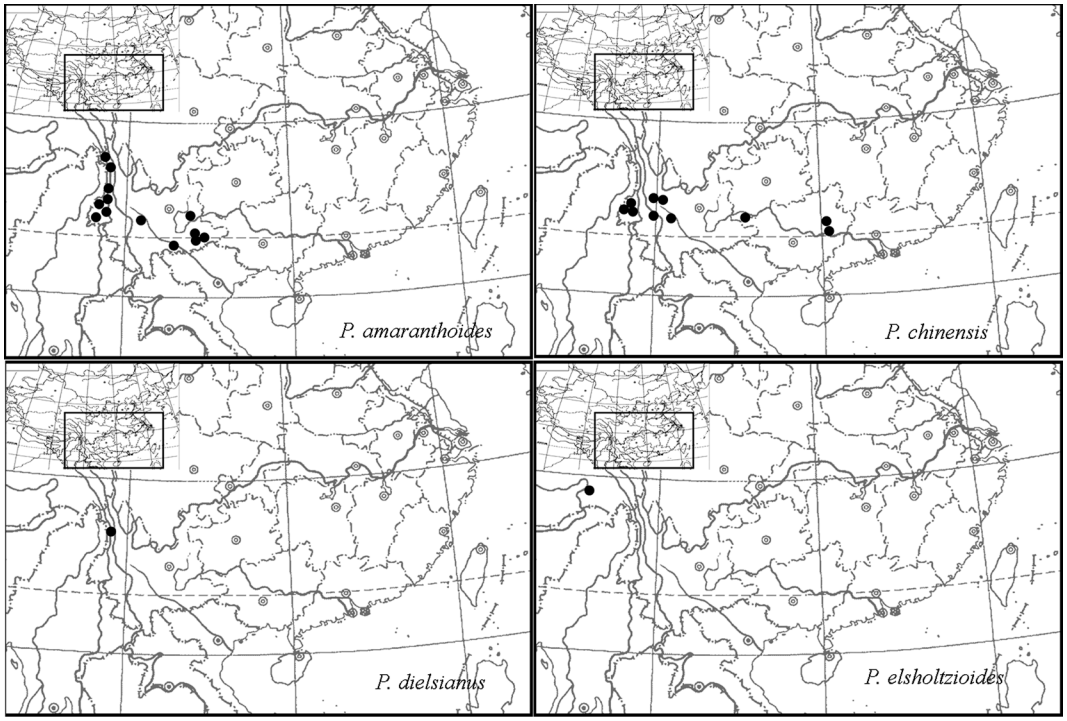

FIGURE 2. Distribution maps of *Pogostemon amaranthoides*, *P. chinensis*, *P. dielsianus* and *P. elsholtzioides*.

Distribution:—This species is usually known as cultivated in tropical Asia, such as in south China, Fiji, India, Indonesia, Philippines, Thailand, and Vietnam. The origin is uncertain. Merrill (1912) stated that the species was unquestionally introduced into Phillippines, but he did not mention where the species is native.

Phenology:—Occasionally flowering from March to May. Young plants of this species are obtained through asexual propagation.

Uses:—It is the source of patchouli oil extracted from its leaves and stems, which is widely used in medicine and perfume industry.

Taxonomic notes:—*Pogostemon cablin* differs from all other Chinese *Pogostemon* species by its large flowers, although it flowers seldomly.

Mentha cablin was presumably based on a Blanco specimen from Philippines, but no specimen has been recorded, even though a few Blanco specimens are said to be extant in MA (Stafleu & Cowan 1976, Smith &

Darwin 1991). Merrill (1918) published his major commentary on all of Blanco's species and cited what he called an "illustrative specimen" for each of Blanco's names with few exceptions. Merrill's specimens are recognized as the neotype for Blanco's names by many authors. However, Merrill's specimens are deposited in many herbaria, and the selection of one specimen as neotype is necessary under Article 9.7 of the ICN (McNeill *et al*. 2012). Here we choose *Merrill Species Blancoanae 112*, an "illustrative specimen" in US, as the neotype as Nicolson & Arculus (2001) suggested.

This species was known as "Patchouli" (Pelletier 1845, Tenore 1847, Hooker 1849, Anonymous 1888, 1889, 1908) and described as *Pogostemon patchouli* (Pelletier 1845: 277) and *P. suavis* Tenore (1847: 56). Many authors discussed the reduction of these two names. We could not trace the types of these two names.

3. *Pogostemon chinensis* C.Y. Wu & Y.C. Huang *in* Wu *et al*. (1977: 742). Type:—CHINA. Yunnan: Yangbi, near Pingpo, 6 November 1946, *T.N. Liou 22524* (holotype KUN!, isotypes IBSC!, PE!). Figure 3.

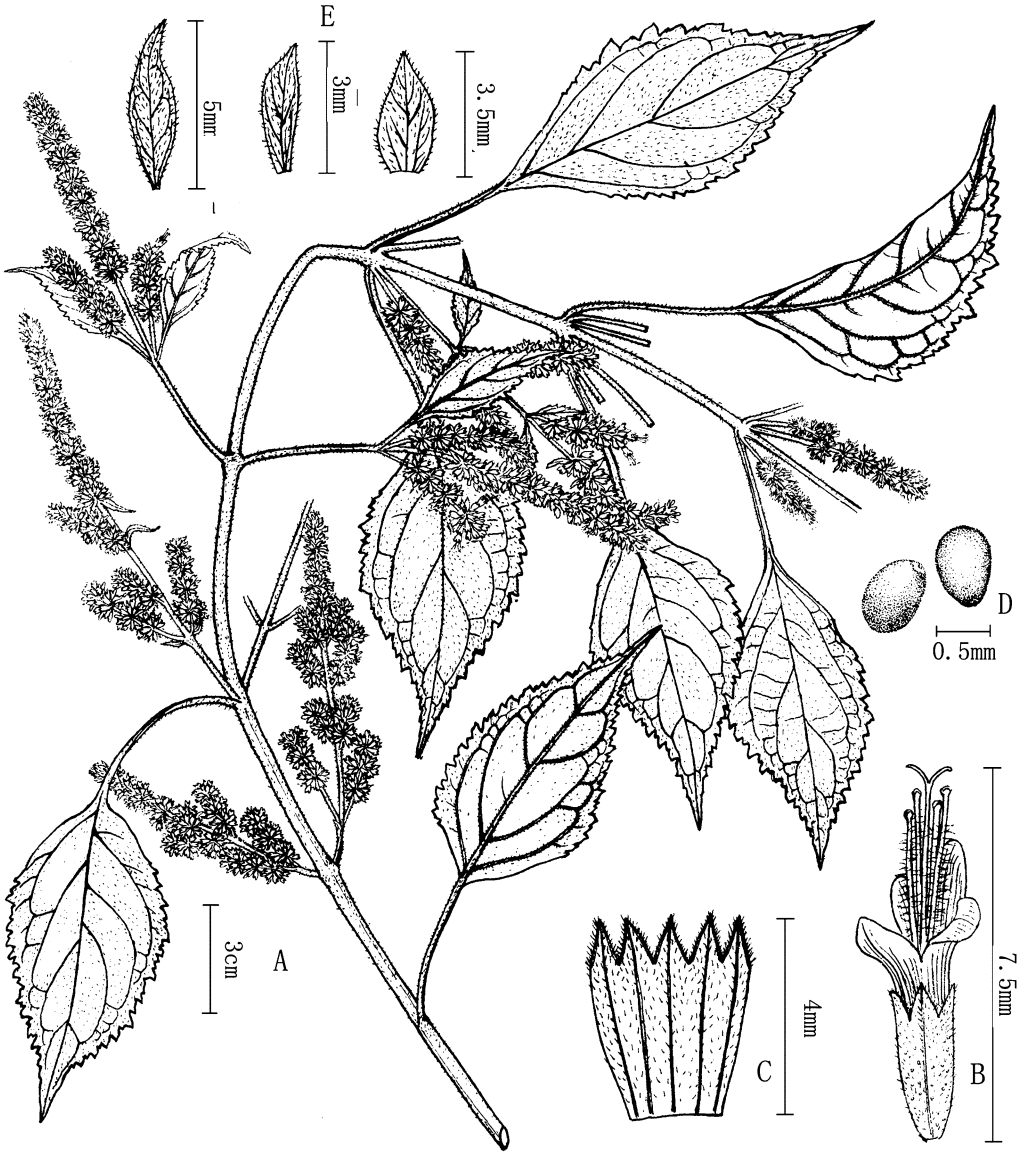

FIGURE 3. A–E. *Pogostemon chinensis*. A. Habit; B. Flower; C. Calyx; D. Nutlets; E. Bracts. Drawn by Y.X. Liu based on *T.N. Liou 22524* (IBSC).

Perennial herbs or subshrubs, to 0.5–2 m tall. Stems solid, erect, terete or obscurely angular, green or brown when dry, strigose, slightly dilated at nodes. Leaves opposite; petiole 0.5–5.5 cm long, strigose; blade ovate, 3–14 × 2–7 cm, papery or submembranous, adaxially strigose, abaxially strigose along veins, base cuneate-attenuate, margin double serrate to double crenate-serrate, apex acuminate, lateral veins 3 or rarely 4 pairs on each side of the midvein. Spikes terminal and axillary, 1.5–7.5 cm × 8–9 mm, interrupted or continuous, with more than two lateral branches; peduncle 0.5–2 cm long, densely strigose; verticillasters many-flowered, flowers sessile. Bracts and bracteoles broadly ovate, ovate, elliptic, or ovate-lanceolate, 3–5 mm long, 0.6–1.5 mm wide, subequal to or slightly longer than the calyx, strigose and densely glandular abaxially. Calyx subtubular, 3–4 mm long, 5-veined, strigose and sparsely glandular outside; teeth 5, narrowly triangular, subequal or 2 of them smaller, 0.7–1 mm long, ca. 1/3 as long as calyx tube, strigose inside, margin ciliate. Corolla reddish to purple, 4–5 mm long, exserted, 2-lipped, upper lip 3-lobed, minutely hirsute outside, lower lip entire. Stamens 4, exserted; filaments 4.5–5 mm long, beared at middle, bearded portion exserted. Anthers 1-locular, cell apex dehiscent. Style 6–7 mm long; stigma bifid, subequal, lobes ca. 0.7 mm long. Nutlets 4, obovoid or subglobose, 0.7–0.8 mm long, slightly flat abaxially, ribbed adaxially, black, shiny.

Distribution and habitat:—The species is endemic to China, occuring in (Yunnan and Guangxi) (Figure 2). It grows in thick forests, grasslands, or ravines at the elevation of 700–1600 m.

Phenology:—Flowering and fruiting from August to December.

Taxonomic notes:—*Pogostemon chinensis* resembles *P. septentrionalis* Wu & Huang (1977: 585), but differs from the latter by the stems and leaves being evidently strigose (not subglabrous or sparsely strigillose, or sparsely strigillose only on veins of leaves).

Wu & Huang (1977) distinguished the two species by the characters of calyx. They considered that the calyx is subtubular, teeth narrowly triangular and ca. 1/3 as long as the calyx tube in *P. chinensis*, and calyx narrowly campanulate, teeth triangular and ca. 1/2 as long as calyx tube in *P. septentrionalis*. However, the ratio of the length of calyx teeth and calyx tube in *P. septentrionalis* is variable. Based on checking a large number of specimens, in *P. septentrionalis*, we found that the ratio of the length of teeth and calyx tube is variable from 1/3 to 1/2, and the shape of teeth is from narrowly triangular to triangular.

4. *Pogostemon dielsianus* Dunn (1913: 159). Type:—CHINA. Yunnan: Fugong, Salween-Irrawaddy divide and valley of the Salween, 26°20' N, 1500–1800 m, November 1905, *G. Forrest 875* (holotype E!, isotype K!).

Perennial shrubs, to 3 m tall, branched. Stems solid, terete or angular, glabrous. Leaves opposite; petiole 0.5–1 cm long; blade linear-lanceolate to lanceolate, 9–14 × 2–3.5 cm, papery, base cuneate-attenuate, margin serrate, apex acminate, adaxially subglabrous, abaxially sparsely strigose-puberulent, lateral veins 5–7 pairs on each side of midvein. Spikes 3.5–7 cm long, 8–12 mm wide, terminal and axillary, subcontinuous, basally somewhat lax, with more than two lateral branched, densely appressed pubescent except for corolla, pedunculate, 0.5–2 cm long; verticillasters sessile, 10–14-flowered, flowers sessile. Bracts lanceolate, subequal to or shorter than the calyx. Calyx tubular, 3.5–4.5 mm long, 5-veined; teeth 5, triangular, 1/5–1/4 as long as the calyx tube. Corolla rose, 7–8 mm long, much exserted, tube cylindric, dilated at throat. Stamens 4, exserted from corolla; filaments 6.2–7 mm long, exserted portion 3.5 mm. Style ca. 6.4 mm long; stigma bifid, lobes ca. 1.2 mm. Disc ca. 0.7 mm long. Nutlets 4, ca. 1.5 × 0.8 mm, lanceolate.

Distribution and habitat:—The species is only known from its type locality, western Yunnan of China (Figure 2). It grows amongst rocky scrub on dry rocky hillsides, at the elevation of 1700–1800 m.

Phenology:—Flowering in November.

Taxonomic notes:—Only the type of *Pogostemon dielsianus* was examined. This species is similar to *P. elsholtzioides* and *P. griffithii* Prain (1908: 181) in having lanceolate leaves. *Pogostemon dielsianus* differs from *P. elsholtzioides* in having larger flowers, the corolla being 7–8 mm long (not ca. 4.5 mm long) and a tubular (not campanulate) calyx, and differs also from *P. griffithii* in larger flowers with the corolla 7–8 mm long (not ca. 5 mm long) and a tubular (not campanulate) calyx. *Pogostemon dielsianus* and *P. elsholtzioides* have narrowly ovoid nutlets, whereas *P. griffithii* has cylindrical nutlets. In addition, the ratio of the length of calyx teeth and calyx tube in *P. dielsianus*, *P. elsholtzioides*, and *P. griffithii* is 1/5–1/4, 1/3–1/2 and 1/2–1 respectively.

5. *Pogostemon elsholtzioides* Bentham (1848: 153). Lectotype (here designated):—INDIA. East Bengal: Khasia, no date, *W. Griffith 3962* (K000249636 !, isolectotype P!).

Perennial bushy, 1–2 m tall. Stem solid, erect, branched, terete or angular, tomentose. Leaves opposite; petiole 1–2 cm long, tomentose; blade narrowly elliptic to lanceolate, 4–15 × 1–5 cm, base cuneate, margin serrate, apex acuminate, tomentose adaxially, tomentose along the veins abaxially, glandular on both urfaces, lateral veins 3–5 pairs on each side of the midvein. Spikes 1.5–12 cm long, 8–11 mm wide, terminal and axillary, sometimes secund, continuous, sometimes interrupted basally, with more than two lateral branches; peduncle 0.5–2 cm long; verticillasters many-flowered, flowers subsessile. Bracts and bracteoles ovate or lanceolate, 1.5–3.3 mm long, tomentose. Calyx campanulate, 3–3.5 mm long, 5-veined, tomentose and golden glandular outside, glabrous inside except for tomentose toward the apex of teeth; teeth 5, triangular, equal, ca. 1mm long, ca. 0.7 mm wide at base, 1/3–1/2 as long as the calyx tube, hairy upward inside, margin ciliate. Corolla mauve, ca. 4.5 mm long, exserted, 2-lipped, upper lip 3-lobed, lobes ca. 0.7 mm long, ca. 0.9 mm wide at base, apex obtuse, lower lip entire, ca. 0.9 mm long, ca. 1 mm wide at base, apex acute. Stamens 4, much exserted, erect; filaments ca. 4.3–4.6 mm long, bearded at middle; anthers 1-locular, cell apex dehiscent. Style ca. 6 mm long; stigma bifid, lobes ca. 1 mm; disc ca. 0.4 mm long. Nutlets 4, lanceolate.

Distribution and habitat:—The species is widely distributed in Himalayan regions. In China, it It is occasional in woodlands of ravine at the elevation of 1100–1300 m.

Phenology:—Flowering and fruiting from September to December.

Taxonomic notes:—The species was misidentified under the name *Pogostemon dielsianus* in the herbarium PE. Obviously, it can be distinguished from *P. dielsianus* by its campanulate (not tubular) calyx 3–3.5 mm long (not 3.5–4 mm long), and the corolla ca. 4.5 mm long (not 7–8 mm long).

Pogostemon elsholtzioides also resembles to *P. dielsianus* and *P. griffithii* in habit, the differences among them are discussed under *P. dielsianus*.

6. *Pogostemon formosanus* Oliver (1896: pl. 2440). Lectotype (here designated):—CHINA. Taiwan: "Formosa, Ape's Hill, Takow", no date, *A. Henry 1178* (K!, isolectotypes CAL!, MO!, NY!, P!, PE!, US!).

Perennial herbs or subshrubs, to 1 m tall. Stems erect, terete or angular, branched, pubescent, glabrescent. Leaves opposite; petiole slender, to 4.5 cm long; blade rhombic-lanceolate to ovate or broadly ovate, 2.5–10 × 1.5–6 cm, papery or membranous, adaxially glabrous or sparsely strigulose, abaxially glabrous or minutely hairy on veins and inconspicuously glandular, base broadly cuneate to cuneate-attenuate, margins entire basally, irregularly incised toward apex or 3-lobed, apex acuminate; lateral veins 2–5 pairs on each side of the midvein. Spikes 2–8 cm long, 1–1.5 cm wide, terminal or axillary, continuous or sometimes interrupted basally, with more than two lateral branches; peduncle 1–3.5 cm long; cymes 5–8-flowered, peduncle short or sessile, flowers subsessile. Bracts and bracteoles linear-lanceolate to linear, 3–4 × 0.5–0.7 mm, subglabrous or sparsely pubescent along veins, margin slightly ciliate. Calyx subtubular, 4–4.4 mm long, 5-veined, glabrous or sparsely pubescent along veins and glandular outside, glabrous and glandular inside of tube; teeth 5, equal, narrowly triangular, 1.3–1.5 mm long, ca. 0.5 mm wide at base, glabrous inside, margin ciliate. Corolla white or purplish, ca. 5 mm long, slightly exserted, 2-lipped, upper lip 3-lobed, lower lip entire. Stamens 4, much exserted; filaments 2.5–3 mm long, inserted at a height of 2.4 mm in the tube, bearded at middle; anther 1-locular, cell apex dehiscent. Style ca. 6 mm long; stigma bifid, equal, ca. 0.5 mm long; disc ca. 0.3 mm long. Nutlets 4, 0.8–0.9 mm long, ellipsoid, reticulate-foveate, black or brown, shiny.

Distribution and habitat:—The species is endemic to China, occurring in Taiwan (Figure 4). It grows usually in the semi-shady forests, trailsides or gravelly slopes, at the elevation of 0–1100 m.

Phenology:—Flowering and fruiting from September to the following April.

Taxonomic notes:—*Pogostemon formosanus* resembles *P. xanthiiphyllus* Wu & Huang *in* Wu *et al.* (1977: 744) in the character of the leaf margins incised towards the apex, but differs from the latter in its glabrescent stems and leaves (not densely minutely hispid), linear-lanceolate or linear bracts and bracteoles (not oblong-lanceolate to broadly lanceolate), and the subtubular calyx, glabrous or sparsely pubescent along veins outside (not campanulate, minutely hispid on veins).

In the protologue, Oliver cited two collections (*Henry 70*, *Henry 1178*) collected from Taiwan, China. Here we choose *Henry 1178* at K as the lectotype.

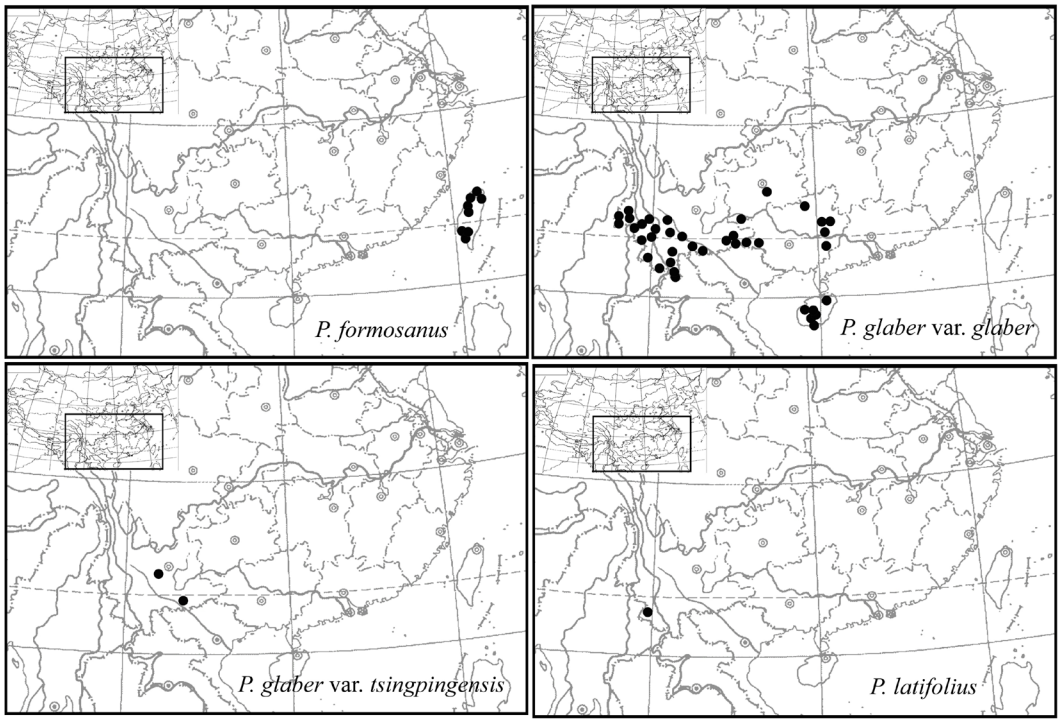

FIGURE 4. Distribution maps of *Pogostemon formosanus*, *P. glaber* var. *glaber*, *P. glaber* var. *tsingpingensis* and *P. latifolius*.

7. *Pogostemon glaber* Bentham (1830: 31). Lectotype (here designated):—NEPAL. "Nepalia", no date, *N. Wallich 1533* (K!, isolectotype K-W!).

Perennial herbs or bush, to 2 m tall. Stems erect, terete or 4-angular, branched, pubescent or subglabrous, glabrescent. Leaves opposite; petiole usually 3–5 cm long, sometimes up to 6.5 cm, subglabrous; blade ovate, 5–15 × 2.5–8 cm, adaxially sparsely pubescent or subglabrous, abaxially pubescent along veins otherwise glabrous, base broadly cuneate, cuneate, or round, margin double serrate or double crenate, apex acuminate, lateral veins 4–6 pairs on each side of the midvein. Spikes 3–15 cm × 6–10 mm, terminal and axillary, continuous or interrupted, with more than two lateral spikes; peduncle 0.5–4 cm long; verticillasters many-flowered, flowers sessile. Bracts and bracteoles ovate, 2.5–6 mm long, margin ciliate. Calyx tubular-inflated or subtubular, 3–4.5 mm long, 5-veined, glabrous, or pubescent outside, or sparsely pubescent only along veins; teeth 5, equal, triangular, ca. 1/3 as long as calyx tube, sparely pubescent or glabrous inside, margin ciliate. Corolla white, pink, purplish-white, or purple, 3.5–5.5 mm long, exserted, 2-lipped, upper lip 3-lobed, lobes apex obtuse, pubescent outside, lower lip entire, glabrous, apex acute. Stamens 4, exserted portion of filaments nearly as long as corolla; filaments bearded at middle, bearded portion exserted; anthers 1-locular, cell apex dehiscent; stigma bifid, equal, lobes 0.9–1.2 mm long. Nutlets 4, 0.5–0.6 mm long, globose, slightly flat, dark brown, shiny.

Infraspecific variation:—The hairs on leaves, bracts, bracteoles and calyx are variable within this species. Most populations in this species are pubescent or subglabrous on leaves, bracts and bracteoles as well as outer part of calyx. However, several populations of this species from southeastern and central Yunnan are villous on their leaves, bracts and bracteoles as well as the outer part of the calyx. Based on this observation, two subgroups are recognized as varieties, var. *glaber* and var. *tsingpingensis*.

Key to the varieties of *P. glaber*

1. Leaves, bracts and bracteoles, and outer part of calyx pubescent or subglabrous ..... var. *glaber*
- Leaves, bracts and bracteoles, and outer part of calyx villous ..... var. *tsingpingensis*

7a. *Pogostemon glaber* var. *glaber.* Figure 5.

Caryopteris esquirolii Léveillé (1911: 449). *Pogostemon esquirolii* (H. Lév.) C.Y. Wu & Y.C. Huang *in* Wu *et al*. (1977: 743). Type:—CHINA. Guizhou: "Kouy-Tcheou, Tchou-Ly", 900 m, 1 January 1910, *J. Esquirol 2053* (holotype E!).

The leaves, bracts and bracteoles, and outer part of calyx pubescent or subglabrous.

Distribution and habitat:—The variety is widespread from northwestern India and Nepal to Thailand, Laos, Vietnam, and China. In China, it is known from Yunnan, Guangxi, Hainan and Guizhou provinces (Figure 4). It is common in waste flats, ravines, thickets or forests, grass slopes, beside the stream or on road side at an elevation of 400–2700 m.

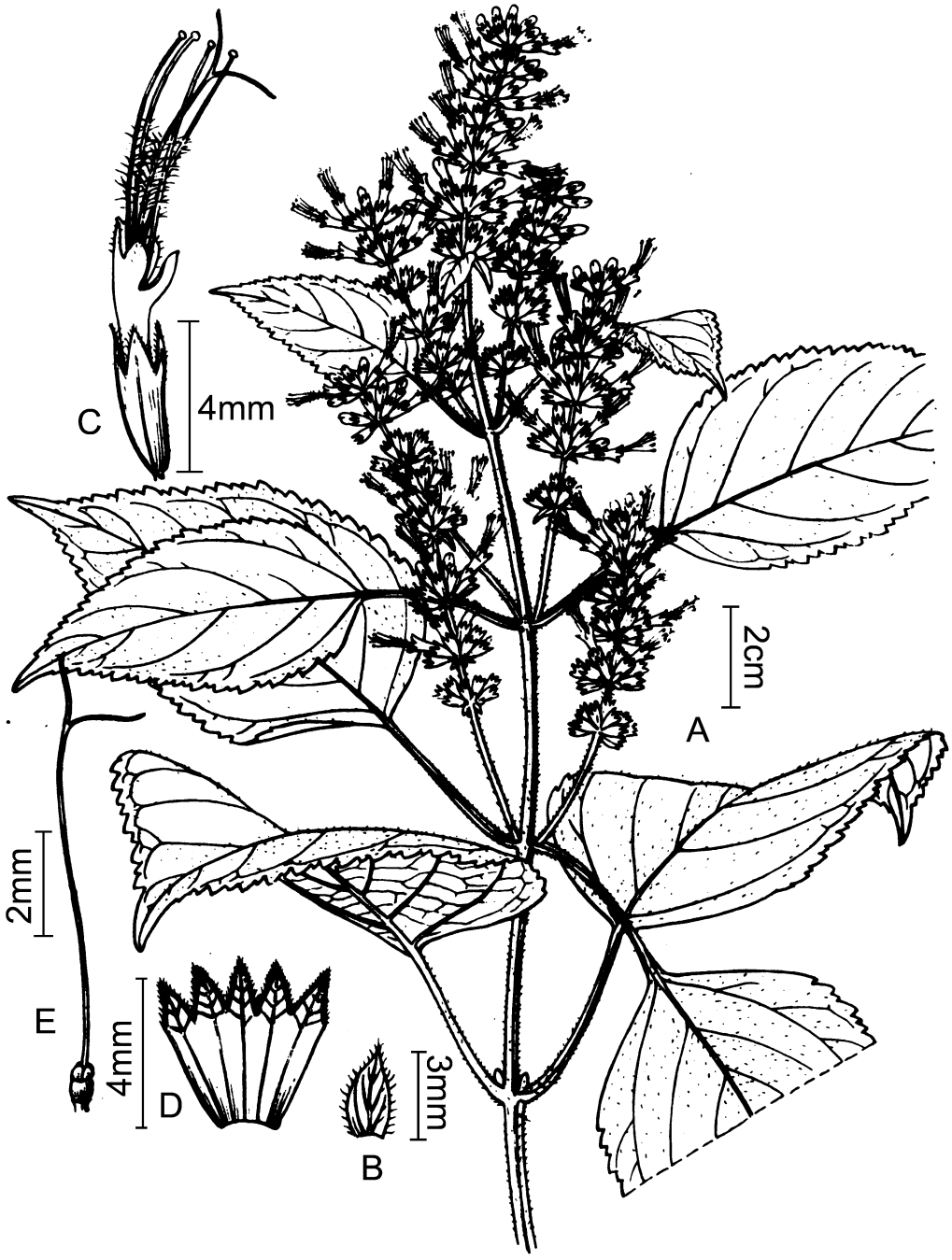

FIGURE 5. *Pogostemon glaber* var. *glaber*. A. Habit; B. Bract; C. Flower; D. Calyx; E. Ovary and style. Drawn by H.P. Yu based on *Hainan Expedition 779* (IBSC).

Phenology:—Flowering and fruiting from November to the following March.

Taxonomic notes:—*Caryopteris esquirolii* was first described in 1911 based on a specimen collected from

Guizhou, China and transferred to *Pogostemon* by Wu *et al*. (1977). However, many Chinese taxonomists (Chun 1977, Wu *et al.* 1977, Wu & Huang 1977, Li & Hedge 1994) were not aware that it had been reduced to the synonymy of *P. glaber* by Rehder (1935). Wu *et al*. (1977) and Wu & Huang (1977) recognized *P. esquirolii* as a separate species and differentiated it from *P. glaber* by characters of its continuous or interrupted spikes 3–9 cm in length, rarely to 12 cm, a subtubular calyx, ca. 4 mm long, and the corolla 6–7 mm in length. It can be observed that *P. glaber* has continuous or interrupted spikes, 2–12 cm in length, rarely up to 20 cm, an ovoid-tubular calyx, ca. 3 mm long, and the corolla ca. 5 mm long. *Flora Hainanica* (Guangdong Institute of Botany 1977) noted that "spikes wide and short, continuous, calyx4–5 mm long presented in *P. esquirolii*, while spikes slim, continuous or interrupted, calyx 2.5–3 mm long in *P. glaber."* However, after observing a larger number of specimens, the boundaries between them are not clear and the morphological characters used to discriminate the two species were found to be variable. The calyx length is variable from 3 mm to 4.5 mm, and the length of corolla is variale from 3.5 mm to 5.5 mm. The calyx up to 5 mm in length and corolla up to 6–7 mm in length as mentioned by Wu *et al.* (1977) and Wu & Huang (1977) are not observed in our present investigations. In addition, types of *P. glaber* and *P. esquirolii* are very similar in characters of the spike and the calyx. The spikes are continuous and about 2.5–8 cm in length, calyx ca. 4 mm long can be observed in the type of *P. glaber*, while spikes are continuous and about 2.5–5.5 cm in length, calyx ca. 3.5–4 mm long, corolla ca. 5 mm long present in the type of *P. esquirolii*. Therefore, we agree with the treatment by Rehder (1935) who proposed to reduce *P. esquirolii* to *P. glaber*.

7b. *Pogostemon glaber* var. ***tsingpingensis*** (C.Y. Wu & Y.C. Huang) Gang Yao, ***comb. nov.***

Basionym: *Pogostemon esquirolii* (H. Lév.) C.Y. Wu & Y.C. Huang var. *tsingpingensis* C.Y. Wu & Y.C. Huang *in* Wu *et al.* (1977: 744). Type:—CHINA. Yunnan: Tsing-pian (now Jinping Xian), 10 January 1933, *H.T. Tsai 52582* (holotype KUN!, isotypes A!, PE!).

The leaves, bracts and bracteoles, and outer part of calyx villous.

Distribution and habitat:—The variety occurs in southeastern and central Yunnan, China (Figure 4). It grows on open slopes at the elevation of 1400–1500 m.

Phenology:—Flowering and fruiting from January to April.

Taxonomic notes:—Since the name *Pogostemon esquirolii* is reduced to *P. glaber*, the new combination for this variety is necessary.

8. *Pogostemon latifolius* (C.Y. Wu & Y.C. Huang) Gang Yao, *comb. et stat. nov.* Basionym: *Pogostemon griffithii* Prain var. *latifolius* C.Y. Wu & Y.C. Huang *in* Wu *et al.* (1977: 744). Type**:—**CHINA. Yunnan: Ximeng, 700 m, 11 March 1958, *Y.C. Du 580208* (holotype KUN!).

Perennial herbs, to 2 m tall. Stems erect, 4-angular, densely appressed pubescent. Leaves opposite; petiole 0.5–1.5 cm long, pubescent; blade ovate to broadly ovate, 5.5–8.5 × 3–5.8 cm, herbaceous, adaxially appressed pubescent, abaxially densely pubescent, base broadly cuneate, margin irregularly double serrate, apex acute, lateral veins ca. 3 pairs on each side of midvein, conspicuously prominent abaxially. Spikes cylindric, (1.5–)5.5–10 × 1–1.2 cm, terminal and axillary, interrupted basally, with more than two lateral branches; peduncle 0.5–3.5 cm long; verticillasters many-flowered, densely appressed pubescent, flowers sessile. Bracts and bracteoles ovate-lanceolate to lanceolate, 1.5–3 mm, densely pubescent, margin ciliate. Calyx narrowly campanulate, 4–5 mm long, 5-veind, densely pubescent outside; teeth 5, narrowly triangular, equal, 1–1.5 mm long, 0.7–0.8 mm wide at base, 1/3–1/2 as long as calyx tube, margin ciliate. Corolla bluish, ca. 6 mm long, exserted, 2-lipped, upper lip 3-lobed, sparsely pubescent outside, lower lip entire. Stamens 4, much exserted, bearded at middle, bearded portion exserted; anthers 1-locular, cell apex dehiscent. Stigma bifid, subequal, lobes 2–2.5 mm long. Nutlet unknown.

Distribution and habitat:—The species is endemic to China and occurs in southwestern Yunnan (Figure 4). It is known only from the type locality. It grows in dense valley forests, at the elevation of ca. 700 m.

Phenology:—Flowering in March.

Taxonomic notes:—The species was described as *Pogostemon griffithii* var. *latifolius* C.Y. Wu & Y.C. Huang in Wu *et al.* (1977: 744). Li & Hedge (1994) noted that *P. griffithii* var. *latifolius* might be only a form of *P. griffithii* and that more material is needed for resolution. Bhatti & Ingrouille (1997) reduced it to be a synonym

of *P. griffithii*. However, as indicated by Wu *et al.* (1977) and Wu & Huang (1977), this taxon is different from the latter by its ovate or broadly ovate leaves 5.5–8.5 × 3.5–5.8 cm (not lanceolate, 10 × 2.5–3 cm), the spikes (1.5–)5–10 × 1.2 cm (not 2–6 cm × 8 mm), the calyx 4–5 mm long (not ca. 4 mm long). Furthermore, after checking type materials of both, more morphological differences between them were observed. *P. griffithii* var. *latifolius* is characterized by the 4-angular stems, an irregularly double serrate leaf margin, lateral veins in 3 pairs, calyx teeth 1/3–1/2 as long as calyx tube, corolla ca. 6 mm long, stigma lobes 2–2.5 mm long. *P. griffithii* var. *griffithii* has stems terete, leaf margin dentate or obscurely dentate, lateral veins 6–8 pairs, calyx teeth subequal to 1/2 as long as the calyx tube, corolla ca. 5 mm long, stigma lobes ca. 1.2 mm long. Therefore, we raise *P. griffithii* var. *latifolius* to specific rank.

9. *Pogostemon parviflorus* Bentham (1830: 31). Lectotype (here designated):—BANGLADESH. Silhet Division: Silhet, 1831, *N. Wallich 1531* (K-W!, isolectotypes G!, K!, P!). Figure 6.

Pogostemon championii Prain (1908: 254), ***syn. nov.*** Type:—CHINA. Hong Kong: Mount Parker, no date, *J.G. Champion 339* (holotype K!).

Pernnial herbs or subshrubs, 30–60 cm tall. Stem erect, terete toward base, obscurely angular upward, slightly dilated at nodes, a few branched, strigose. Leaves opposite; petiole 1–4.5 cm long, strigose; blade ovate to ovate-lanceolate, 4–12 × 2–6.5 cm, papery or membranous, strigose on both surfaces, base broadly cuneate to cuneate, margin obscurely double crenate to double serrate, entire at base, apex acuminate, lateral vein 4 or 5 pairs on each side of the midvein. Spikes 0.7–3.5 × 0.8–1 cm, terminal and axillary, continuous, with more than two lateral branches; peduncle 0.5–2.5 cm long; verticillasters many-flowered, flowers sessile. Bracts and bracteoles ovate to ovate-lanceolate, 4–6 mm long, strigose and glandular abaxially. Calyx tubular-inflated, 4–4.2 mm long, 5-veined, strigose and densely golden glandular outside, sparsely strigillose inside at the upper part of tube; teeth 5, narrowly triangular, equal, 1.2–1.3 mm long, 0.5–0.6 mm wide at base, sparsely strigillose inside, ciliate. Corolla white, pink, or purplish, 4–5.5 mm long, exserted, 2-lipped, upper lip 3-lobed, lower lip entire. Stamens 4, erect, much exserted; filaments ca. 4.5 mm long, all inserted at a height of 2 mm in the tube, bearded at middle, bearded portion exserted; anther 1-locular, cell apex dehiscent. Style ca. 5 mm long; stigma bifid, lobes subequal, ca. 0.7 mm long. Disc 0.6–0.7 mm long. Nutlets 4, 0.75 × 0.6 mm long, oblong or subglobose, abaxially slightly flat, adaxially ribbed, black, shiny.

Distribution and habitat:—This species is distributed in Myanmar, Cambodia, China, India, and Vietnam. In China, it occurs in Guangdong, Hongkong and Yunnan (Figure 7). It grows in mixed forests, ravine, or near villages.

Phenology:—Flowering from August to November and fruiting from October to December.

Taxonomic notes:—*Pogostemon championii* was described by Prain (1908) based on a specimen collected from Hongkong. It is notable that, however, this specimen from Hongkong was identified previously as *P. parviflorus* in the *Flora Hongkongensis* (Bentham 1861) and later by Hooker (1885). In its original protologue, Prain compared *P. championii* with *P. pubescens* Bentham (1848: 152), but not *P. parviflorus*. He noted that *P. championii* is similar to *P. parviflorus* in morphological characters, but didn't give the differences from the latter. Since Prain, *P. championii* has been recognized as an endemic species from China for a long time (Wu *et al.* 1977, Wu & Huang 1977, Li & Hedge 1994, Bhatti & Ingrouille 1997). However, examination of the type material reveals that *Pogostemon championii* is conspecific to *P. parviflorus*. *Pogostemon parviflorus* can be distinguished from other Chinese *Pogostemon* species by the characters of an obscurely double crenate or very shallow serrate leaf margin, very short spikes to ca. 1.5–3.5 cm long, ovate-lanceolate bracts, longer than the calyx and imbricate over flowers in young spikes.

Bhatti & Ingrouille (1997) considered *Pogostemon parviflorus* to be a synonym of *P. benghalensis* (Burman 1768: 128) Kuntze (1891: 529), which was treated as a synonym of *P. plectranthoides* by most taxonomists (Bentham 1848, Miquel 1856, Hooker 1885, Kuntze 1891). Bhatti & Ingrouille (1997) differentiated *P. benghalensis* from *P. plectranthoides* in having "a corolla with a narrower cylindrical tube and a verticillaster which is generally less crowded". As Hooker (1885) indicated, however, *P. parviflorus* is different from *P. plectranthoides* (*P. benghalensis* as its synonym) by its narrower bracts, slender spikes and the indumentum. *Pogostemon plectranthoides* is densely whitish pubescent, while *P. parviflorus* has a lax grayish strigose

indumentum. He also pointed out that the shape of the leaf margin is variable in *P. parviflorus*. A double serrate to shallow double serrate leaf margin was observed in specimens from Yunnan (*Tao & Li 40021*, *Yao 365*, *Expedition to Xishuangbanna 34496*) and India (*Pantling s.n.*, *Anonymous 21531*, *32420*), while leaves with shallow double serrate to obscurely double crenate margins were observed in specimens from south Guangdong (*Yue-78 Team 6319*, *Tsang 25959*) and Hong Kong (*Hu 12421*). Additionally, *Pogostemon parviflorus* also can be distinguished from *P. plectranthoides* by its smaller flowers with the corolla 4–5.5 mm long (vs. up to 8 mm long), filaments ca. 4.5 mm long (vs. up to 8.6 mm long), and the style ca. 5 mm long (vs. ca. 10 mm long). Here we agree to treat *P. parviflorus* as an independent species separate from *P. plectranthoides.*

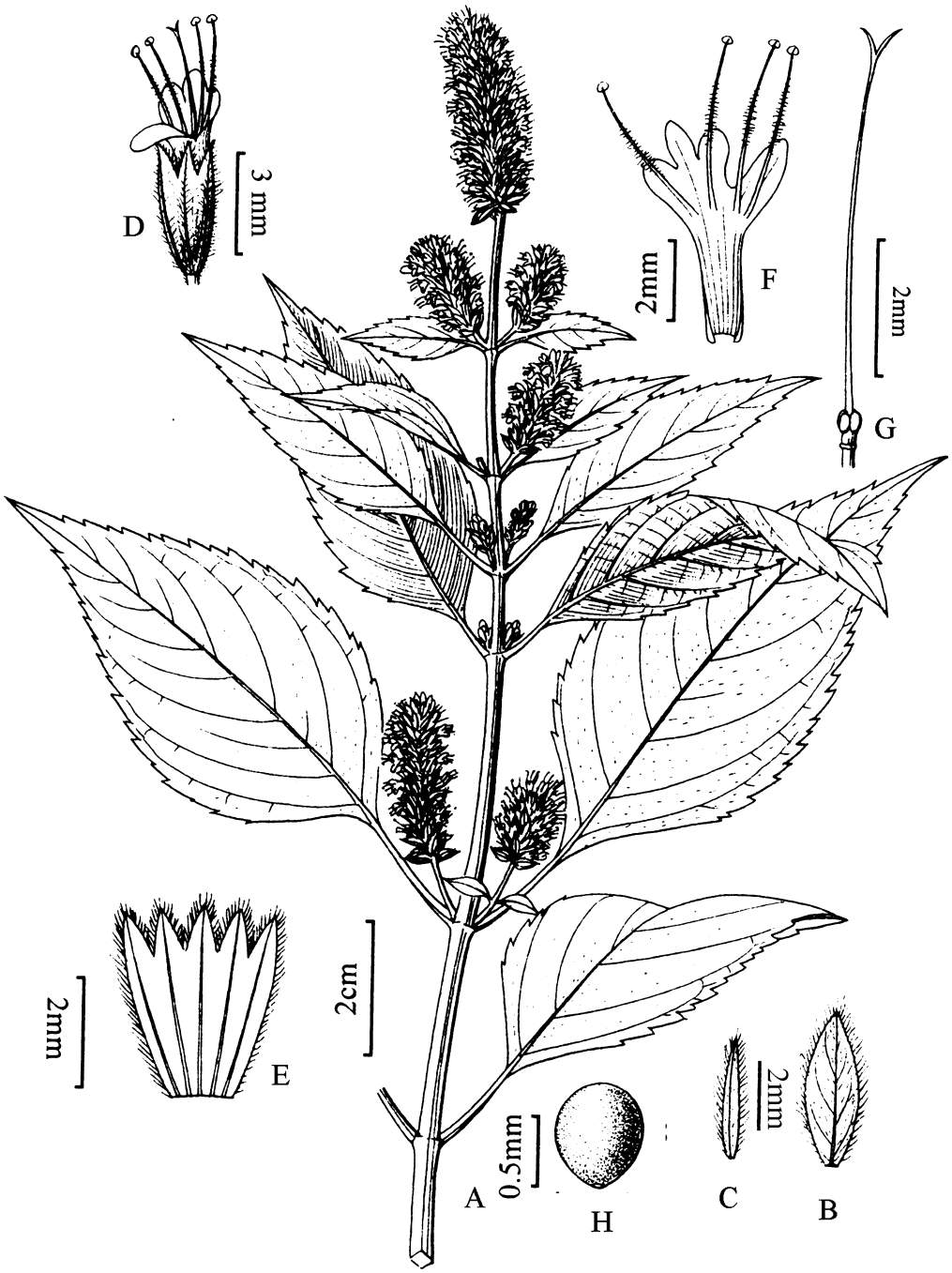

FIGURE 6. *Pogostemon parviflorus*. A. Habit; B. Bract; C. Bracteole; D. Flower; E. Calyx; F. Corolla slipt shown stmens; G. ovary and style; H. Nutlet. Drawn by Li Zhimin based on *S.Z. Zhang et al. SCAUF1124* (SZBG).

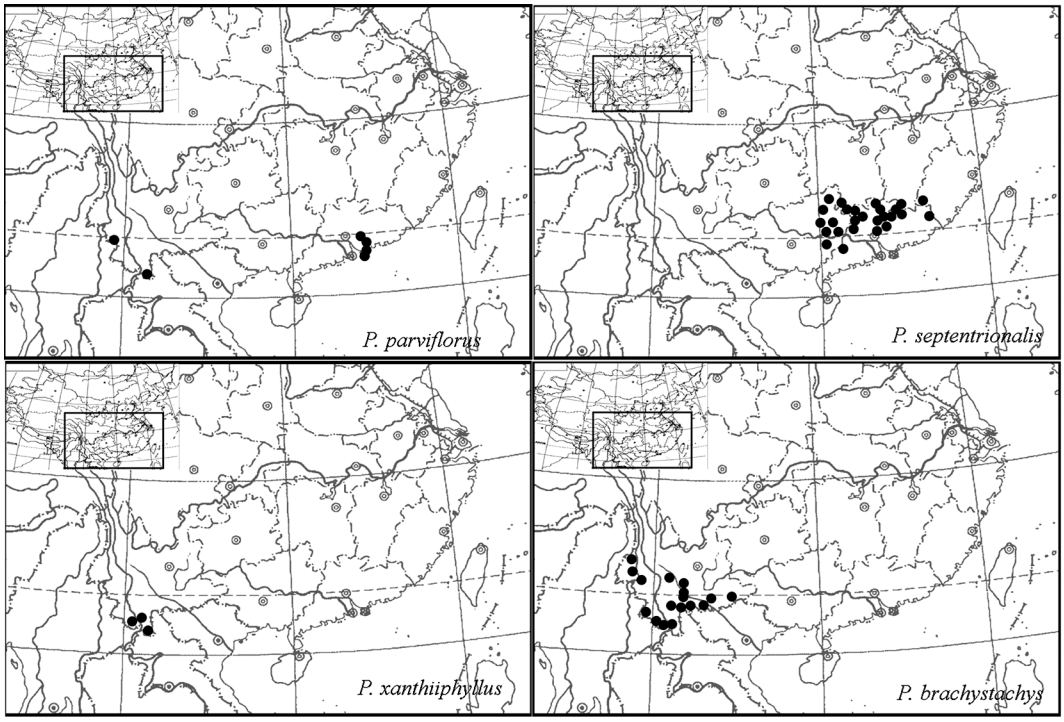

FIGURE 7. Distribution maps of *Pogostemon parviflorus*, *P. septentrionalis*, *P. xanthiiphyllus* and *P. brachystachys*.

10. *Pogostemon septentrionalis* Wu & Huang (1977: 369). Type:—CHINA. Guangdong: Wengyuan, 14 October 1935, *S.K. Lau 24884* (holotype IBSC!). Figure 8.

Perennial herbs or subshrubs, 1.5–2 m tall. Stems erect, terete or obscurely angular, finely strigillose, slightly dilated at nodes. Leaves opposite; petiole 0.5–5.5 cm long, glabrous or sparsely strigillose; blade ovate to rhombic-ovate, 4–12 × 2–8 cm, herbaceous, adaxially glabrous or sparsely strigillose, abxially glabrous or strigillose along veins, base broadly cuneate to cuneate-attenuate, margin double serrate, apex acuminate, lateral veins 3 or 4 pairs on each side of the midvein, conspicuously elevated abaxially. Spikes 3–13 cm long, 7–9 mm wide, terminal and axillary, continuous, with more than two lateral branches; peduncle 0.5–3.5 cm long; verticillasters many-flowered, flowers sessile. Bracts and bracteoles lanceolate, oblong-lanceolate, or ovate-lanceolate, 3–4 mm long, subequal or slightly shorter than calyx in length, pubescent, margin ciliate. Calyx infundibuliform, 3–4 mm long, 5-veined, subglabrous or pubescent and glandular outside, glandular inside in flower but glabrescent in fruit; teeth 5, triangular, equal, 1/3–1/2 as long as the calyx tube, sparsely pubescent or glabrous inside, margin ciliate. Corolla white to purple, 4–4.5 mm long, slightly exserted from calyx, 2-lipped, upper 3-lobed, lobes apex obtuse, lower lip entire, apex acute. Stamens 4, erect, exserted; filaments ca. 3.5 mm long, inserted at middle of corolla tube, beared at middle; anther 1-locular, cell apex dehiscent. Style 4–4.5 mm long; stigma bifid, equal, 0.7–0.8 mm long; disc ca. 0.5 mm long. Nutlets 4, 0.9–1 mm long, black or dark brown, orbicular or obovoid.

Distribution and habitat:—This species is endemic to China and occurs in Fujian, Guangdong, Guangxi, and Hunan (Figure 7). It grows in ravines, near streams, or on slopes, at 100–800 m elevation.

Phenology:—Flowering from September to October and fruiting from November to December.

Taxonomic notes:—*Pogostemon septentrionalis* resembles *P. chinensis*, and the distinguishing characters are discussed under *P. chinensis*.

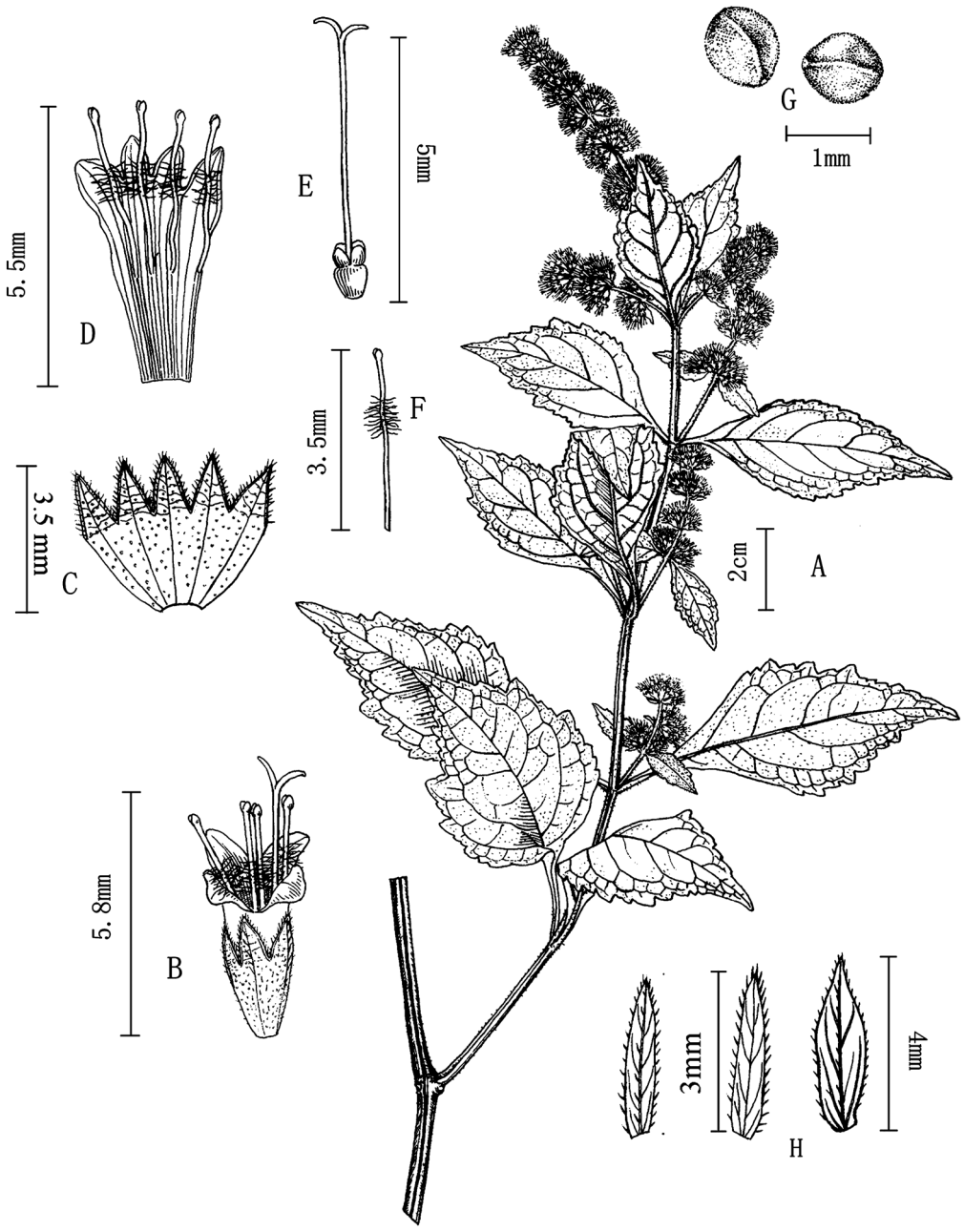

FIGURE 8. A–H. *Pogostemon septentrionalis*. A. Habit; B. Flower; C. Calyx; D. Corolla split open with stamens; E. Style; F. Stamen; G. Nutlets; H. Bracts. Drawn by Y.X. Liu based on *S. K. Lau 24884* (IBSC).

11. *Pogostemon xanthiiphyllus* C.Y. Wu & Y.C. Huang *in* Wu *et al.* (1977: 744). Type:—CHINA. Yunnan: Mengla Xian, Longlin, 720 m, 19 October 1959, *H.T. Tsai 59-11069* (holotype KUN!, isotype KUN!).

Perennial herbs or subshrubs, 0.5–1 m tall. Stems solid, 4-angular, branched, densely minutely setose, slightly dilated at nodes. Leaves opposite; petiole 0.5–4.5 cm long, densely setose; blade ovate to broadly ovate, 3–8.5 × 2–6.5 cm, adaxially dark green, densely minutely hispid on both sides, base broadly cuneate to rounded, margin double incised-serrate or irregular double serrate, apex acute to short acuminate, lateral veins 2 or 3 pairs on each side of the midvein. Spikes 2–11 cm long, 7–9 mm wide, terminal and axillary, continuous, or interrupted basally sometimes, with more than two lateral branches, densely hispid; peduncle 0.5–2 cm long; verticillasters 3–14-

flowered, flowers sessile. Bracts and bracteoles sessile, oblong-lanceolate to broadly lanceolate, ca. 3 mm long, slightly shorter than calyx, midvein sparsely hispid, margin minutely hispid. Calyx campanulate, 3.5–4 mm long, 5-veined, minutely hispid along veins, sparsely pubescent inside; teeth 5, triangular to narrowly triangular, subequal, ca. 0.9 mm long, about 1/3 as long as the calyx tube, margin rigidly ciliate. Corolla white or yellow, 3.5–4 mm long, subequal or slightly exserted from calyx, 2-lipped, upper lip 3-lobed, lower lip entire. Stamens 4, posterior filaments longer, bearded at middle, anterior 2 glabrous; anther 1-locular, cell apex dehiscent; stigma bifid, lobes subequal. Nutlet unknown.

Distribution and habitat:—The species is endemic to China, occurring in S Yunnan (Figure 7). It occasionally grows in forests or forest margins, at the elevation of 720–1100 m.

Phenology:—Flowering from September to October.

Taxonomic notes:—This species is similar to *Pogostemon formosanus* in having the leaf margin double incised-serrate. Differences between them are discussed under the latter.

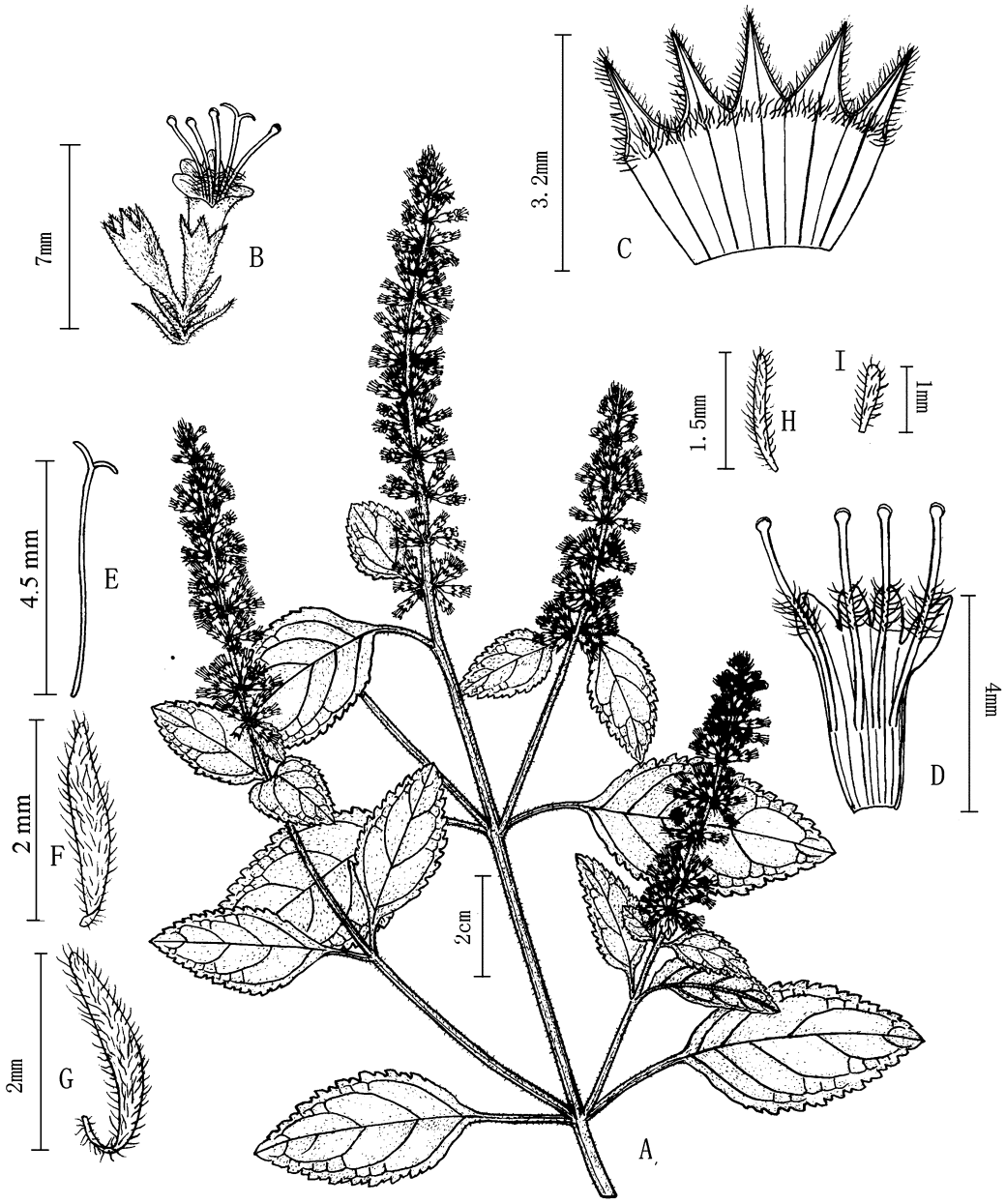

FIGURE 9. A–I. *Pogostemon brachystachyus*. A. Habit; B. Flower; C. calyx split; D. Corolla split open with stamens; E. Style; F–I. Bracts and bracteoles. Drawn by Y. X. Liu based on *G. Yao 358* (IBSC).

II. ***Pogostemon*** subgen. ***Allopogostemon*** Bhatti & Ingrouille (1997: 97; nom. inval.). ex Gang Yao, Y. F. Deng & X. J. Ge, *subgen. nov.* Type: *Pogostemon vestitus* Benth.

Pogostemon sect. *Racemosae* Bentham (1833: 155). Lectotype (here designated): *Pogostemon vestitus* Benth. According to Article 39.1 of the ICN (McNeill *et al*. 2012), the name *Pogostemon* subgen. *Allopogostemon* Bhatti & Ingrouille (1997: 97) is invalidly published because no type was designated. Here we validate the name through designating *Pogostemon vestitus* Benth. as its type.

When Bentham (1833: 155) established the name *Pogostemon* sect. *Racemosa*, eight species were included in the section. Here we choose *Pogostemon vestitus* Bentham (1830: 31) as the lectotype.

12. *Pogostemon brachystachyus* Bentham (1848: 156). Lectotype (here designated):—INDIA. Meghalaya State: "Khasia", *W. Griffith 3967* (K!, barcodes 513009; isolectotype K!). Figure 11.

Pogostemon nigrescens Dunn (1913: 159), ***syn. nov.*** *Pogostemon fraternus* Miq. var. *nigrescens* (Dunn) Kudô (1929: 52). Lectoype (designated by Bhati & Ingrouille 1997: 107):—CHINA. Yunnan: Feng-che-lin Mts., no date, *A. Henry 11174* (K!, isolectotypes A!, MO!, NY!, PE!).

Annual herbs, 20–70 cm tall. Stems erect, or procumbent and rooting at nodes sometimes basally, usually branched in large plants, densely pubescent with reflexed hairs. Leaves opposite; petiole 0.5–3.5 cm long, pubescent; blade ovate, 2–8.5 × 1.5–3.5 cm, blackish or brownish when dry, adaxially densely appressed pubescent, abaxially pubescent and densely along the veins, glandular on both surfaces, base obtuse, rounded, or cuneate, margin double crenate or serrate, apex acute to acuminate, lateral veins 3–5 pairs on each side of the midvein. Spike terminal, unbranched or sometimes with two lateral branches, 4–19 cm long, 1 cm wide, blackish or dark brown when dry, loose, continuous or subcontinuous, usually interrupted basally, densely pubescent; peduncle 1–3.5 cm long; verticillasters up to 20-flowered, rachis densely spreading gray pubescent, flowers with a short pedicel 1–2 mm long. Bracts and bracteoles linear or filiform, 1–2.5 mm long, margin ciliate. Calyx tubular-campanulate, 3–3.5 mm long in flower, ca. 4 mm long in fruit, 10-veined, green to purple in live plant, black or dark brown when dry, densely gray pubescent and glandular outside, densely white hirsute annulate inside; teeth 5, unequal, 0.9–1.1 mm long, upper three subulate, lower two narrowly triangular, margin ciliate; Corolla pink to purplish or purple, ca. 4 mm long, exserted from calyx, 2-lipped, upper lip 3-lobed, lobes apex obtuse, densely pubescent outside, lower lip entire, apex acuminate or acute, pubescent outside. Stamens 4, exserted; filaments pink, ca. 3 mm long, sparsely bearded at middle, inserted at the 1/2–2/3 height in corolla tube; anther 1-locular, cell apex dehiscent; style 4–4.5 mm long; stigma bifid, equal, lobes ca. 0.4 mm long. Disc ca. 0.5 mm long. Nutlets 4, 0.6–0.7 mm long, orbicular to obovoid, abaxially flat slightly, adaxially ribbed, black, shiny.

Distribution and habitat:—The species is distributed in Bhutan, Myanmar, India and China. In China, it occurs in Yunnan (Figure 7). It grows in boscage, roadsides, slopes on hills, and forests at an elevation of 1100–2600 m.

Phenology:—Flowering from September to November and fruiting from October to December.

Uses:—In Yunnan, it is used as medicine for bellyache by the local people.

Taxnomic notes:—*Pogostemon brachystachyus* is similar to *P. hispidocalyx* C.Y. Wu & Y.C. Huang in Wu *et al.* (1977: 745) in habit, but differs from the latter by its leaf margin being double crenate or serrate (not acutely double serrate), lateral veins in 3–5 pairs (not 5–9 pairs), the calyx tubular-campanulate (not urceolate-campanulate) in fruit and densely gray pubescent (not sparsely hispid or subglabrous) outside, and sparsely bearded (not glabrous) stamens much exserted from the corolla (not included).

Pogostemon nigrescens was considered to be an independent species endemic to Yunnan, China, distinct from *P. brachystachyus*, in previous studies (Wu & Huang 1977, Wu *et al.* 1977, Wu 1984, Li & Hedge 1994). Based on the original description and other previous descriptions (Bentham 1848, Hooker 1885, Bhatti & Ingrouille 1997), *P. nigrescens* shares the same morphological characters with *P. brachystachyus*, e.g. stems procumbent at base, pubesecnt with reflexed hairs, ovate to ovate-lanceolate leaf blades, hirsute or finely tomentose, dense or loose spikes sometimes longer than 10 cm, the calyx about 4 mm long, hirsute or hispid and exhibiting an annulus of hairs on the tube inside, the teeth awl-shaped and fringed with bristles, a purple corolla about 4 mm long, the filaments sparsely bearded, and sub-orbicular nutlets. Examination of the type material and a large number of specimens reveals that *P. nigrescens* is conspecific with *P. brachystachyus*.

In the original protologue, Dunn (1913) cited three collections (*Henry 9082*, *11174* and *12563*) from Yunnan but did not designate a type. Bhatti & Ingrouille (1997: 107) indicated the specimen *Henry 11174* in K as the holotype. In fact, they effectively chose the lectotype for the name *Pogostemon nigrescens* Dunn and the term "holotype" can be corrected as "lectotype" according to Article 9.9 of the ICN (McNeill *et al*. 2012).

13. *Pogostemon fraternus* Miquel (1856: 963). Lectotype (designated by Keng 1969: 159):—INDONESIA. West Java: op den G. Praoe, no date, *T. Horsfield 1141* (K).

Annual herb, 20–70 cm tall. Stems solid, terete, procumbent or diffuse and rooting sometimes at base, hairy upward. Leaves opposite; petiole 1–4.5 cm long, subglabrous; blade ovate to ovate-lanceolate, 2.5–9 × 1–5 cm, membranous or papery, subglabrous, base cuneate or rounded, margin serrate to double serrate, apex acute or acuminate, lateral veins 3–6 pairs on each side of the midvein. Spike terminal, unbranched or sometimes with more than two lateral branches, 5–15 × 1.2–1.5 cm, loose; peduncle 0.5–2.5 cm long; verticillasters 5–11-flowered, flowers with a pedicel 2.5–4 mm long. Bracts and bracteoles linear, 2–4 mm long, hairy. Calyx subtubular, 4–6 mm long, 2-lipped, 10-veined, sparsely hairy and glandular outside, an annulus of hairs in the throat; teeth 5, margin minutely hispid, postieror 3 narrowly triangular, ca. 1.5 mm long, anterior 2 subulate, ca. 2 mm long. Corolla purplish or pink-purple, to 7.5 mm long, 4-lobed, subequal. Stamens 4, violet, filaments inserted at different heights, the lowest at a hight of 3.5 mm in the tube; filaments 8.0–8.8 mm long, exserted portion ca. 4.8 mm; filaments more or less glabrous towards the base; anthers 1-locular, cell apex dehiscent; style ca. 11 mm long, violet; stigma bifid, equal, lobes 0.6–0.9 mm. Disc ca. 0.8 mm long. Nutlets 4, ca. 1.1 × 0.9 mm, subglobose, abaxially flattened, adaxially ribbed, reticulate-foveate.

Distribution and habitat:—The species is widespread from north India to China, Thailand, Myanmar, Vietnam, and Java. In China, it is only found in south Yunnan (Figure 10). It grows in streamsides or wet areas in forests, at an elevation of 1000–1400 m.

Phenology:—Flowering from March to April.

Taxonomic notes:—Keng (1969) erroneously reduced *Pogostemon fraternus* to the synonymy of *P. menthoides* Blume (1826: 825). This treatment was wrongly followed in many previous Chinese publications (Wu & Huang 1977, Wu *et al.* 1977, Wu *et al.* 1984, Li & Hedge 1997). However, *Pogostemon fraternus* can be easily distinguished from *P. menthoides* by the stem being subglabrous (not pubescent), the leaves 2.5–9 × 1–5 cm (not 3–5.5 × 1.5–4 cm), with cuneate to rounded (not cuneate) base and a petiole to 5 cm long (not less than 2 cm long), the calyx of flowers 4–6 mm long (not ca. 3.5 mm long), and the corolla to 7.5 mm long (not ca. 4.5 mm long). All Chinese specimens examined are idenfical with *P. fraternus,* and *P. menthoides* is obviously not found in China.

Bhatti & Ingrouille (1997) errenuously considered *Horsfield 29* as the type of *P. menthoides*. However, the syntypes of *P. menthoides* were collected by Korthals and Blume, and *Blume s.n.* was designated by Keng (1969) as the lectotype.

14. *Pogostemon hispidocalyx* C.Y. Wu & Y.C. Huang in Wu *et al.* (1977: 745). Type:—CHINA. Yunnan: Shang-pa Hsien (now Fugong Xian), 2800 m, 10 October 1933, *H.T. Tsai 58679* (holotype KUN!, isotypes A!, IBSC!).

Annual herbs, 30–65 cm tall. Stems erect, or procumbent and rooting sometimes at nodes basally, unbranched or a few branched, pubescent, glabrescent. Leaves opposite; petole 0.5–2.5 cm long, strigose; blade ovate-lanceolate to elliptic, 1–6 × 1–3 cm, submembranous, adaxially strigose to subglabrescent, abaxially glabrous or strigose along veins and densely brown glandular, base cuneate to attenuate, margin acutely double serrate, apex acuminate, lateral veins 5–9 pairs on each side of the veins. Spike terminal, unbranched or sometimes with two lateral branches, 3–15 cm × 8–10 mm, blackish or dark brown when dry; peduncle 1–2 cm long, densely pubescent; verticillasters 6–16-flowered; flowers with a pedicel 0.5–1 mm long, and extending to 2–3 mm long in fruit. Bracts and bracteoles linear, 1–2.5 mm long, margin ciliate. Calyx campanulate in flower, 2–2.5 mm long, and turn to urceolate-campanulate in fruit, 2.5–3 mm long, 10-veined, hispid and glandular outside, throat densely white hirsute annulate; teeth 5, subulate, 0.6–1 mm long, about 1/2 or subequal as long as calyx tube, margin ciliate; Corolla pink or purplish, 2.6–3 mm long, exserted from calyx, 2-lipped, upper lip 3-lobed, lobes obtuse at apex, lower lip entire, apex acute. Stamens 4, not exserted; filaments ca. 1.2 mm long, glabrous, inserted at the middle in corolla tube; anther 1-locular, cell apex dehiscent; style ca. 2.3 mm long; stigma bifid, equal, lobes ca. 0.2 mm long. Disc ca. 0.5 mm long. Nutlets 4, ca. 0.8 mm, subglobose, black, shiny.

Distribution and habitat:—The species is restricted to NW Yunnan in China (Figure 10). It grows occasionally in forests, valleys, or beside roads, at 1250–2800 m elevation

Phenology:—Flowering and fruiting from August to December.

Taxonomic notes:—*Pogostemon hispidocalyx* is similar to *P. brachystachyus* in habit, the differences between them are discussed under the latter.

The glabrous filaments not exserting from corolla in this species is diferent from all other *Pogostemon* species in China.

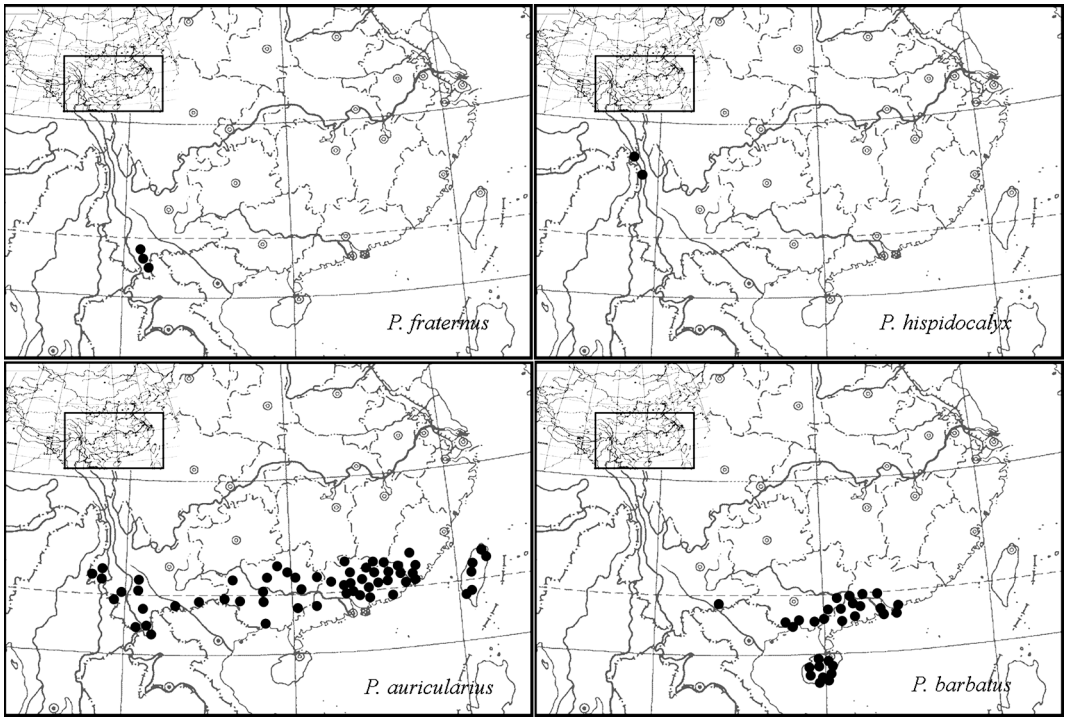

FIGURE 10. Distribution maps of *Pogostemon fraternus*, *P. hispidocalyx*, *P. auricularius* and *P. barbatus*.

III. ***Pogostemon*** subgen. ***Dysophylla*** (Blume) Bhatti & Ingrouille ex Gang Yao, Y.F. Deng & X.J. Ge, ***comb. et stat. nov.*** Basionym: *Dysophylla* Blume (1826: 826). Type: *Pogostemon auricularius* (L.) Hassk. [= *Dysophylla auricularia* (L.) Blume]

When Bhatti & Ingrouille (1997: 107) treated *Dysophylla* as a subgenus of *Pogostemon*, they did not validate the name *Pogostemon* subgen. *Dysophylla* because they did not fully cite the reference of the basionym which is not in agreement with the requirements of Article 41.3 of the ICN (McNeill *et al*. 2012). Here we validate the name through full citation of the reference of the basionym.

IIIa. ***Pogostemon*** sect. ***Dysophylla*** (Blume) Mueller (1865: 200). *Dysophylla* Blume (1826: 826). *Dysophylla* sect. *Eudysophylla* Kudô (1929: 46), *nom. inval*. Type: *Pogostemon auricularius* (L.) Hassk. [= *Dysophylla auricularia* (L.) Blume]

Dysophylla sect. *Oppositifoliae* Bentham (1833: 157), *nom. inval*. Type: *Dysophylla auricularia* (L.) Blume.

According to Article 22.2 of the ICN (McNeill *et al.* 2012), the name *Dysophylla* sect. *Oppositifoliae* was not validly published by Bentham (1833) because the original type of *Dysophylla*, *D. auricularia*, was included.

15. *Pogostemon auricularius* (L.) Hasskarl (1843: 127). *Mentha auricularia* Linnaeus (1767: 81). *Dysophylla auricularia* (L.) Blume (1826: 826). *Mentha foetida* Burman (1768: 126), *nom. illeg. superfl.* Lectotype (designated by Tucker *et al.* 1980: 238):—SRI LANKA. Without locality, 1670–1677, *Herb. Hermann 4:42, no. 411* (BM!). Figure 11.

Annual herbs, 0.4–2 m tall. Stem procumbent or diffuse basally, rooting at nodes, ascending, sometimes branched upwards, densely yellow spreadingly hirsute. Leaves opposite; petiole absent or rarely up to 1 cm in length; blade oblong to ovate-oblong, 2.5–8 × 1.5–3 cm, yellow strigose on both surfaces, with scattered impressed glands, base rounded to shallowly cordate, rarely cuneate, margin serrate, apex obtuse to acute, lateral veins 5–7 pairs on each

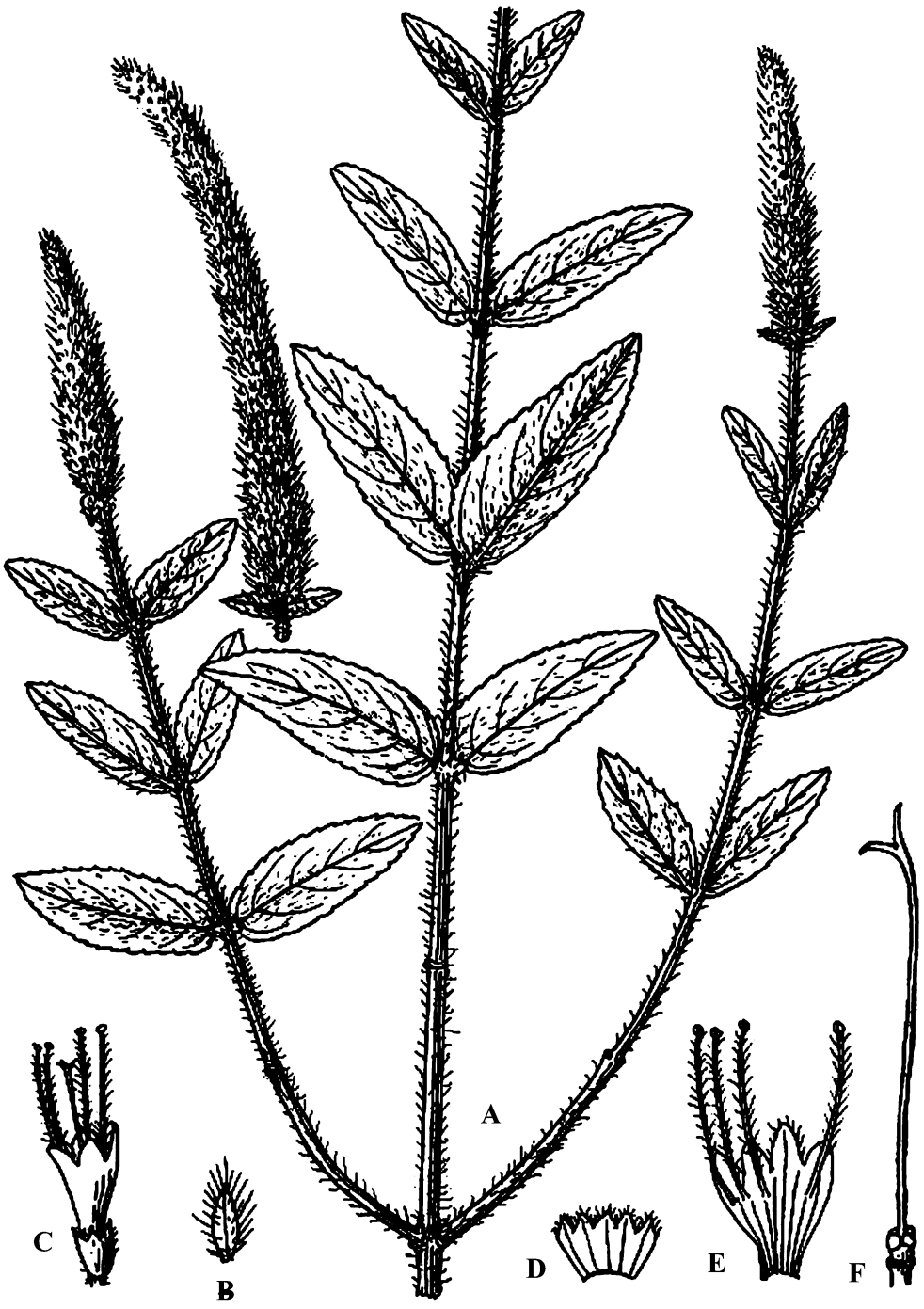

FIGURE 11. *Pogostemon auricularius*. A. Habit; B. Bract; C. Flower; D. Calyx; E. Corolla and stamens; F. Ovary and style. Drawn by H.P. Yu based on *C.L. Tso 21899* (IBSC) and provided by the Flora of Hong Kong project via Hong Kong Herbarium (HK)

side of the midvein, conspicuous abaxially. Spikes terminal, simple, 3–18 cm long, 6–10 mm wide, apex caudate-acuminate, continuous or sometimes interrupted basally, strigose; peduncle subsessile to 2 cm long; flowers subsessile. Bracts and bracteoles ovate-lanceolate, narrowly elliptic, linear, or spatulate, 1.8–2.6 mm long, pubescent and brown glandular abaxially, glabrous adaxially, margin strigose. Calyx campanulate, ca. 1 mm long, 5-veined, glandular and with a few hairs outside, glabrous inside; teeth 5, triangular, ca. 1/3 as long as calyx tube, margin ciliate, incurved in fruit. Corolla white to purplish, ca. 2.3 mm long, much exserted, sparsely pubescent and glanular outside, subequally 4-lobed. Stamens 4, much exserted; filaments ca. 2.3 mm long, inserted at the middle of corolla tube, bearded portion exserted; anthers 1-locular, cell apex dehiscent; style ca. 3.8 mm long; stigma bifid, equal, lobes ca. 0.5 mm. Disc ca. 0.3 mm long. Nutlets 4, ca. 0.7 mm long, ellipsoid-fusiform, brown, reticulate.

Distribution and habitat:—*Pogostemon auricularius* is one of the most widespread species in the genus. It is distributed in Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, the Philippines, Sri Lanka, Thailand and Vietnam. In China, it occurs in Fujian, Hainan, Guangdong, Guangxi, Jiangxi, Taiwan and Yunnan provinces (Figure 10). It grows in wet areas or marshy grounds in sparse forests, stream sides, or near villages, at an elevation of 200–1700 m.

Phenology:—Flowering and fruiting from April to December.

Taxonomic notes:—*Pogostemon auricularius* is similar to *P. barbatus* Bhatti & Ingrouille (1997: 109) in habit, but differs from the latter in its petioles being absent or less than 1 cm long (not usually 1–2 cm long), yellow strigose (not brown or dark brown strigose) stems and both leaf surfaces, the leaves with rounded to shallowly cordate to rarely cuneate (not broadly cuneate to cuneate) base and serrate (not crenate or double crenate) margin.

In the protologue of both *Mentha auricularia* and *M. foetida*, three same pre-1753 synonyms were included, i.e., "*Aloperuro-Veronica*" of *Flora Zeylanica* (Linnaeus 1747), "*Veronica hirsuta latifolia aquatica*" of *Thesaurus Zeylanicus* (Burman 1737) and "*Majana foetida"* of *Herbarium Amboinense* (Rumphius 1750). Linnaeus (1771) treated *M. foetida* as a synonym of *M. auricularia*. As discussed by Merill (1921), the species in Burman's *Flora Indica* were often described by Linnaeus (1767, 1771) in his *Mantissa Plantarum* under the same name Burman used or under another name. Obviousely, these two names were based on the same material and the later Burman's name *M. foetida* is thus an illegitimate superfluous name. Tucker *et al.* (1980) designated *Herb. Hermann 4:42, no. 411* at BM as the lectotype of *M. auricularia*. According to the Article 7.5 of ICN (McNeill *et al.* 2012), the type of *M. foetida* is the same as *M. auricularia*.

16. *Pogostemon barbatus* Bhatti & Ingrouille (1997: 109). Type:—CHINA. Hong Kong: Fau Tan Valley, 12 October 1972, *S.Y. Hu 12319* (holotype K!). Figure 12.

Dysophylla auricularia (L). Blume var. *gigantea* Doan (1936: 965), *nom. inval. Pogostemon auricularius* var. *giganteus* (Doan) Hô ex Budantzev (1999: 22), *nom. inval.* "Types":—CAMBODIA. Battambang: Avaichek, 20 October 1927, *E. Poilane 14287* (P!). LAOS. Poukhane, no date, *A. Spire 119* (P). Luang Prabang: in 1899, *D.J. Du Puy 183* (P!). VIETNAM. Cao Bang: "Tonkin, Nam-kep, sur le Pia-ouac", July 1932, *A. Petelot 714* (P!). Da Nang: "Annam, Tourane", May–July, 1927, *J. & M.S. Clemens 3037* (P!). Hai Duong: "Tonkin, Lam, Sept-Pagodes", September 1909, *S. Mourel 279* (P!). Ha Nam: Phu Ly, in 1919, *M. d'Alleizette 243* (P!). Hanoi: "Tonkin, Kien De, Tu Phap", 7 October 1891, *B. Balansa 4462* (P!). Lang Son: 21 October 1911, *H. Lecomte & A. Finet 88* (P!). Lao Cai: "Tonkin, Lao-Kay, route de Lao-Kay à Muong Xen", 4 December 1913, *A. Chevalier 29283* (P!);. Ninh Binh: "Tonkin, Khang Thuong, avoras nemoris Má Cò", 21 October 1880, *H. Bon 31* (P!); "Tonkin, Khang Thuong, avoras nemoris Má Cò, 21 October 1880, *H. Bon 829* (P!). Ninh Thuan: "Annam, Cana, Prov. Phanrang", 2 December 1928, *E. Poilane 9407* (P!). Phu Tho: "Tonkin, La Phu, Prov. Phu-Tho", no date, *P.A. Eberhardt 4385* (P!). Quang Tri: "Annam, Prov. Quang Tri, Centre Le Boi et Ba Thung", 9 June 1927, *E. Poilane 13408* (P!). Thua Thien-Hue: "Annam, Thua Thien", no date, *P.A. Eberhardt 1505* (P!).

Annual herbs, 0.4–1 m tall. Stem terete or angular, solid, procumbent or diffuse basally, rooting at nodes, ascending, upward branched sometimes, grayish brown, densely hirsute. Leaves opposite; petiole 0.5–2.5 cm long, strigose, blades 3–9 × 1.5–3.5 cm, black or dark brown when dry, oblong-clavate, elliptic, narrowly elliptic or narrowly oblong, base broadly cuneate to cuneate, margin serrate, crenate, or double crenate, apex bluntly acute or round, hirsute, with golden, sunken glands. Spike terminal, simple, 3–9 cm long, 6–9 mm wide; peduncle subsessile to 2 cm long; flowers subsessile. Bracts and bracteloes clavate-oblanceolate or linear, 1–2.5 mm long, margin ciliate. Calyx campanulate, 1.5–1.7 mm long, 5-veined, outside glabrous, with sparsely golden glandular, inside glabrous; teeth 5, triangular, subequal, 0.4–0.5 mm long, incurved in fruit, glabrous inside, margin ciliate. Corolla white or pink, ca. 2.5 mm long, exserted, sparsely hairy outside, subequally 4-lobed. Stamens 4, much exserted; filaments ca. 3.2 mm long, inserted at the middle of corolla tube, glabrous at base, bearded towards the

middle of filaments on one side, bearded portion exserted; anthers 1-locular, cell apex dehiscent; style ca. 4 mm long; stigma bifid, equal, lobes 0.4–0.5 mm long. Nutlets 4, 0.6 × 0.5 mm, oblong or obovoid, brown or dark brown.

Distribution and habitat:—The species is distributed in China, Cambodia, Laos and Vietnam. In China, it occurs in Hainan, Hongkong, Macao, Guangdong and Guangxi provinces (Figure 10).

Phenology:—Flowering and fruiting from April to November.

Taxonomic notes:—*Pogostemon barbatus* resembles *P. auricularius*, differences between them are discussed under the latter species.

Dysophylla auricularia var. *giganteus* Doan is an invalid name because it was only described in French and no Latin diagnosis was provided, not in agreement with Article 39.1 of the ICN (McNeill *et al*. 2012). The authors checked all collections in herbarium P cited by Doan (1936) in the protologue, but only the collection *Poilane 9407* was annotated with "*Dysophylla auricularia* var. *gigantea*".

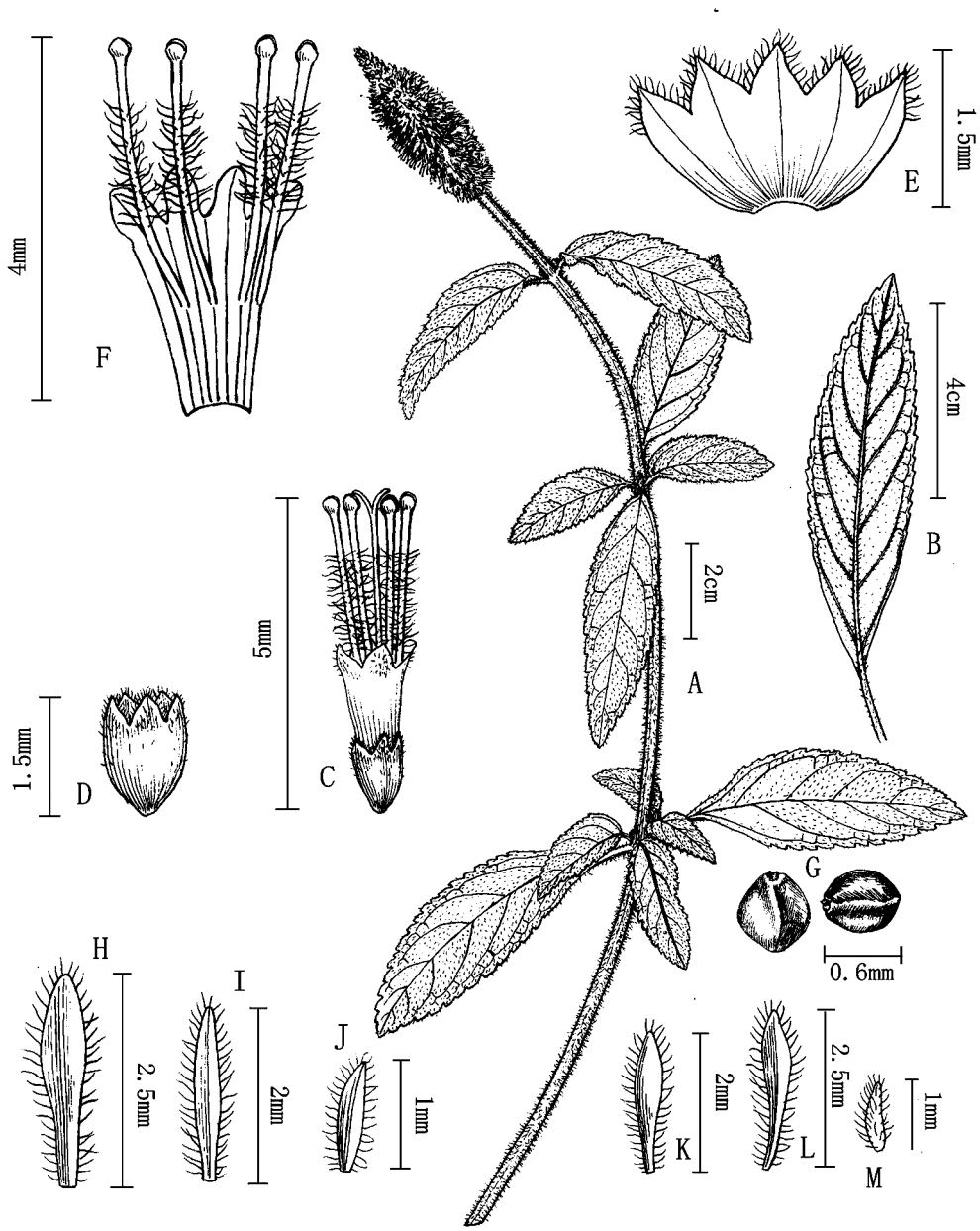

FIGURE 12. A–M. *Pogostemon barbatus*. A. Habit; B. Leaf; C. Flower; D. Calyx; E. Calyx split; F. Corolla split open with stamens; G. Nutlets; H–M. Bracts and bracteoles. Drawn by Y. X. Liu based on *G. Yao 274* (IBSC).

17. *Pogostemon falcatus* (C.Y. Wu) C.Y. Wu & H.W. Li in Li (1975: 76). *Dysophylla falcata* C. Y. Wu in Wu *et al.* (1965: 237). Type:—CHINA. Yunnan: Cheli Xian (now Jinghong Shi), Nan-hsien-ho, 800 m, October 1936, *C.W. Wang 79441* (holotype PE!, isotypes A!, IBSC!).

Herbs, 30–50 cm tall. Stems erect, terete, basally woody, densely appressed hirsute, apex densely gray hairy, slightly swollen at nodes, sometimes branched upwards. Leaves opposite or in whorls of 3; petiole subsessile to ca. 3 mm long, densely silky; blades linear to falcate, 4.5–7.5 cm × 4–7 mm, adaxially appressed silky, abaxially densely so along veins and glandular, base attenuate, margin remotely serrate except base 1/2 entire, apex acuminate, midvein elevated abaxially, lateral veins 3–5 pairs on each side of the midvein, conspicuous abaxially. Spikes terminal, 2–7.5 cm × 4–6.5 mm, black when dry, compact, subtended from the leaf axil; pedicel ca. 0.7 mm long, pilose. Bracts and bracteoles linear, equivalent or slightly longer than calyx, densely silky. Calyx 1.5–1.7 mm long, membranous, sparely pilose outside, teeth 5, ca. 0.4 mm long, narrowly triangular, pilose outside, glabrous inside, margin ciliate. Corolla red, black when dry, 1.7–2.1 mm long, exserted, subequally 4-lobed. Stamens 4, much exserted; filaments black when dry, sparsely hairy at middle, inserted at the middle of corolla tube; anthers 1-locular, cell apex dehiscent; style ca. 2.5 mm long; stigma bifid, lobes equal, ca. 0.7 mm long. Nutlet unknown.

Distribution and habitat:—The species is endemic to China and only known from the type locality, southern Yunnan (Figure 13). It grows on rocks by streams, at an elevation of about 800 m.

Phenology:—Flowering in October.

Taxonomic notes:—*Pogostemon falcatus* can be easily distinguished from other Chinese *Pogostemon* species by its woody stem and falcate leaves. In its original description, it was indicated that the species has opposite leaves. However, after examining the types, we found that there was a short petiole or a conspicuous scar where the leaf had fallen off on some nodes with two leaves. So, this species has the leaves opposite or in whorls of 3. The similar case was also observed in *Pogostemon quadrifolius* (Bentham 1930: 30) Kuntze (1891: 530), which was clustered in the clade of subgen. *Dysophylla* sect. *Dysophlla* in a cladistic analysis based on morphological characters of *Pogostemon* species (Ingrouille & Bhatti 1998). Accordingly, *P. falcatus* is treated here as a member of sect. *Dysophlla*. Further studies on the phylogenetic position of the species with leaves opposite or in whorls of 3 are neccessary.

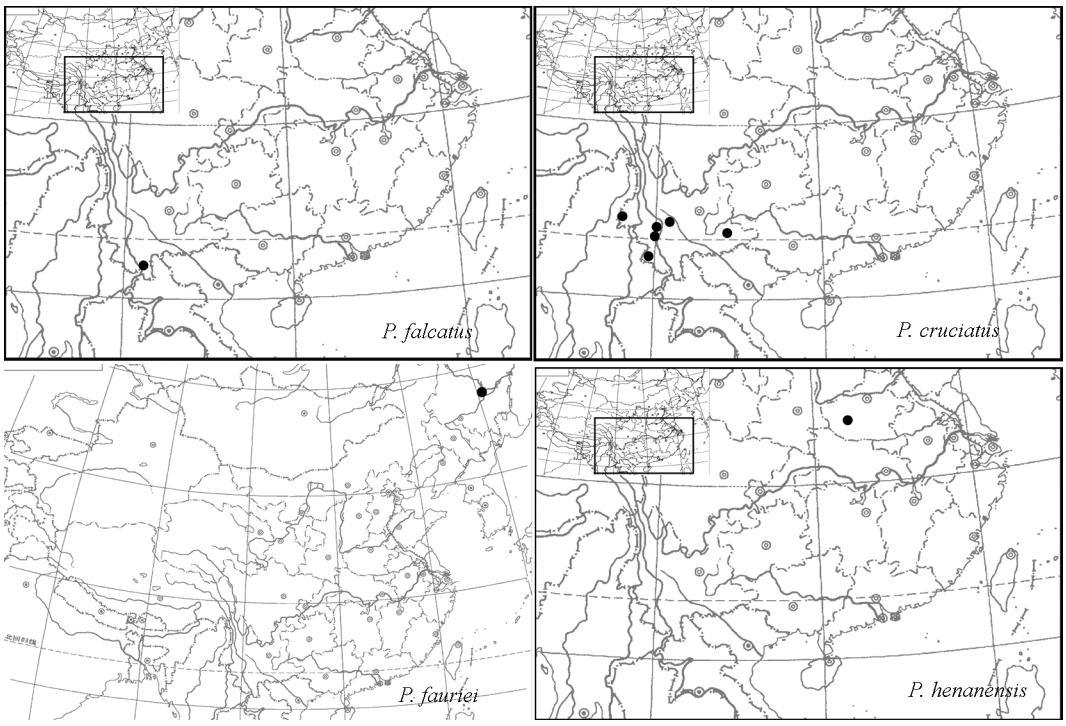

FIGURE 13. Distribution maps of *Pogostemon falcatus*, *P. cruciatus*, *P. fauriei* and *P. henanensis*.

18. *Pogostemon quadrifolius* (Benth.) Kuntze (1891: 530). *Dysophylla quadrifolia* Bentham (1830: 30). *Mentha stellata* Buch.-Ham. ex Roxburgh (1832: 5), *nom. illeg.* non *Mentha stellata* Loureiro (1790: 360). *Eusteralis quadrifolia* (Benth.) Panigrahi (1976: 478). *Anuragia quadrifolia* (Benth.) Raizada (1976: 218). Lectotype (here designated):—INDIA. No locality, no date, *W. Roxburgh s.n.* (K!, isolectotype BM!).

Perennial herbs, 20–50 cm tall. Stems erect, soild, terete, woody basally, upward densely hirsute, branched sometimes upward. Leaves opposite or mostly 3–4 in whorls; petiole ca. 3–5 mm long, densely silky; blades linear, or rarely linear-lanceolate, 3–6.5 cm × 3–6 mm, adaxially appressed silky, abaxially densely so along veins and glandular, base cuneate, margin shallow serrate except base 1/2 entire, apex acuminate, midvein elevated abaxially, lateral veins 2–4 pairs, conspicuous abaxially. Spikes terminal, 4.5–12.5 cm × 4–6 mm, black when dry, compact. Bracts and bracteloes linear, equivalent or slightly longer than calyx, densely silky. Calyx campanulate, ca. 2 mm long, hairy outside, glabrous inside; teeth 5, 0.4–0.5 mm long, triangular to narrowly triangular, hairy outside, glabrous inside, margin ciliate. Corolla purple, black when dry, ca. 3.3 mm long, exserted, subequally 4-lobed, lobes ca. 0.9 mm wide, hairy outside. Stamens 4, much exserted; filaments black when dry, equally hairy at base, inserted at a height of 1.4 mm in the corolla tube; anthers 1-locular, cell apex dehiscent; style ca. 4.5 mm long; stigma bifid, lobes subequal, 0.9–1 mm long. Nutlet 3–4, ca. 0.5 mm long, ellipsoid-oblong, dark brown, spinulose.

Distribution and habitat:—The species is distributed from India, Bangladesh to Myanmar and China. In China, it occurs in southern Yunnan. It grows occasionally near roads at the edge of forests, at an elevation of about 500 m.

Phenology:—Flowering from September to October.

Taxonomic notes:—*Pogostemon quadrifolius* resembles *P. falcatus*, the distinguishing characters are discussed under *P. falcatus*.

IIIb. ***Pogostemon*** sect. ***Verticillati*** (Benth.) Panigrahi (1984: 102). *Dysophylla* sect. *Verticillatae* Bentham (1833: 157). Type: *D. verticillata* Benth. [= *Pogostemon stellatus* (Lour.) Kuntze]

Pogostemon sect. *Eusteralis* (Raf.) Keng (1978: 352). *Eusteralis* Rafinesque (1837: 95). Type: *Eusteralis pumila* Rafinesque (1837: 95) [= *Pogostemon stellatus* (Lour.) Kuntze]

19. *Pogostemon cruciatus* (Benth.) Kuntze (1891: 530). *Dysophylla cruciata* Bentham (1830: 30). *Eusteralis cruciata* (Benth.) Panigrahi (1976: 478). *Anuragia cruciata* (Benth.) Raizada (1976: 218). Lectotype (designated here):—NEPAL. In 1821, *N. Wallich 1541* (K-W!, isolectotypes E!, K!, NY!, P!).

Dysophylla tetraphylla Wight (1833: 355). Type:—INDIA. Probably Malabar, no date, *R. Wight 2531* (holotype K; isotype E!).

Annual herbs, 15–45 cm tall. Stems solid, erect, terete, with shallow grooves, procumbent and branched sometimes basally, yellow or brown strigose, lower internodes short. Leaves in whorls of 4–5, sessile; blade linear, 1.2–3.5 cm × 2–5.5 mm, obliquely spreading, papery, strigose, abaxially glandular, base broad cuneate, margin entire and strong revolute, apex acute, lateral veins inconspicuous. Spike terminal, simple, 1.5–10 cm × 7–8 mm, continuous and compact; flowers subsessile. Bracts and bracteoles linear to narrowly lanceolate, 1.5–3.3 mm long, equal to or longer than the corolla, gray strigose, gray-purple. Calyx campanulate, ca. 1.5 mm long, 5-veined, villous and sparsely glandular outside, glabrous inside; teeth 5, ovate-triangular, ca. 1/3 as long as calyx tube, hairy inside, margin ciliate. Corolla pink, purplish pink or red, ca. 2.3 mm, about 1.5 × as long as calyx, exserted, villous outside, subequally 4-lobed. Stamens 4, much exserted; filaments ca. 2.8 mm long, much exserted, inserted at the middle of corolla tube, bearded at middle, beard portion exserted; anthers 1-locular, cell apex dehiscent; style ca. 3.7 mm long; stigma bifid, lobes equal, ca. 0.6 mm long; disc ca. 0.3 mm long. Nutlets 4, oblong, ca. 0.6 mm long, dark brown, smooth, shiny.

Distribution and habitat:—The species is distributed in Cambodia, China, India, Laos, Nepal, Thailand, and Vietnam. In China, it occurs in Yunnan (Figure 13). It grows in open ravines, grassy slopes, or near streams, at 1100–1800 m elevation.

Phenology:—Flowering and fruiting from July to December.

Taxonomic notes:—The species is similar to *Pogostemon szemaoensis* (Wu & Hsuan 1965: 238) Press (1982: 74) in habit, but differs in its leaf margin being entire and strongly revolute (not remotely shallow serrate, flat or

slightly revolute) and its stems covered with spreading and ascending strigose indumentum (not appressed strigose). This species is also similar to *P. petelotii* Doan ex Yao *et al*. (2013: 39) from Vietnam and Thailand, but differs in having the stems and leaves brown spreadingly hirsute (not whitish adpressed tomentose), hairs on leaves 2–3-cellular (not unicellular), leaf margins revolute and quite entire (not revolute and dentate upward), midrib inconspicuously elevated (not conspicuously elevated), lateral veins invisible (not distinct in 3–5 pairs), and the calyx tube rounded (not 4-angled).

20. *Pogostemon fauriei* (H. Lév.) Press (1982: 73). *Dysophylla fauriei* Léveillé (1911: 248). Type:—KOREA. "In orizetis Quelpaert", October 1906, *A. Faurie 760* (holotype E!).

Annual herbs, 10–40 cm long. Stem weak, erect or procumbent basally, lower internodes very short sometimes, rooting at nodes basally, glabrous. Leaves in whorls of 3–4, sessile; blade linear to linear-lanceolate, 1–3.5 cm × 1.2–6 mm, abaxially inconspicuously glandular, base cuneate, margin obscurely dentate or entire, apex acute, glabrous, lateral vein inconspicuous. Spike terminal, simple, 0.8–2.5 cm × 4–6 mm; flowers subsessile. Bracts and bracteoles lanceolate, linear-lanceolate, or linear, 2.5–3 mm long, purplish, margin ciliate. Calyx campanulate, purplish, 2.5–2.8 mm long in fruit, 5-veined, glabrous or sparsely hairy and glandular outside; teeth 5, triangular, subequal, 2/5–1/2 as long as calyx tube, hairy inside, margin ciliate. Corolla to 3.3 mm long, exserted, 2-lipped, lower lip ca. 1 × 1 mm, upper lip ca. 2 mm across, central lobe ca. 0.6 × 0.5 mm. Stamens 4, exserted; filaments 3.5–3.8 mm long, all inserted at a height of ca. 1.4 mm in the tube, exserted portion ca. 1.9 mm, glabrous at the base; style ca. 4.5 mm long; stigma bifid, lobes equal, ca. 1 mm long. Disc ca. 0.3 mm long. Nutlets 4, ca. 2/3 mm long, oblong or obovate, dark brown, reticulate-punctate.

Distribution and habitat:—The species is distributed in NE China and Korea. In China, it occurs in Heilongjiang province (Figure 13). It grows in marsh grounds or rice paddies, at 100–200 m elevation.

Phenology:—Fruiting from September to October.

Taxonomic notes:—*Pogostemon faurei* was omitted in the *Flora Reipublicae Popularis Sinicae* (Wu & Huang 1977) and *Flora of China* (Li & Hedge 1994), but recorded in *Flora Plantarum Herbacearum Chinae Boreali-Orientalis* (Fu *et al.* 1981) and *Flora of Heilongjiangensis* (Mu & Dong 2001). It is similar to *P. stellatus* in habit, but differs from the latter by its shorter spikes less than 2 cm long (not 0.5–5 cm), corolla ca. 3 mm long (not 1.5 mm), calyx ca. (2–)2.5–2.8 mm long (not 1.5 mm) and leaves in whorls of 3–4 (not 4–10).

21. *Pogostemon henanensis* Gang Yao, *sp. nov.* Figure 14.

Diagnosis: This species is similar to *Pogostemon stellatus* in habit, but differs in its leaves in whorls of 3, calyx c. 1.6 mm long and corolla c. 2.5 mm long.

Type:—CHINA. Henan: Songxian, Longchiman Nature Reserve, 600 m, 17 August 1983, *Expedition for Plant Resource 20263* (holotype PE!).

Annual herbs, to 30 cm long. Stems with shallow grooves, glabrous, short branches usually axillary. Leaves in whorls of 3, sessile; blade linear, 1.5–6 cm × 4–7 mm, adaxially glabrous, abaxially glabrous and densely yellow brown glandular, base attenuate, margin remote serrate upward, apex acuminate, midvein slightly elevated abaxially, lateral vein inconspicuouse. Spike terminal, simple, ca. 7.5 cm × 8 mm, continuous and compact; flowers sessile. Bracts and bracteoles linear, 2–2.5 mm long, villous. Calyx funnelform, ca. 1.6 × 1.5 mm, 5-veined, densely hairy and glandular outside, glabrous inside; teeth 5, triangular, ca. 0.6 mm long, ca. 0.6 mm wide at base, margin ciliate. Corolla purplish red, ca. 2.5 mm long, exserted, sparsely glandular outside, glabrous inside, subequally 4-lobed, center lobe ca. 2 mm long. Stamens 4, erect, much exserted; filaments ca. 3.4 mm long, all inserted at a height of 1 mm in the tube, bearded at middle, bearded portion exserted; anthers 1-locular, cell apex dehiscent; style ca. 5.4 mm long; stigma bifid, lobes equal ca. 0.8 mm. Disc ca. 0.3 mm long. Nutlet unknown.

Distribution and habitat:—The species is only known from its type locality, Longchiman Nature Reserve, Songxian, Hennan, China (Figure 13). It grows near water at an elevation of about 600 m.

Phenology:—Flowering in August.

Etymology:—*Pogostemon henanensis* is named after its type locality, Henan province.

Taxonomic notes:—This new species is similar to *Pogostemon stellatus* in habit, but differs in its leaves in

whorls of 3 (not 4–8), calyx ca. 1.6 mm long (not 1.2 mm), corolla ca. 2.5 mm long (not 1.5–1.8 mm). It also resembles to *P. faurei*, but differs from in having leaves 1.5–6 cm long (not 1.2–3.5 cm long), leaf margins conspicuously serrate (not obscurely dentate or entire), and spikes 7.5 cm long (not to 2.5 cm long).

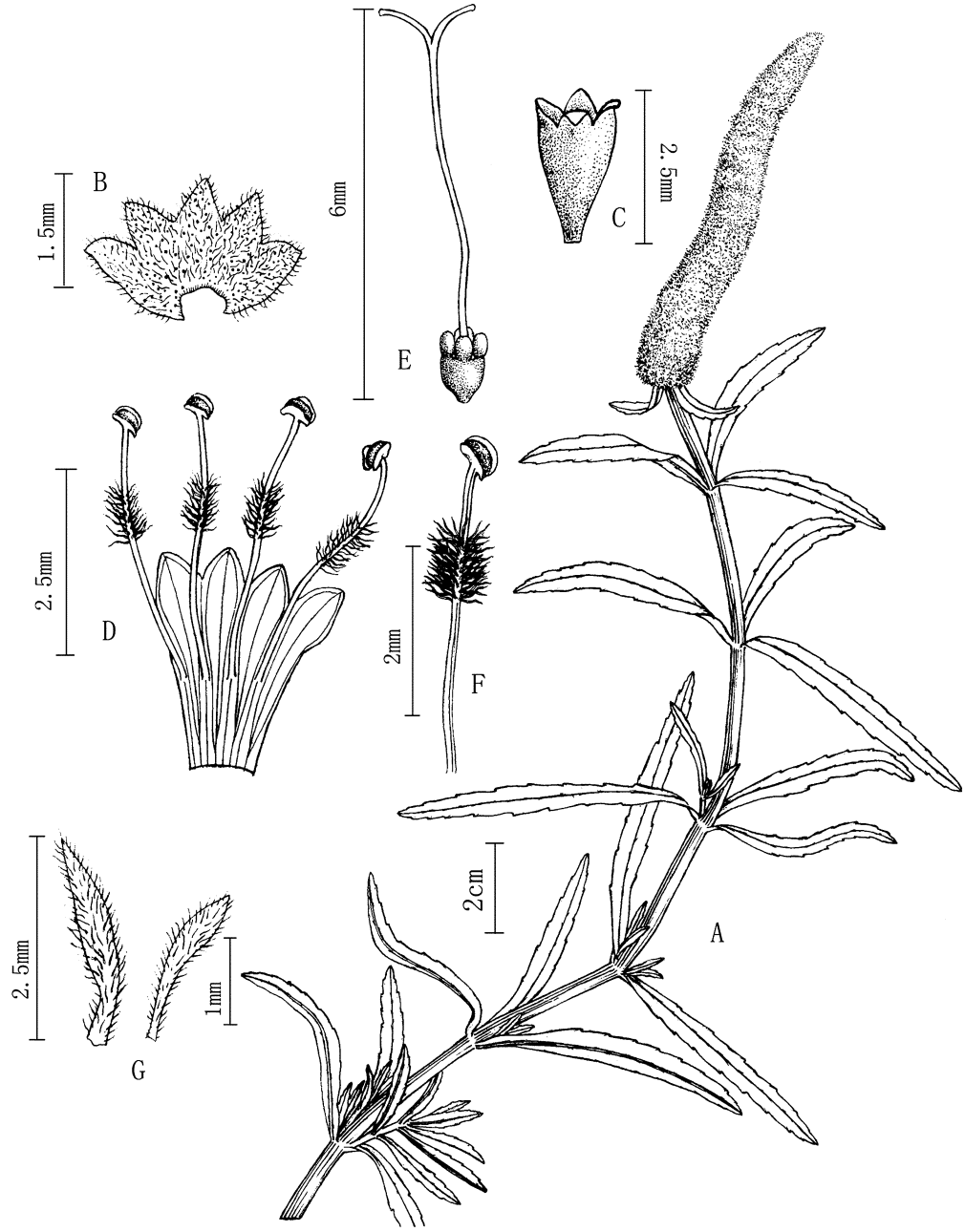

FIGURE 14. A–G. *Pogostemon henanensis*. A. Habit; B. Calyx split; C. Corolla; D. Corolla split open with stamens; E. Style; F. Stamen; G. Bract and bracteole. Drawn by Y. X. Liu based on *Expedition for Plant Resource 20263* (PE).

22. *Pogostemon linearis* (Benth.) Kuntze (1891: 529). *Dysophylla linearis* Bentham (1848: 157). *Eusteralis linearis* (Benth.) Panigrahi (1976: 476). *Anuragia linearis* (Benth.) Raizada (1976: 218). Lectotype (designated by Panigrahi 1976: 476):—INDIA. Assam: no locality, no date, *J. Mack s.n.* (K). Figure 15.

Annual herbs, to 80 cm tall. Stems hollow, terete, with shallow grooves, erect-ascending, base procumbent and trailing, pubescent, rust colored. Leaves in whorls of 4–6, sessile; blade linear-lanceolate to linear, 2.5–7.5 cm × 2–6 mm, papery, adaxially puberulent, abaxially glandular pubescent on midvein otherwise glandular, base acute,

margin entire or obscurely remote serrate toward apex, slightly revolute, apex acuminate. Spike terminal, simple, 2–7 cm × 9–12 mm, continuous; flowers subsessile. Bracts and bracteoles lanceolate to linear, 2.5–4 mm long, apex purple-red, pubescent. Calyx narrowly campanulate, 2.5–2.8 mm long, 5 veined, sparsely pubescent and brown glandular outside, puberulent inside of tube; teeth 5, triangular, suberect, pubescent inside, margin ciliate. Corolla 4–4.2 mm long, much exserted, puberulent outside, subequally 4-lobed, sparsely pubescent and glandular outside. Stamens 4, much exserted; filaments 4.3–4.5 mm long, inserted at a same height in corolla tube, bearded at middle, bearded portion exserted; anthers 1-locular, cell apex dehiscent; style 5–6 mm long; stigma bifid, lobes subequal, 0.7–0.8 mm long; disc ca. 0.3 mm long. Nutlets 4, ellipsoid to ellipsoid-oblong, reticulate-foveate.

Distribution and habitat:—The species is distributed in Bhutan, China, and NE India. In China, it occurs in Yunnan (Figure 16). It is discovered infrequently in wet areas or marsh grounds where with rich organic matter, at the elevation of 1500–2400 m .

Phenology:—Flowering and fruiting from October to December.

Taxnomic note:—The species resembles *Pogostemon yatabeanus* (Makino 1898: 55) Press (1982: 74), but differs from the latter in its stems and leaves with rust colored hairs (not glabrous), and leaves in whorls of 4–6 (not 3–4).

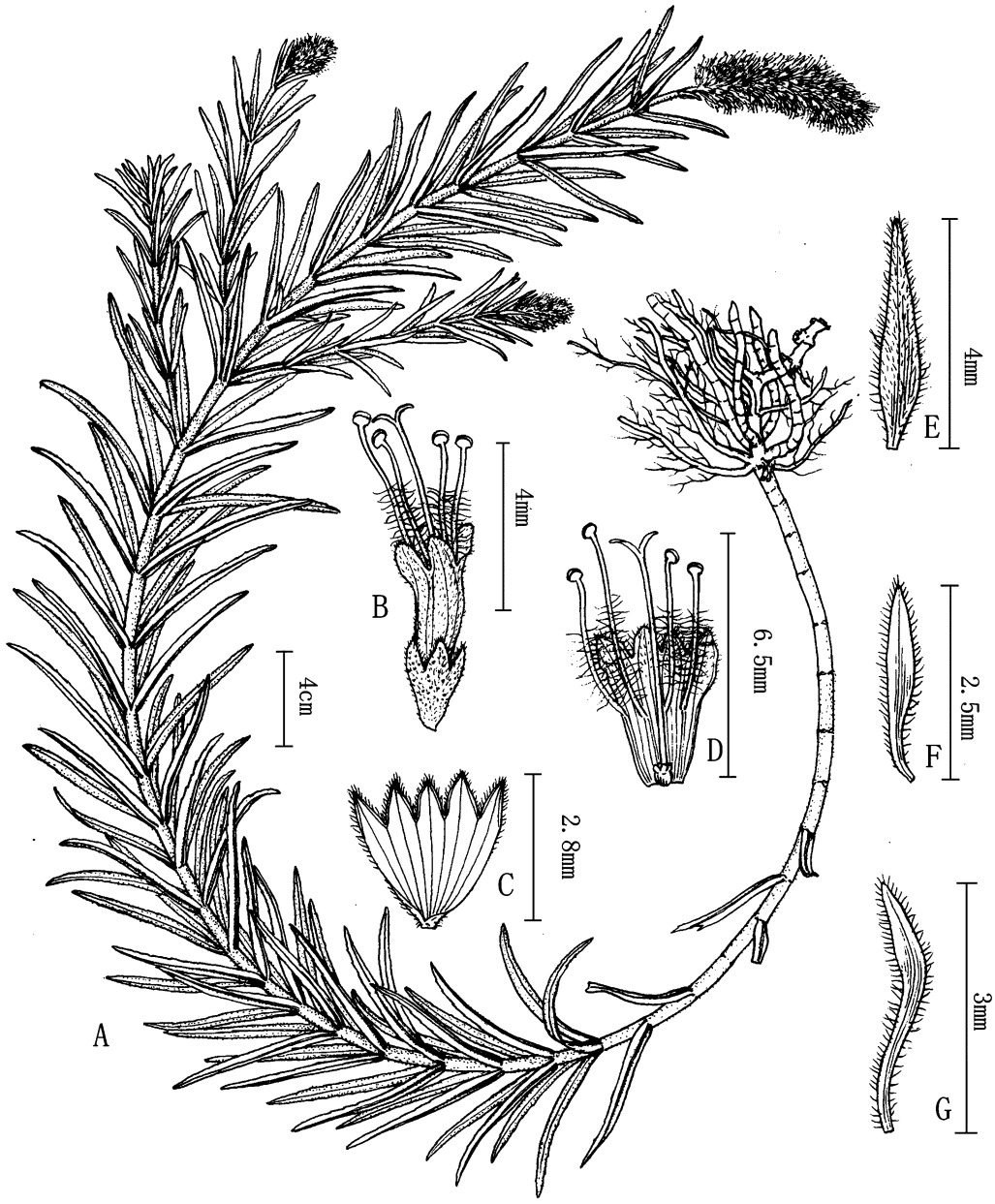

FIGURE 15. A–G. *Pogostemon linearis*. A. Habit; B. Flower; C. Calyx split; D. Corolla split open with stamens and style; E–G. Bract and bracteole. Drawn by Y.X. Liu based on *G. Forrest 25138* (PE).

23. *Pogostemon pentagonus* (C.B. Clarke ex Hook.f.) Kuntze (1891: 530). *Dysophylla pentagona* C.B. Clarke ex Hooker (1885: 641). *Eusteralis pentagona* (C.B. Clarke ex Hook.f.) Panigrahi (1976: 477). *Anuragia pentagona* (C.B. Clarke ex Hook.f.) Raizada (1976: 219). Type:—INDIA. Bihar: Chota Nagpur, Singhboom, 28 October 1873, *C.B. Clarke 20438* (holotype K!).

Annual herbs, 10–40 cm tall. Stems solid, terete, erect-ascending, base trailing, glabrous. Leaves in whorls of 4, sessile; blade linear to oblanceolate, 1–2.5 cm × 1–3.5 mm, glabrous, abaxially sparsely glandular, base attenuate, margin entire or slightly revolute, apex obtuse, lateral veins inconspicuouse. Spike terminal, simple, 1–4 cm × 8–9 mm, subcapitate; flowers subsessile. Bracts and bracteoles purplish, lanceolate or linear, subequal as long as the corolla, pubescent, margin gray villous. Calyx campanulate, ca. 1 × 0.8 mm, 5-veined, 5-sulcate, pilose and glandular outside, glabrous inside; teeth 5, triangular, margin ciliate. Corolla reddish, ca. 2 times as long as the calyx, subequally 4-lobed. Stamens 4, much exserted; filaments inserted at a same height in the tube, bearded; anthers 1-locular, cell apex dehiscent; style ca. 3.5 mm long; stigma bifid, lobes unequal. Nutlets 4, ca. 0.7 × 0.4 mm, oblong, 4-angled, light brown.

Distribution and habitat:—The species is distributed in China, India, Thailand, and Vietnam. In China, it occurs in southern Yunnan (Figure 16). It grows occasionally in marshy grounds, at ponds, or near streams, at 800–1550 m elevation.

Phenology:—Flowering and fruiting from October to the following May.

Taxonomic notes:—*Pogostemon pentagonus* is similar to *P. faurei* in having small leaves, but differs from the latter by its calyx ca. 1.2 mm long (not longer than 2 mm), corolla ca. 2.5 mm long (not ca. 3.3 mm) and distributed in south Yunnan (not Heilongjiang).

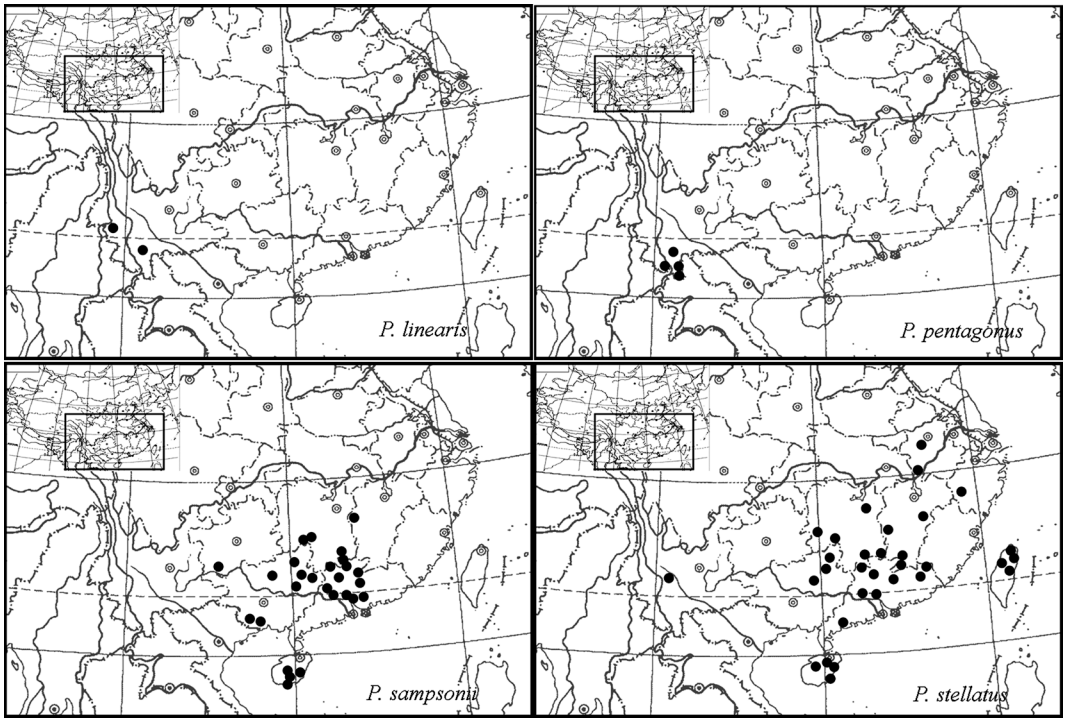

FIGURE 16. Distribution maps of *Pogostemon linearis*, *P. pentagonus*, *P. sampsonii* and *P. stellatus*.

24. *Pogostemon sampsonii* (Hance) Press (1982: 74). *Dysophylla sampsonii* Hance (1866: 234). *Eusteralis sampsonii* (Hance) Panigrahi (1976: 478). Lectotype (here designated):—CHINA. Guangdong: Guangzhou, "in udis circa Canthonem", November 1864, *G.T. Sampson in Herb. H.F. Hance 10946* (BM!, isolectotypes K!, NY!, P!). Figure 17.

Dysophylla benthamiana Hance var. *intermedia* C.Y. Wu & S.J. Hsuan *in* Wu *et al.* (1965: 237). ***syn. nov.*** *Dysophylla stellata* (Lour.) Benth. var. *intermedia* (C.Y. Wu & S.J. Hsuan) C.Y. Wu & H.W. Li *in* Li (1975: 77). Type:—CHINA. Hainan: Yahsien (now Sanya), 1300 m, 25 February 1933, *F.C. How & N.K. Chun 70209* (holotype IBSC!, isotype IBK!).

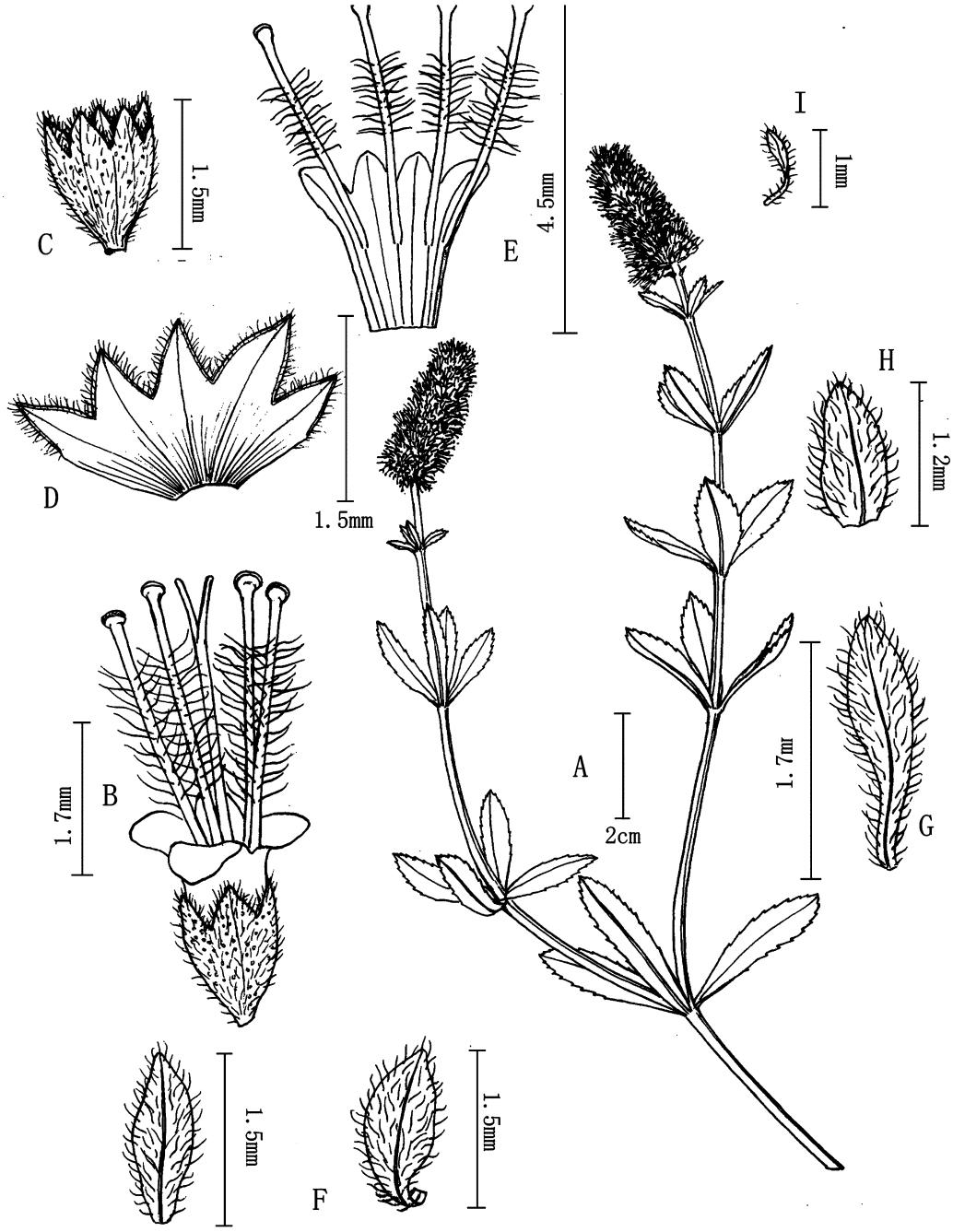

FIGURE 17. A–I. *Pogostemon sampsonii*. A. Habit; B. Flower; C. Calyx; D. Calyx split; E. Corolla split open with stamens; F–I. Bracts and bracteoles. Drawn by Y.X. Liu based on *G. Yao 273* (IBSC).

Annual herbs, 15–50 cm tall. Stems hollow, sub-terete or 4-angled, branched, erect-ascending, base procumbent and trailing at base, basal internodes short, glabrous, reddish, swollen at nodes. Leaves in whorls of 3–4, sessile; blade obovate-oblong to oblanceolate or linear-lanceolate, 1.5–7 cm × 3–8(–14) mm, papery, glabrous, densely black glandular, base attenuate, margin conspicuously serrate except basal 1/3 entire, apex obtuse to acute; midvein elevated abaxially, lateral vein obscure. Spike terminal, simple, 1.2–7 cm × 5–8 mm, continuous; flowers subsessile; rachis glandular villous. Bracts and bracteoles ovate, ovate-lanceolate, spathulate or linear, 1–1.7 mm long, reddish, margin ciliate. Calyx broadly campanulate, 1.4–1.7 mm long, 5-veined, pubescent and yellow glandular outside, purlish red; teeth 5, ovate-triangular, more than 1/3 as long as the calyx, pubescent inside, margin ciliate. Corolla purplish-red, 2–2.5 mm, exserted, subequally 4-lobed. Stamens 4, erect, much exserted;

filament purplish red, inserted at a same height in the tube, 2.6–3 mm long, much exserted, bearded at middle, glabrous at the base, bearded portion exserted; anthers 1-locular, cell apex dehiscent; style purplish red, 3.5–4 mm long; stigma bifid, subequal or unequal, lobes ca. 0.5–1 mm long. Nutlets 4, ca. 0.7 × 0.5 mm, ovoid, dark brown, shiny.

Distribution and habitat:—The species is endemic in south China and occurs in Guangdong, Guangxi, Hainan, Hunan and Jiangxi (Figure 16). It is common in marshy grounds, grass lands, beside rice paddies and at streamsides, at 30–1100 m elevation.

Phenology:—Flowering from September to October and fruiting from October to November.

Taxonomic notes:—The species is easily distinguished from other Chinese *Pogostemon* species by the stems being 4-angled, leaf blades obovate-oblong to oblanceolate or lanceolate, with the margin conspicucously serrate distally but entire toward the base.

Dysophylla stellata var. *intermedia* was reduced to synonymy of *D. stellata* (= *Pogostemon stellata*) by Li & Hedge (1994). Examination of the type material revealed that it differs from *P. stellata* evidently by its 4-angled (not terete) stems, obovate-oblong to oblanceolate or lanceolate (not linear) leaf blades, with the margin conspicuously serrate distally but entire toward the base (not remote serrulate or entire), and the calyx to 2 mm long (not 1–1.1 mm long). However, these characters are well identical with *P. sampsonii*.

25. *Pogostemon stellatus* (Lour.) Kuntze (1891: 529). *Mentha stellata* Loureiro (1790: 361). *Dysophylla stellata* (Lour.) Bentham (1830: 30). *Eusteralis stellata* (Lour.) Panigrahi (1976: 474). *Anuragia stellata* (Lour.) Raizada (1976: 218). *Mentha quadrifolia* B. Heyne ex Roth (1821: 256), *nom. illeg*. Type:—VIETNAM. "loco humido inculta in Cochinchina", no date, *J. de Loureiro s.n.* (holotype BM!). Figure 18.

Dysophylla verticillata Bentham (1830: 30). *Pogostemon verticillatus* (Benth.) Miquel (1856: 965). *Anuragia verticillata* (Benth.) Raizada (1976: 218). Lectotype (designated by Panigrahi 1976: 474):—BANGLADESH. Sylhet, no date, *N. Wallich 1544* (K-W!).

Mentha verticillata Roxburgh (1832: 5), *nom. illeg*, non *Mentha verticillata* Don (1825: 114). *Pogostemon verticillatus* Bhatti & Ingrouille (1997: 115), *nom. illeg.*, non *Pogostemon verticillatus* (Benth.) Miquel (1856: 965). Lectotype (here designated):—INDIA. BANGLADESH. "Panee-kula", no date, *W. Roxburgh 159* (BM!, isolectotype K!).

Dysophylla benthamiana Hance (1866: 234). *Pogostemon benthamianus* (Hance) Kuntze (1891: 530). Type:—CHINA. Guangdong: Cantonem (now Guangzhou), August 1864, *G.T. Sampson in Herb. Hance 11448* (holotype BM!, isotypes K!, P!).

Dysophylla esquirolii Léveillé (1912: 476). Type:—CHINA. Guizhou: Teng-Chang, riziéres, September 1904, *J. Esquirol 155* (holotype E!).

Dysophylla. benthamiana Hance var. *hainanensis* C.Y. Wu & S. J. Hsuan *in* Wu *et al.* (1965: 238). *Dysophylla stellata* (Lour.) Benth. var. *hainanensis* (C.Y. Wu & S.J. Hsuan) C.Y. Wu & H.W. Li *in* Li (1975: 77). Type:—CHINA. Hainan: Chung-tzao, Nor-da, 21 November 1921, *F.A. McClure 1688* (holotype SYS!).

Annual herbs, 15–80 cm tall. Stems solid, strong or slim, terete with shallow grooves, erect or erect-ascending but base procumbent, trailing at base, lower internodes short (occasionally with long internodes basally), many branches in tall plant, glabrous, nodes sometimes gray villous. Leaves in whorls of 4–8, sessial; blade linear, 2–7 cm × 1.5–4(–7.5) mm, glabrous, glandular abaxially, base attenuate, margin remote serrulate or entire, revolute or flat, apex acute, lateral veins inconspicuouse. Spike terminal, simple, 0.5–9 cm × 4–8 mm, continuous and compact; flowers subsessile. Bracts lanceolateor ovate, ca. 1.5 mm long, bracteoles linear or filiform, slightly shorter or subequal as long as the calyx. Calyx campanulate, 1–1.1 mm long in flower, enlarge to 1.6 mm long in fruit, 5-veined, densely gray tomentose outside; teeth 5, triangular, equal, ciliate. Corolla purple-red, 1.5–1.8 mm, exserted, subequally 4-lobed. Stamens 4, exserted; filaments ca. 1.5 mm long, bearded portion slightly exserted from corolla; anthers 1-locular, cell apex dehiscent; style 1.8–2 mm long; stigma bifid, lobes subequal, 0.4–0.5 mm long; disc ca. 0.2 mm long. Nutlets 4, 0.5–0.6 mm long, ellipsoid to subglobose, brown or dark brown.

Distribution and habitat:—The species is widely distributed in Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Japan, Laos, Malaysia, Thailand, Vietnam, and extends to Australia. In China, it occurs in Anhui, Guangdong, Guangxi, Hainan, Hunan, Jiangxi, Taiwan, Yunnan, and Zhejiang (Figure 16). It is very common in rice paddies, wet areas along streams or pools, at an elevation of 300–1500 m.

Phenology:—Flowering and fruiting nearly the whole year.

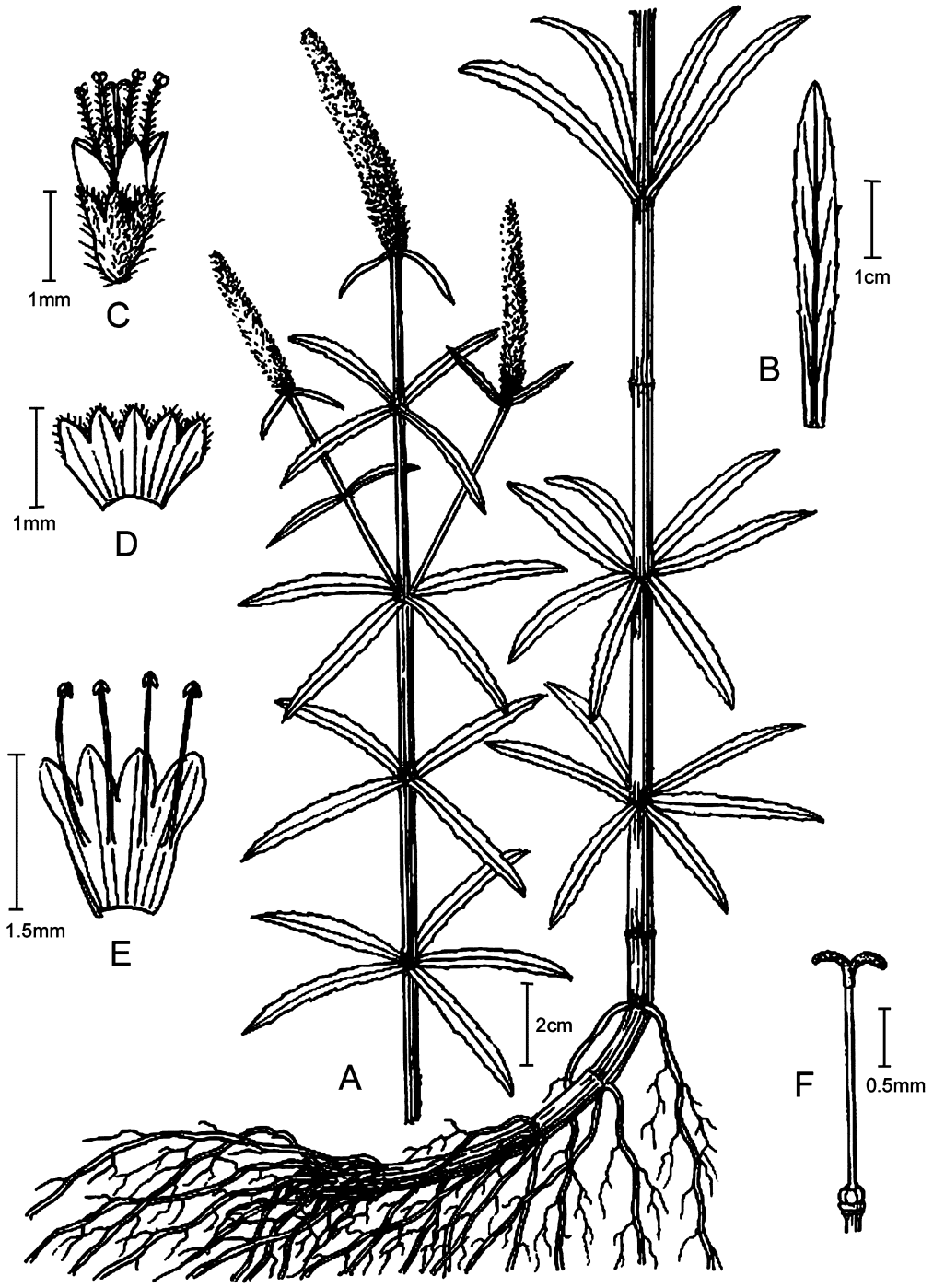

FIGURE 18. *Pogostemon stellatus*. A. Habit; B. Leaf; C. Flower; D. Calyx; E. Corolla and stamens; F. Ovary and style. Drawn by H.P. Yu based on *X.R. Liang 61180* (IBSC) and provided by Flora Hong Kong project via Hong Kong Herbarium (HK).

Taxonomic notes:—*Pogostemon stellatus* is variable in the following characters: stem slim with long internodes or strong with short internodes basally, leaves in whorls of 4–8, margin dentate or sometimes entire and revolute, nutlets ellipsoid to ellipsoid-oblong or oblong in shape.

Pogostemon stellatus was treated as conspecific with *P. verticillatus* by many authors (Miquel 1856, Kuntze 1891, Doan 1936, Panigrahi 1976, Wu *et al*. 1977, Wu & Huang 1977, Li & Hedge 1994), but Hooker (1885) and Bhatti & Ingrouille (1997) treated them as independent species. Hooker indicated that *P. stellatus* can be distinguished from *P. verticillatus* by the characters of the stem decumbent or creeping at base (not erect), the leaf

margin revolute (not revolute or obscurly toothed), and calyx teeth erect (not stellately spreading). Bhatti & Ingrouille (1997) differentiated *P. stellatus* from *P. verticillatus* by the stems with short internodes (not long and weak), leaves in whorls of 4–8 (not up to 6), leaf margin entire and revolute (not dentate), spikes ca. 5.5 cm long (not 6–16 cm long), nutlets oblong (not ellipsoid to ellipsoi-oblong). However, we find that the morphological characters used to separate them by Hooker (1885) and Bhatti & Ingrouille (1997) are continuous and variable and here treat them as same species. In addition, the long spikes (c. 6–16 cm long) as mentioned by Bhatti & Ingrouille (1997) were not observed in the present study.

Bhatti & Ingrouille (1997: 115) published the new combination *Pogostemon verticillatus* (Roxb.) Bhatti & Ingrouille based on *Mentha verticillata* Roxburgh (1832: 5). However, according to the Articles 52.1 and 58.1 of ICN (McNeill *et al.* 2012), they published a new name rather than a new combination because the name *Mentha verticillata* Roxb. is a later illegitimate homonym of *Mentha verticillata* Don (1825: 114).

26. *Pogostemon szemaoensis* (C.Y. Wu & S.J. Hsuan) Press (1982: 74). *Dysophylla szemaoensis* C.Y. Wu & S.J. Hsuan in Wu *et al*. (1965: 238). Type:—CHINA. Yunnan: "juxta Sze-mao", 1200 m, 27 November 1933, *Y. Tsiang 12713* (holotype NAS!, isotypes NAS!, PE!).

Annual herbs, 20–40 cm tall. Stems solid, erect, trailing at base, with grooves, short branched, appressed strigose towards upper portion, baselly subglabrous and reddish. Leaves in whorls of 4; petiole absent; blade linear, 1.2–3.5 cm long, 1.8–3.5 mm wide, adaxially appressed ciliate, abaxially densely black glandular, densely ciliate along the midvein, base cuneate, margin remotely shallow serrate, flat or slightly revolute, ciliate, apex acuminate; midvein elevated abaxially, lateral veins inconspicuouse. Spike terminal, simple, 2–6 cm × 6–7 mm, continuous and compact; flowers subsessile. Bracts linear-lanceolate, ca. 2.5 mm long, almost as long as the corolla, gray villous, grayish purple-red, bracteoles linear or filform, less than 1 mm long. Calyx campanulate, ca. 1.2 × 1 mm, 5-veined, pilose outside; teeth 5, triangular. Corolla purplish, ca. 2 × as long as the calyx, exserted, subequally 4-lobed. Stamens 4, exserted; filaments bearded; anthers 1-locular, cell apex dehiscent; stigma bifid, equal. Nutlet unknown.

Distribution and habitat:—The species is known only from the type locality, Simao Shi, south Yunnan in China (Figure 19). It grows in wet place at an elevation of about 1200 m.

Phenology:—Flowering in November.

Taxonomic notes:—The species is similar to *Pogostemon cruciatus* in habit, the differences between them are discussed under that species.

27. *Pogostemon yatabeanus* (Makino) Press (1982: 74). *Dysophylla yatabeana* Makino (1898: 55). *D. linearis* var. *yatabeana* (Makino) Kudô (1929: 48). Lectotype (designated by Panigrahi 1976: 479):—JAPAN. Honshu: Tokyo, Prov. Mushashi, Koiwa-Maru, 15 September 1883, *Herb. Sc. College, Imp. Univ. Tokyo s.n.* (K!, isolectotype TI).

Dysophylla martini Vaniot (1904: 178). Type:—CHINA. Guizhou: "Kouy-tcheou, environs de Tsin-Tchen", 13 September 1897, *L. Martin & E. Bodinier 1946* (holotype E).

Dysophylla lythroides Diels (1926: 1031). *Pogostemon lythroides* (Diels) Press (1982: 74). Type:—CHINA. Zhejiang: Yeu chow, Suian hsien (Chunan Xian), 200 m, 15 October 1920, *H.H. Hu 520* (holotype B probably destroyed).

Dysophylla tsiangii Y.Z. Sun in Sun & Hu (1966: 50), ***syn. nov***. *Pogostemon tsiangii* (Y.Z. Sun) Press (1982: 74)**.** Type:—CHINA. Guizhou: Shuicheng, outside of E. Gate., in water, 23 October 1930, *Y. Tsiang 9449* (holotype PE!, isotypes IBSC!, NAS!).

Annual herbs, 40–60 cm tall. Stems hollow, erect or procumbent at base, terete with shallow grooves, glabrous except for puberulent apex, usually unbranched or rarely short branched. Leaves in whorls of 3–4, sessile; blade linear, 3.5–7 cm × 5–7 mm, papery, glabrous, inconspicuously brown glandular abaxially, base acute, margin entire or obscurely remote serrate toward apex, apex obtuse, lateral veins inconspicuouse. Spike terminal, simple, 2.8–7 cm × ca. 1.5 cm, continuous and compact, sometimes interrupted basally; flowers subsessile. Bracts and bracteoles purplish, linear-lanceolate or filiform, 2–4 mm long, pilose. Calyx ovoid-campanulate, 1.6–2.1 mm long, 5-veined, pilose and glandular outside; teeth 5, triangular, subequal, 0.7–0.8 mm long, hairy inside, margin ciliate. Corolla purplish-red or purplish-blue, 3–3.5 mm long, c. 2 × as long as the calyx, glabrous, exserted, subequally 4-lobed, sparsely glandular outside. Stamens 4, much exserted; filaments 4–4.2 mm long, all inserted at a height of 1.5 mm in the tube, bearded at middle, bearded portion exserted; anthers 1-locular, cell apex dehiscent; style 5.5–5.8 mm long; stigma bifid, lobes subequally, 0.9–1.5 mm long. Nutlets 4, ellipsoidal, light brown, smooth.

Distribution and habitat:—The species is distributed in China, Japan, and Korea. In China, it occurs in Anhui, Guangxi, Guizhou, Hubei, Hunan, Jiangxi, Sichuan and Zhejiang (Figure 19). It is found usually in rice paddies, near ponds or open wet places, at the elevation of 350–1200 m.

Phenology:—Flowering and fruiting from August to October.

Taxonomic notes:—*Dysophylla lythroides* (*Pogostemon lythroides*) was reduced to the synonymy of *P. yatabeanus* (*Dysophylla yatabeana*) by Wu & Huang (1977) and Li & Hedge (1994). But Bhatti & Ingrouille (1977) recognized it as an independent species and discussed that *P. lythroides* differs from *P. yatabeanus* by the number of leaves in whorls of 4 (not 3). However, leaves in whorls of 4 can also be observed in *P. yatabeanus*. Therefore, we treat *P. lythroides* as a synonym of *P. yatabeanus* again.

In the original description, it is indicated that *Pogostemon tsiangii* has leaves in whorls of 2 or 3. After examining type specimens, it was found that the leaves are indeed in whorls of 3 because those nodes with two leaves exhibit a scar which indicates that the third leaf has fallen off. *Pogostemon tsiangii* was reduced to synonymy of *P. sampsonii* (*Dysophylla sampsonii*) by Wu & Huang (1977). In fact, *P. tsiangii* is easily distinguished from *P. sampsonii* by the stem terete (not 4-angled), leaf margin with 1 or 2 obscurely teeth (not conspicuously serrate except for the basal 1/3 of leaf being entire), the calyx ca. 2.5 mm long (not ca. 1.5 mm long) and the corolla ca. 4.3 mm long (not ca. 2 mm long). These characters are however identical with *P. yatabeanus*.

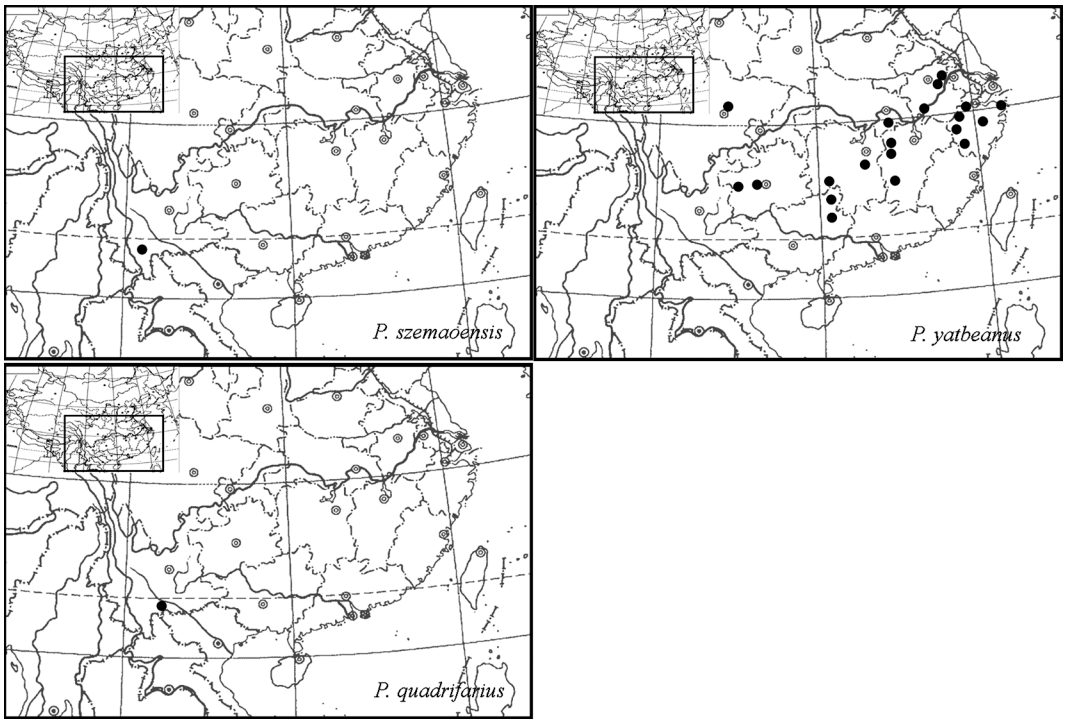

FIGURE 19. Distribution maps of *Pogostemon szemaoensis*, *P. yatbeanus* and *P. quadrifolius*.

Doubtful species

The following species was reported from China by some authors, but it can not be confirmed and is listed here as doubtful species because no specimens were available in the present study.

Pogostemon pressii Panigrahi (1984: 102). *Dysophylla griffithii* Hooker (1885: 641). *Eusteralis griffithii* (Hook. f.) Panigrahi (1976: 477). *Pogostemon griffithii* (Hook.f.) Press (1982: 73), *nom. illeg.* [non Prain]. Type:—INDIA. Tamil Nadu: Madras, no date, *W. Griffith 3986* (holotype K!).

Note:—Bhatti & Ingouille (1997) noted that this species is distributed in China. However, no specimen of this species from China was discovered during the present study.

Excluded species

The following species were placed in *Pogostemon* or *Dysophylla* previously but are now excluded from *Pogostemon*. Accepted names are in bold type.

Dysophylla communis Collett & Hemsley (1890: 114) = ***Elsholtzia communis*** (Coll. & Hemsl.) Diels (1912: 47).

Dysophylla ianthina Maxim. ex Kanitz (1891: 46). *Pogostemon ianthinus* (Maxim. ex Kanitz) Léveille (1911: 219) = ***Elsholtzia densa*** Bentham (1835: 714).

Dysophylla mairei Léveillé (1912b: 236) = ***Elsholtzia pilosa*** (Bentham 1830: 30) Bentham (1833: 163).

Pogostemon cyprianii (Pavolini 1908: 434) Pampanini (1910: 708) = ***Elsholtzia cyprianii*** (Pavol.) S. Chow ex Hsu (1965: 170).

Pogostemon japonicus Bentham & Hooker (1876: 1180) = ***Comanthosphace japonica*** (Miquel 1865: 103) Moore (1877: 293)

Acknowledgments

This study was financially supported by Firmenich Aromatic (China) Ltd. Co. as a part of the research project IN-CD-DS-YGY002, the National Natural Science Foundation of China (grant nos.31470302, 31110103911), and Main Direction Program of Knowledge Innovation of Chinese Academy of Sciences (grant no. KSCX2-EWZ-1). The authors are indebted to the curators of the herbaria A, BM, CAL, E, G, HHBG, HITBC, IBK, IBSC, IFP, K, KUN, L, LBG, MO, NAS, NEFI, NY, P, PE, SYS, TAI and US for providing specimen images or hosting our visits, Ms. Yunxiao Liu and Hanping Yu for preparing the illustrations, Mr. E. D. Liu, H. C. Ouyang, H. Wang, R. Z. Wang, X. F. Bai, X. Gong for assistance during our field investigations. We are also grateful to Kuenshum Pang, the curator of Hong Kong Herbarium, to permit use the illustrations of *Pogostemon stellatus* and *P. auricularius* from Flora of Hong Kong.

References

Adelbert, A.G.L. (1954) Notes on the flora of Java VII. *Reinwardtia* 3: 145–155.

Airy Shaw, H.K. (1967) The genus *Dysophylla* Blume: A nomenclatural note. *Taxon* 16: 189–190. http://dx.doi.org/10.2307/1216987

Anonymous (1888) Patchouli. (*Pogostemon patchouli*, var. *suavis*.). *Bulletin of Miscellaneous Information Kew* 1888: 133–134. http://dx.doi.org/10.2307/4111349

Anonymous (1889) Patchouli. (*Pogostemon patchouli*, var. *suavis*.). *Bulletin of Miscellaneous Information Kew* 1889: 135–139. http://dx.doi.org/10.2307/4111381

Anonymous (1908) Patchouli. (*Pogostemon patchouli*, var. *suavis*, Hk. f. = *P. cablin*, Benth.). *Bulletin of Miscellaneous Information Kew* 1908: 78–82. http://dx.doi.org/10.2307/4111836

Bendiksby, M., Thorbek, L., Scheen, A.C., Lindqvist, C. & Ryding, O. (2011) An updated phylogeny and classification of Lamiaceae subfamily Lamioideae. *Taxon* 60: 471–484.

Bentham, G. (1830) Synopsis of the genera and species of Indian Labiatae enumerated in the Catlogue of the collections in Dr. Wallich's charge. *In*: Wallich, N. (Ed.) *Plantae Asiaticae Rariores* 1. Treuttel & Würtz, London etc., pp. 28–31.

Bentham, G. (1833) *Labiatarum Genera et Species* 2. James Moyes, London, pp. 61–188.

Bentham, G. (1835) *Labiatarum Genera et Species* 7. James Moyes, London, pp. 646–783.

Bentham, G. (1848) Labiatae. *In:* Candolle, A.L.P. P. de (Ed.) *Prodromus Systematis Naturalis Regni Vegetabilis* 12. Sumptibus Sociorum Treuttel & Würtz, Paris, pp. 27–603.

Bentham, G. (1861) *Flora Hongkongensis*. L. Reeve, London, 482 pp. http://dx.doi.org/10.5962/bhl.title.21052

Bentham, G. & Hooker, J.D. (1876). *Genera Plantarum* 2. L. Reeve & Co., London, 1279 pp.

Bhatti, G.R. & Ingrouille, M. (1997) Systematics of *Pogostemon* (Labiatae). *Bulletin of the Natural History Museum, London (Botany)* 27: 77–147.

Blanco, M. (1837) *Flora de Filipinas*. Impr. de M. Sanchea, Manila, 887 pp.

Blume, C.L. (1826) *Bijdragen tot de flora van Nederlandsch Indië* 14. Lands Drukkerij, Batavia, pp. 731–850.

http://dx.doi.org/10.5962/bhl.title.395
Briquet, J. (1897) Labiatae. *In*: Engler, A. & Prantl, K. (Eds.) *Die Natürlichen Pflanzenfamilien* 4(3a). Wilhelm Engelmann, Leipzig, pp. 183–374.
Brown, R. (1810) *Prodromus Florae Novae Hollandiae*. J. Johnson & Co., London, 590 pp.
http://dx.doi.org/10.5962/bhl.title.3678
Budantzev, A.L. (1999) The family Lamiaceae in Vietnam. *Komarovia* 1: 3–33.
Burman, N.L. (1768) *Flora Indica*. Cornelius Haak, Leiden & Johannes Schreuder, Amsterdam, 241 pp.
Burman, J. (1737) *Thesaurus Zeylanicus.* Janssonius-Waesberg & Salomon Schouten, Amsterdam, 235 pp.
Collett, H. & Hemsley, W.B. (1890) On a collection of plants from upper Myanmar and the Shan States. *Journal of the Linnean Society, Botany* 28: 1–150.
http://dx.doi.org/10.1111/j.1095-8339.1890.tb01452.x
Desfontaines, R.L. (1815) Description d'un nouveau genre de Labiée. *Mémoires du Muséum d'Histoire Naturelle* 2: 154–156.
Diels, F.L.E. (1912) Plantae Chinenses Forrestianae: Numerical catalogue of all the plants collected by G. Forrest during his first exploration of Yunnan and Eastern Tibet in the years 1904, 1905, 1906 (nos. 1–1120). *Notes from the Royal Botanic Garden, Edinburgh* 7: 1–80.
Diels, F.L.E. (1926) Miscellanea sinensia II. *Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem* 9: 1027–1033.
http://dx.doi.org/10.2307/3994450
Doan, T. (1936) Labiatae. *In*: Lecomte, H. (Ed.) *Flore Générale de l'Indo-Chine* 4. Masson, Paris, pp. 915–1046.
Don, D. (1825) *Prodromus Florae Nepalensis*. J. Gale, London, 256 pp.
Dunn, S.T. (1913) Notes on Chinese Labiatae. *Notes from the Royal Botanic Garden, Edinburgh* 8: 153–171.
Dunn, S.T. (1915) A key to the Labiatae of China. *Notes from the Royal Botanic Garden, Edinburgh* 6: 127–208.
Dunn, S.T. & Tutcher, W.J. (1912) Flora of Kwangtung and Hongkong (China). *Bulletin of Miscellaneous Information Kew, Additional Series* 10: 1–370.
El-Gazzar, A. & Watson, L. (1967) Consequences of an escape from floral minutiae and floristics in certain Labiatae. *Taxon* 16: 186–189.
http://dx.doi.org/10.2307/1216986
Fang, Y.Y. (1989) Labiatae. *In:* Fang, Y.Y. (Ed.) *Flora of Zhejiang* 5. Zhejiang Science and Technology Publishing House, Hangzhou, pp. 228–311.
Forbes, F.B. & Hemsley, W.B. (1890) An enumeration of all the plants known from China Proper, Formosa, Hainan, Corea, the Luchu Archipelago, and the Island of Hongkong, together with their distribution and synonymy, Part IX. *Journal of the Linnaean Society, Botany* 36: 237–316.
http://dx.doi.org/10.1111/j.1095-8339.1890.tb00651.x
Fu, P.Y., Yang, Y.L., Li, J.Y. & Chen, Y.A. (1981) Labiatae. *In:* Liou, T.N. (Ed.) *Flora Plantarum Herbacearum Chinae Boreali-Orientalis* 7. Science Press, Beijing, pp. 247–248.
Fu, S.X. (2002) *Flora Hubeiensis* 3. Hubei Science and Technology Press, Wuhan, 746 pp.
Guangdong Institute of Botany (1977) *Flora Hainanica* 4. Science Press, Beijing, 644 pp.
Guo, X.H. (1991) Labiatae. *In*: Qian, X.H. (Ed.) *Flora of Anhui* 4. Anhui Science and Technology Press, Hefei, pp. 233–317.
Hance, H.F. (1866) Adversaria in stirpes imprimis Asiae orientalis criticas minusve notas interjectis novarum plurimarum diagnosibus. [Sér. 5] *Annales des Sciences Naturelles*. *Botanique* 5: 202–260.
Handel-Mazzetti, H.R.E. (1936) *Symbolae Sinicae* 7(4). Julius Springer, Wien, pp. 731–1186.
Handel-Mazzetti, H.R.E. (1937) Plantae Mellianae Sinenses (III). *Beihefte zum Botanischen Centralblatt* 56(B): 448–482.
Handel-Mazzetti, H.R.E. (1939) Plantae Sinenses a Dre. H. Smith Annis 1921–1922, 1924 et 1934 lectae XXXIX. Labiatae. *Acta Horti Gothoburgensis* 13: 337–380.
Harley, R.M., Atkins, S., Budantsev, A.L., Cantino, P.D., Conn, B.J., Grayer, R., Harley, M.M., Kok, R.de, Krestovskaya, T., Morales, R., Paton, A.J., Ryding, O. & Upson, T. (2004) Labiatae. *In:* Kubitzki, K. & Kadereit, J.W. (Eds.) *The families and genera of vascular plants* 7. Springer, Berlin & Heidelberg, pp. 167–275.
Hasskarl, J.C. (1842) Plantarum genera et species novae aut reformatae javenses. *Flora* 25 Beibl. 2(1–2): 1–32.
Hasskarl, J.C. (1843) Annotationes de plantis quibusdam Javanicis nonnullisque Japonicis, e Catalogo Horti Bogoriensis. Accedunt nonnullae novae species. *Tijdschrift voor Natuurlijke Geschiedenis en Physiolgie* 10: 115–150.
Hooker, J.D. (1885) Labiatae. *In*: Hooker, J.D. (Ed.) *The Flora of British India* 4. Macmillan, London, pp. 604–705.
Hooker, W.J. (1849) Pucha-Pat, or Patchouli (*Pogostemon patchouli*). *Hooker's Journal of Botany and Kew Garden Miscellany* 1: 328–330.
Hsu, P.S. (1965) Notes on the flora of Mt. Hwangshan. *In*: Chen, P.C., Wu, P.C., Chiu, P.H., Hsu, P.S. & Chow, C.L. (Eds.) *Observationes ad Florulam Hwangshanicam*. Shanghai Science and Technology Publishing House, Shanghai, pp. 101–208.
Hu, Q.M. (2009) Lamiaceae. *In*: Hu, Q.M. (Ed.) *Flora of Hong Kong* 3. Agriculture, Fisheries and Conservation Department, Hong Kong, pp. 97–120.
Hu, Q.M. (2012) Lamiaceae. *In*: Li, P.Q. (Ed.) *Flora of Shenzhen* 3. China Forestry Publishing House, Beijing, pp. 267–303.
Ingrouille, M. & Bhatti, G.A. (1998) Infrageneric relationships within *Pogostemon* Desf. (Labiatae). *Botanical Journal of the Linnean Society* 128: 159–183.

http://dx.doi.org/10.1111/j.1095-8339.1998.tb02114.x
Kanitz, A. (1891) *Novenytani Gyujtesek Eredmenyei Grof Szechenyi Bela Keletazsiai Utjabol, 1877–1880*. Kessinger Publishing, Kolozsvar, 80 pp.
Keng, H. (1969) Flora Malesianae precursors XLVIII—A revision of Malesian Labiatae. *The Gardens' Bulletin Singapore* 24: 13–180.
Keng, H. (1978) Labiatae. *In:* Steenis, C.G.G. van (Ed.) *Flora Malesiana Series I Spermatophyta, Flowering Plants* 8(3). Sijthoff & Noordhoff International Publishers, Alphen aan den Rijn, pp. 301–394.
Kudô, Y. (1929) Labiatarum sino-japonicarum prodromus. *Memoirs of the Faculty of Science and Agriculture Taihoku Imperial University*, *Formosa* 2(2): 37–332.
Kuntze, O. (1891) *Revisio Generum Plantarum* 2. A. Felix, Leipzig, pp. 371–1011.
http://dx.doi.org/10.5962/bhl.title.327
Léveillé, H. (1911) Decades plantarum novarum XLIX–LI, LII–LIII & LIX–LXX. *Repertorium Specierum Novarum Regni Vegetabilis* 9: 218–224, 245–248, 441–463.
http://dx.doi.org/10.1002/fedr.4870092706
Léveillé, H. (1912a) Decades plantarum novarum. LXXXVII–LXXXVIII. *Repertorium Specierum Novarum Regni Vegetabilis* 10: 473–476.
http://dx.doi.org/10.1002/fedr.4870103004
Léveillé, H. (1912b) Nouvelles Labiées chinoises. *Bulletin de Géographie Botanique* 22: 236.
Léveillé, H. (1914–1915) *Flore du Kouy-Tchéou.* Autograph by the author, Le Mans, 532 pp.
http://dx.doi.org/10.5962/bhl.title.448
Li, H., Tao, D.D. & Li, R. (2000) Labiatae. *In:* Li, H., Guo, H.J. & Dao, Z.L. (Eds.) *Flora of Gaoligong Mountains*. Science Press, Beijing, pp. 1006–1022.
Li, H.W. (1975) Some changes of botanical name in Chinese Labiatae (Continued). *Acta Phytotaxonomica Sinica* 13: 72–95.
Li, H.W. (1994) *Labiatae*. *In*: Wang, W.T. (Ed.) *Vascular Plants of the Hengduan Moutains* 2. Science Press, Beijing, pp. 1656–1740.
Li, H.W. & Hedge, I.C. (1994) *Pogostemon* and *Dysopylla*. *In:* Wu, Z.Y. & Raven, P.H. (Eds.) *Flora of China* 17. Science Press, Beijing & Missouri Botanical Garden Press, St. Louis, pp. 260–266.
Li, Y.H. (1996) *List of Plants in Xishuangbanna*. Yunnan Nationality Press, Yunnan, 702 pp.
Linnaeus, C. (1747) *Flora Zeylanica*. Laurent. Salvius, Stockolm, 1240 pp.
Linnaeus, C. (1767) *Mantissa Plantarum* 1. Laurent. Salvius, Stockholm, 142 pp.
Linnaeus, C. (1771) *Mantissa Plantarum* 2. Laurent. Salvius, Stockholm, pp. 143–587.
Loureiro, J. de (1790) *Flora Cochinchinensis* 2. Typis et expensis Academicis, Ulyssipone, pp. 355–744.
http://dx.doi.org/10.5962/bhl.title.560
Mabberley, D.J. (2008) *Mabberley's Plant-book: a portable dictionary of plants, their classification and uses.* ed. 3. Cambridge University Press, Cambridge, 1021 pp.
Makino, T. (1898) Plantae Japonenses novae vel minus cognitae. *The Botanical Magazine* 12: 55–57.
http://dx.doi.org/10.15281/jplantres1887.12.137_en55
McNeill, J., Barrie, F.R., Buck, W.R., Demoulin, V., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Marhold, K., Prado, J., Prud'Homme Van Reine, W.F., Smith, G.F., Wiersema, J.H. & Turland, N.J. (2012) *International Code of Nomenclature for algae, fungi, and plants (Melbourne Code) adopted by the Eighteenth International Botanical Congress Melbourne, Australia, July 2011.* [Regnum Vegetabile 154] Gantner, Ruggell, 240 pp.
Merrill, E.D. (1912) New or noteworthy Phillippine plants IX. *The Philippine Journal of Science (Botany)* 7: 259–357.
Merrill, E.D. (1918) *Species Blancoanae*. Bureau of Printing, Manila, 423 pp.
Merrill, E.D. (1921) A review of the new species of plants proposed by N.L. Burman in his *Flora Indica.* The Philippine Journal of Sciences 19: 329–388.
Merrill, E.D. (1925) An enumeration of the McClure collection of Hainan plants. *Lingnan Agicultural Review* 2: 115–139.
Merrill, E.D. (1927) An enumeration of Hainan plants. *Lingnan Science Journal* 5: 1–186.
Merrill, E.D. (1928) A supplementary list of Hainan plants. *Lingnan Science Journal* 6: 271–289.
Miquel, F.A.W. (1856) *Flora van Nederlandsch Indië* 2. C. G. van der Post, Amsterdam, 1103 pp.
Miquel, F.A.W. (1865) Prolusio Florae Japonicae. *Annales Musei Botanici Lugduno-Batavi* 2: 69–212.
Moore, S.L.M. (1877) Alabastra diversa. *Journal of Botany* 15: 292–298.
Mu, L.Q. & Dong, D.F. (2001) *Dysophylla*. *In:* Zhou, Y.L. (Ed.) *Flora Heilongjiangensis* 8. Northeastern Forestry University Press, Harbin, p. 216.
Mueller, F. von (1865) *Fragmenta Phytographiae Australiae* 5(XL). Auctoritate gubern. coloniae Victoriae, Melbourne, pp. 191–208.
Nicolson, D.H. & Arculus, D. (2001) Candidates for neotypification of Blanco's names of Philippine plants: specimens in the U.S. National Herbarium. *Taxon* 50: 947–954.
Oliver, D. (1896) *Pogostemon formosanus*. *Hooker's Icones Plantarum*.
Pampanini, R. (1910) Lepainte vascolari raccolte dal Rev. P. C. Silvestri nell'Hu-peh durrante gli anni 1904–1907. *Nuovo Giornale Botanico Italiano, new series* 17: 669–735.
http://dx.doi.org/10.5962/bhl.title.10811

Panigrahi, G. (1976) Taxonomic notes on certain taxa of Asiatic angiosperms. *Phytologia* 32: 473–479.
Panigrahi, G. (1984) Nomenclatural notes on *Pogostemon* Desf. (Lamiaceae). *Taxon* 33: 102. http://dx.doi.org/10.2307/1222044
Pavolini, A.F. (1908) Contributo alla flora dell'Hu-pé. *Nuovo Giornale Botanico Italiano, new series* 15: 391–443.
Pelletier, P.J. (1845) Description et figure du Patchouly. *Mémoires de la Société Royale des Sciences, Belles-lettres et Arts d'Orléans* 5: 274–289.
Phuong, V.X. (1982) Conspectus Lamiacearum Florae Vietnami. *Novosti Sistematiki Vysshikh Rastenii* 19: 125–160.
Phuong, V.X. (1995) The Lamiaceae in the Flora of Vietnam. *Journal of Biology [Tap Chi Sinh Hoc]* 17(4): 33–46.
Prain, D. (1889) *Microtoena cymosa*. *Hooker's Icones Plantarum* 19: pl. 1872.
Prain, D. (1898) On three new genera of plants from the Kachin hills. *Scientific Memoirs by Officers of the Medical and Sanitary Departments of the Government of India* 11: 41–44.
Prain, D. (1908) XXXII-Decades Kewenses: Plantarum novarum in herbario Horti Regii conservatarum. Decas L. *Bulletin of Miscellaneous Information Kew* 1908: 249–255. http://dx.doi.org/10.2307/4111573
Press, J.R. (1982) Taxonomic studies in the Labiatae tribe Pogostemoneae. *Bulletin of the British Museum* (*Natural History*), *Botany* 10:1–89.
Rafinesque, C.S. (1837) *Flora Telluriana* 2. Auctore C.S. Rafinesque, Philadelphia, 105 pp. http://dx.doi.org/10.5962/bhl.title.7751
Raizada, M.B. (1976) *Supplement to Duthie's Flora of the Upper Gangetic Plain and of the Adjacent Siwalik and Sub Himalayan Tracks*. Bishen Singh Mahendra Pal Singh, Dehra Dun, 355 pp.
Reichenbach, H.G.L. (1825) *Iconographia Botanica Exotica* 1. Friedericum Hofmeister, Leipzig, 32 pp.
Rehder, A. (1935) Notes on the lLigneous plants described by Leveille from Eastern Asia. *Journal of the Arnold Arboretum* 16: 311–340.
Roth, A.W. (1821) *Novae plantarum species*. H. Vogler, Halberstad, 412 pp.
Roxburgh, W. (1832) *Flora Indica ed. 1832,* 3. W. Thacker and Co., Calcutta & Parbury, Allen and Co., London, 875pp.
Rumphius, G.E. (1750) *Herbarium Amboinense* 6. Stephanum Neaulme, Utrecht, 256 pp.
Scheen, A.C., Bendiksby, M., Ryding, O., Mathiesen, C., Albert V.A. & Lindqvist, C. (2010) Molecular phylogenetics, character evolutiona and suprageneric classification of Lamioidese (Lamiaceae). *Annals of the Missouri Botanical Garden* 97: 191–219. http://dx.doi.org/10.3417/2007174
Shui, Y.M. (2003) *Seed plants of Honghe region in SE Yunnan, China*. Yunnan Science and Technology Press, Kunming, 664 pp.
Smith, A.C. & Darwin, S.P. (1991) Lamiaceae. *In*: Smith, A.C. (Ed.) *Flora Vitiensis Nova* 5. National Tropical Botanical Garden, Lawai, Kauai, Hawaii, pp. 216–243.
Smith, J.E. (1805) *Exotic Botany* 2. R. Taylor and Co., London, 122 pp.
Stafleu, F.A. & Cowan, R.S. (1976) *Taxonomic Literature.* 2nd edition 1 (A–G). Bohn, Scheltema & Holkema, Utrecht, 1136 pp.
Sun, Y.Z. (1932) An enumeration of Labiatae from Kweichow collected by Y. Tsiang. *Contributions from the Biological Laboratory of the Science Society of China, Botanical Series* 7: 229–243.
Sun, Y.Z. & Hu, C.H. (1966) New species, varieties, forms and new names of Chinese Labiatae. *Acta Phytotaxonomica Sinica* 11: 35–56.
Tenore, M. (1847) Intorno ad una nuova specie di *Pogostemon*, noto ne'giardini sotto il *Pat-chouli*. *Giornale Botanico Italiano* 2: 53–57.
Thiers, B. (2013, continuously updated). *Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium*. The New York Botanical Garden, New York. Available from: http://sweetgum.nybg.org/ih/ (accessed 22 February 2013).
Tucker, A.O., Harley, R.M. & Fairbroters, E. (1980) The Linnaean Types of *Mentha* (Lamiaceae). *Taxon* 29: 233–255. http://dx.doi.org/10.2307/1220285
Vanoit, M.E. (1904) Plantae Bodinierianae Faurieanae et Cavelerienses: Labiées. *Bulletin de l'Académie Internationale de Géographie Botanique* 14: 165–192.
Willdenow, C.L. (1800) *Species plantarum* 3. G.C. Nauk, Berlin, 847 pp.
Wight, R. (1833) *Icones Plantarum Indiae Orientalis* 4(3). J.B. Pharoah, Calcutta, 20 pp. http://dx.doi.org/10.5962/bhl.title.92
Wu, C.Y. (1984) *Index Florae Yunnanensis* 2. People's Publishing House, Yunnan, pp. 1071–2259.
Wu, C.Y. & Huang, Y.C. (1977) *Pogostemon* and *Dysophylla*. *In*: Wu, C.Y. & Li, H.W. (Eds.) *Flora Reipublicae Popularis Sinicae* 66. Science Press, Beijing, pp. 366–387.
Wu, C.Y., Li, H.W., Hsuan, S.J. & Huang, Y.C. (1965) Materiae ad Floram Labiatarum Sinensium (2). *Acta Phytotaxonomica Sinica* 10: 215–242.
Wu, C.Y., Li, X.W., Chen, J., Huang, S.Q., Li, H., Fang, R.Z., Huang, S.H, Zhuang, X., Li, Y.R. & Bia, P.Y. (1977) Labiatae. *In*: Yunnan Institue of Botany (Eds.) *Flora Yunnanica* 1. Science Press, Beijing, pp. 497–817.
Yao, G., Deng, Y.F. & Ge, X.J. (2013) Validation of the name *Pogostemon petelotii* (Lamiaceae). *Phytotaxa* 81: 38–44. http://dx.doi.org/10.11646/phytotaxa.81.1.11

Appendix I. Numerical list of taxa and specimens examined

Numerical list of taxa

1. *Pogostemon amaranthoides*
2. *Pogostemon cablin*
3. *Pogostemon chinensis*
4. *Pogostemon dielsianus*
5. *Pogostemon elsholtzioides*
6. *Pogostemon formosanus*
7a. *Pogostemon glaber* var. *glaber*
7b. *Pogostemon glaber* var. *tsingpingensis*
8. *Pogostemon latifolius*
9. *Pogostemon parviflorus*
10.*Pogostemon septentrionalis*
11. *Pogostemon xanthiiphyllus*
12. *Pogostemon brachystachyus*
13.*Pogostemon fraternus*
14. *Pogostemon hispidocalyx*
15. *Pogostemon auricularius*
16. *Pogostemon barbatus*
17. *Pogostemon falcatus*
18.*Pogostemon quadrifolius*
19. *Pogostemon cruciatus*
20. *Pogostemon fauriei*
21. *Pogostemon henanensis*
22. *Pogostemon linearis*
23. *Pogostemon pentagonus*
24. *Pogostemon sampsonii*
25. *Pogostemon stellatus*
26. *Pogostemon szemaoensis*
27. *Pogostemon yatabeanus*

List of specimens examined

The number in parenthesis refer to the corresponding species in the text and in the numerical list of taxa presented above

Balansa, B. 4462 (16);
Beijing Expedition 891603 (7a); 892080 (7a); 892404 (7a);
Bodinier, E. 407 (16);
Bon, H. 31 (16); 829 (16);
Cai, C.X. 5324 (15);
Cai,G.L. 735 (2);
Cavalerie, J. 7843 (7a);
Champion, J.G. 339 (9);
Chan, K.Y. 1542 (16);
Chang, C.C. 10881 (7a); 10969 (7a);
Chen, D.Z. & Wang, C. 160628 (2);
Chen, H.B. 546 (15);
Chen, J. 390 (7a); 499 (7a); 503 (7a); 656 (3); 668 (1); 716 (12); 732 (12); 906 (1);
Chen, L.Q. 92480 (15);

Chen, L.Q & Xu, Y.B. 10036 (24);
Chen, M. 3206 (1); 3405 (7a); 4086 (7a);
Chen, M.H. 10 (6);
Chen, S.Q. 2901 (25); 3727 (24); 4365 (24); 5802 (24); 6306 (15); 6325 (25); 6719 (15);
Chen, S.Z. & Li, B.S. 3107 (5);
Chen, W. 84189 (15);
Chen, W.H. & Sheng, J.S. 30038 (15);
Chen,W.Q. 277 (16);
Chen, Y.F. 3008 (25);
Chen, Z.Y. 53126 (27); 53159 (10); 53332 (10);
Cheng, W.C. & Hwa, C.T. 835 (7a);
Chevalier, A. 29283 (16);
Chinese and Germanic Expedition 547 (24); 1457 (25); 1918 (7a); 2002 (24);
Chinese and Soviet Expedition 5127 (7a); 5905 (13); 7871 (13); 9021(13);
Ching, R.C. 6338 (15); 7035 (3); 25171 (3);
Chiu, N.Y. s. n. (2);
Chun, N.K. 7803 (16);
Chun, N.K. & How, F.C. 70209 (24);
Chun. N.K. & Tso, C. L. 43387 (16);
Chun, W.Y. 11072 (24);
Chung, C.S. 83134 (15);
Clarke, C.B. 20438 (23);
Clemens, M.S. & J. 3037 (16);
d'Alleizette, M. 243 (16);
Dayaoshan Expedition 11116 (3); 11781 (15); 12198 (10); 12636 (10); 13628 (7a); 13737 (7a);
Deng, L. 2801 (16); 5309 (15); 8787 (10); 8089 (10); 8156 (15); 8616 (15); 8932 (15); 9776 (2); 9951 (15);
Deng, S.W. 1153 (27);
Ding, G.Q. & Shi, G.L. 1910 (25);
Du, Y. C. 580208 (8);
Duan, G.W. 23 (7a);
Dulongjiang Expedition 1177 (14); 3195 (14);
Du Puy, D.J. 183 (16);
Eastern Expedition of China 3690 (27); 3759 (27); 4429 (25); 7276 (25);
Eastern Expedition of Hainan 473 (7a);
Eberhardt, P.A. 1505 (16); 4385 (16);
Esquirol, J. 155 (25); 2053 (7a);
Expedition to Xishuangbanna 34496 (9);
Expedition for Plant Resource 20263 (21);
Expedition for Spicery 85-87 (7a); 85-89 (7a); 85-120 (7a);
Expedition to Qinghai-Tibet Plateau 9169 (1); 9446 (14); 9692 (1);
Faurie, A. 760 (20);
Feng, K.M. 12011(1); 12207 (12); 13864 (7a); 21764 (7a);
Forrest, G. 875 (4); 16059 (22); 16161 (7a); 25138 (22); 25140 (19); 25146 (22);
Fung, H. 20453 (25);
Gao, X.F. 53403 (24);
Gressitt, J.L. 1635 (15);
Griffith, W. 3962 (5); 3962/1 (1); 3967 (12);
Guangxi Expedition 3897 (24); 3962 (24);
Hainan Expedition 779 (7a); 1085 (16);
Hainan Work Group 1331 (2);
Hance, H.F. 10946 (24); 11448 (25);
He, G.S. 6491 (15);

He, S.C. 84162 (12); 85503 (15); 85690 (12);
He, X.Y. 4363 (27);
He, Y.S. 12169 (10);
Henry, A. 70 (6); 1178 (6); 9082 (12); 10418 (7a); 11174 (12); 11182 (1); 11487 (7a); 11699 (13);12226 (23); 12226A (23); 12311 (15); 12479 (23); 12563 (12); 12628 (22); 12479 (23); 12832 (7a);
Herb. Hermann no. 411 (15);
Herb. Sc. College, Imp. Univ. Tokyo s.n. (27);
Heude, P. 362 (27);
Hong, L. 2626 (27);
Hooker, J.D. s.n. (1);
Horsfield, T. 1141 (13);
How, F.C. 71390 (25); 73875 (24); 74011 (25);
How, F.C. & Chun, N.K. 70209 (24);
Hsu, C.C. 1352 (25);
Hu, H.H. 520 (27);
Hu, S.Y. 5652 (16); 8181 (16); 8413 (16); 11032 (16); 12319 (16); 12421 (9);
Hu, Z.H. 621 (27);
Huang, M.X. 113145 (24);
Huang, S.F. 1352 (25);
Huang, S.M. 190941 (15);
Huang, T.C. 3480 (15); 4956 (6); 13055 (6);
Huang, T.C. & Huang, S.F. 15096 (25); 15993 (6);
Jiangxi Expedition 1783 (25); 2509 (24); 2945 (24);
Kao, M.T. 4323 (15);
Kao, Y.C. 710 (6);
Katsumoto, K. 5551 (25);
Lai, S.K. 5035 (25);
Lai, Y.H. 110 (6);
Lau, S.K. 661 (15); 802 (10); 840 (10); 2214 (15); 2549 (25); 2673 (24); 4269 (10); 4587 (10); 4591 (15); 4656 (10); 6179 (24); 24262 (15); 24371 (25); 24647 (15); 24713 (24); 24854 (25); 24884 (10); 25658 (7a); 28139 (25); 29121 (24);
Lau, S.K. & Wang, C. 30222 (10);
Lecomte, H. &Finet, A. 88 (16);
Lee, C.T. 602780 (7a);
Li, B.G. *et al*. 5605 (25);
Li, B. G. & Sun, L. 960034 (7a);
Li, B.S. & Chen, S.Z. 1556 (5);
Li, H. 10850 (12); 11429 (3);
Li, J.Y. 20426 (2);
Li, M.K. 343 (25); 414 (25); 506 (12); 750 (12); 1614 (7a); 1830 (7a); 2126 (7a); 2130 (7a); 2242 (12); 2251 (7a);
Li, S.G. 200087 (24);
Li, X.G. 200224 (10); 202081 (15); 202388 (15); 202583 (15); 202675 (10);
Li, Y.H. 291 (7a); 1128 (7a); 3682 (15); 3690 (7a); 4709 (7a); 5738 (12); 20259 (12); 20260 (1);
Li, Y.H. & Yu, P.H. 20478 (7a); 20691 (3);
Li, Y.K. 402164 (24); 402375 (10);
Li, Y.T. 913 (15);
Li, Z.T. 1408 (25);
Li, Z.Y. 1248 (10);
Li, Z.Y. *et al*. 1915 (15);
Liang, B.H. 83013 (25); 83187 (24); 83386 (24);
Liang, B.H. *et al*. 3854 (15);
Liang, C.F. 30676 (24); 33683 (16);33851 (16);34058 (2);

Liang, X.R. 60778 (25); 61180 (25); 61302 (10); 64057 (7a); 61223 (24); 64312 (7a); 67097 (15);
Liang, X.R. & Huang, R.K. 31594 (10); 31720 (10);
Lin, R. 2572 (15);
Liou, T.N. 659 (27); 18568 (7b); 22524 (3); 22528 (3);
Liu, E.D. 150 (7a);
Liu, E.D. & Yang, D.C. 408 (12); 441 (22);
Liu, G.Y. 2689 (10);
Liu, J.K. 260 (24);
Liu, N. *et al*. 2049 (10); 2061 (15);
Liu, X.Q. 24520 (10); 25353 (10);
Liu, Y. 679 (24);
Liu, Y.G. 1328 (24); 3005 (15);
Loureiro, J. de, s.n. (25);
Lu, Q.H. 4754 (15);
Luo, L.B. 310 (27); 397 (25);
Luo, X.R. 1330 (2); 900001 (2);
Luo, Y.B. 3309 (27);
Luo, Z.C. 1747 (27);
Ma, M.H. 824 (27);
Mack, J. s.n. (22);
Makino, T. 1328 (15);
Mao, P.Y. 6290 (15);
Martin, L. & Bodinier, E. 1946 (27);
Matuda, E. 1589 (15); 1599 (6);
McClure, F.A. 1688 (25); 7542 (25); 7708 (25); 8454 (7a); 9491 (7a);
Meihuashan Expedition 174 (10);
Menglian Expedition 9916 (19);
Merrill, E.D. Species Blancoanae 112 (2);
Mo, X.M. 20901 (15); 21077 (10); 21356 (15);
Mori, T. s. n. (6);
Mourel, S. 279 (16);
Nanling Expedition 1364 (10); 1981 (24); 3441 (24); 3685 (10);
Nanling-Lechang Expedition 4119 (10);
Nie, S.Q. 60083 (19);
Nonggang Expedition 10521 (24);
Ohashi, H. *et al.* 30219 (6);
Pei, S.J. s.n. (7a); 59-9462 (15); 59-9593 (15);
Peng, H. 1453 (1);
Petelot, A. 714 (16);
Poilane, E. 9407 (16); 13408 (16); 14287 (16);
Qian, Y.Y. 3860 (15);
Qiu, B.Y. 52547 (7a); 52886 (1); 53714 (12);
Roxburgh, W. 159 (25);
Saito, S. 8488 (15); 8622 (15);
Sasaki, K. s. n. (2); 15686 (15); 15716 (15);
Sasaki, S. 380477 (15);
Shenzhen Expedition 1414 (16);
Shi, G.L. 11828 (25); 12359 (24); 14056 (24); 14357 (24); 14503 (10); 15043 (10);
Shi, G.L. & Huang,S . D. 10467 (2);
Shixing Expedition 389 (10);
Shui, Y.M. 2530 (7a);
Shui, Y.M. & Chen, W.H. 13428 (18); 13565 (7a);

Simada, H. 1112 (6);
Simada, Y. 5419 (6);
Simizu, H. 3146 (25);
Spire, A. 119 (16);
Sun, H. 84 (12);
Suzuki, S. 520 (6);
Suzuki, T. 21576 (6); 200884 (6);
Sykes, W.R. Ch400 (24); 460344 (24);
Tan, C.M. 95768 (27); 99536 (10); 9511139 (27);
Tan, P.X. 59390 (10); 60448 (10); 62371 (10); 971954 (15);
Tao, D.D. 219 (12); 584 (15); 735 (7a); 1130 (12);
Tao, G.D. 7160 (7a); 8324 (12); 21100 (13); 34496 (7a); 38920 (12); 40140 (7a); 41466 (7a);
Tao, G.D. & Li, H.W. 39680 (19); 39745 (12); 40021 (9);
Tateishi, Y. *et al*. 1538 (10);
Tsai, H.T. 51560 (1); 52528(7a); 52582 (7b); 55058 (7a); 55619 (7a); 55698 (1);55780 (7a); 56355 (7a); 56716 (1); 56770 (7a); 58679 (14); 58783(1); 58879 (1);61473 (1); 61655 (12); 61727 (12); 61941 (12); 59-10586 (11); 59-11069 (11);
Tsang, W.T. 132 (25);751 (25);21691 (15); 23134 (10); 25959 (9); 26785 (16);
Tsiang, Y. 7403 (24); 9449 (27); 12100 (1); 12343 (27); 12713 (26); 12724 (15); 13545 (7a);
Wallich, N. 1531 (9); 1533 (7a); 1541 (19); 1544 (25);
Wan, P.P. & Chow, K.S. 79176 (24);
Wan, W.H. 11985 (25);
Wang, C. 31594 (10); 31720 (10); 35218 (7a); 38464 (25); 39026 (7a); 40710 (7a); 160203 (2); 162284 (16); 164757 (24);
Wang, C. & Deng, L. 556 (2);
Wang, C.S. 86 (20);
Wang, C.W. 10199 (15); 71986 (7a); 72503 (7a); 72968 (7a); 73793 (23); 75666 (15); 76286 (12); 78510 (12); 78725 (11); 79441 (17); 80864 (9); 81005(15); 84556 (1); 84605(19); 84778 (7a); 86878 (7a);
Wang, G.D. 6845 (15); 7359 (15);
Wang, H. 2971 (15); 2972 (15); 2979 (12); 2987 (7a); 2989 (12); 3014 (7a); 3011 (7a); 3015 (7a); 3019 (7a); 4649 (7a); 6370 (7a); 4652 (7a); 8351 (12);
Wang, J.C. 369 (16);
Wang, M.J. 3944 (25);
Wang, X. *et al*. 100197 (7a) ;
Wang, X.E. 1(2);
Wang, X.W. *et al*. 369 (9); 522 (9);
Wang, X.W. & Zhang, G.C. 8087 (10);
Wang, X.Z. 7445 (10);
Wei, Y.G. 970154 (24);
Wei, Z.F. 120781 (15); 121085 (15);
Wen, S.K. 580516 (19); 580634 (3);
Wight, R. 2531 (19);
Wu, G.S. 476 (12); 47142 (15);
Wu, Q.A. 8391 (15);
Wu, S.K. *et al*. 330 (7a);
Wu, Y.Y. 70-206 (7a);
Xiao, B.Z. 4826 (25);
Xin, S.Z. 25301 (15);
Xing, F.W. & Ye, H.G. 840 (10);
Xing, F.W. *et al*. 390 (25); 471 (15);
Xingan Expedition 47 (10); 215 (25); 339 (27);
Xiong, R.L. & Wen, S.K. 580135 (15); 580772 (15);

Xu, S.G. 5354 (1); 5463 (12);
Xu, X.H. *et al*. 317 (25);
Xu, X.H. & Lin, C.F. 190 (15);
Xu, Y.B. 10036 (25);
Yang, Z.H. 10871 (9);
Yao, G. 254 (2); 264 (10); 272(10); 273 (24); 274 (16); 348 (22); 358 (12); 359 (12); 364 (7a); 365 (9); 386 (7a);
Yang, T.Y.A. & Chuang, C.H. 11540 (25);
Yang, Z.H. 12543 (15);
Ye, G.D. 1508 (15);
Ye, H.G. *et al*. 426 (25); 2571 (10); 2989 (15); 42221 (15);
Ye, H.G. & Xing, F.W. 9104 (16);
Yen, H.F. 8684 (6);
Yin, W.Q. 731 (7b);
Yü, T.T. 17632 (3); 17696 (19); 17850 (1); 20395 (1);
Yu, P.H. & Li, Y.H. 20233 (15);
Yue-77 Team 5511 (10);
Yue, J.S. *et al*. 2123 (15); 2216 (10);
Yue-78 Expedition 6319 (9); 6405 (24);
Yunkai Expedition 82 (16);
Zeng, F.Y. *et al*. 1702 (15); 1826 (15); 2218 (15); 2280 (10);
Zhang, C.L. 56307 (10);
Zhang, G.C. *et al*. 112 (10);
Zhang, J.Q. 87782 (2);
Zhang, S.C. 9712153 (3);
Zhang, S.G. 4363 (27);
Zhang, S.Y. 4363 (27); 6919 (27);
Zhang, S.Z. *et al*. 4805 (15); 5495 (9); SCAUF1124 (9)
Zhao, C.J. 76 (7a);
Zhong, G.G. 642 (25); 734 (27); 919 (25);
Zhong, J.X. 11072 (24); 808417 (24); 83787 (7a); 84781 (15); 84847 (10); 84857 (2);
Zhong, S.Q. 463381 (16);
Zhou, G.S. *et al*. 79176 (24);
Zhou, S.S. 597 (7a); 3390 (7a); 3400 (12); 3682 (7a); 4316 (7a) ; 4506 (7a) ;
Zhou, Y.Z. 97 (12); 184 (1) ;
Zhu, T.P. 528 (19); 550 (7a);
Ziyunshan Expedition 2945 (24);
Zollinger, H. 4651 (2);
Zuo, J.L. 21223 (24); 21899 (15).

Appendix II. Plates of Type Images

PLATE 1. Syntype of *Pogostemon amaranthoides* Benth. (*Griffith 3962/1*, P)

PLATE 2. Isotype of *Pogostemon brevicorollus* Y. Z. Sun (*M. Chen 3206* NAS)

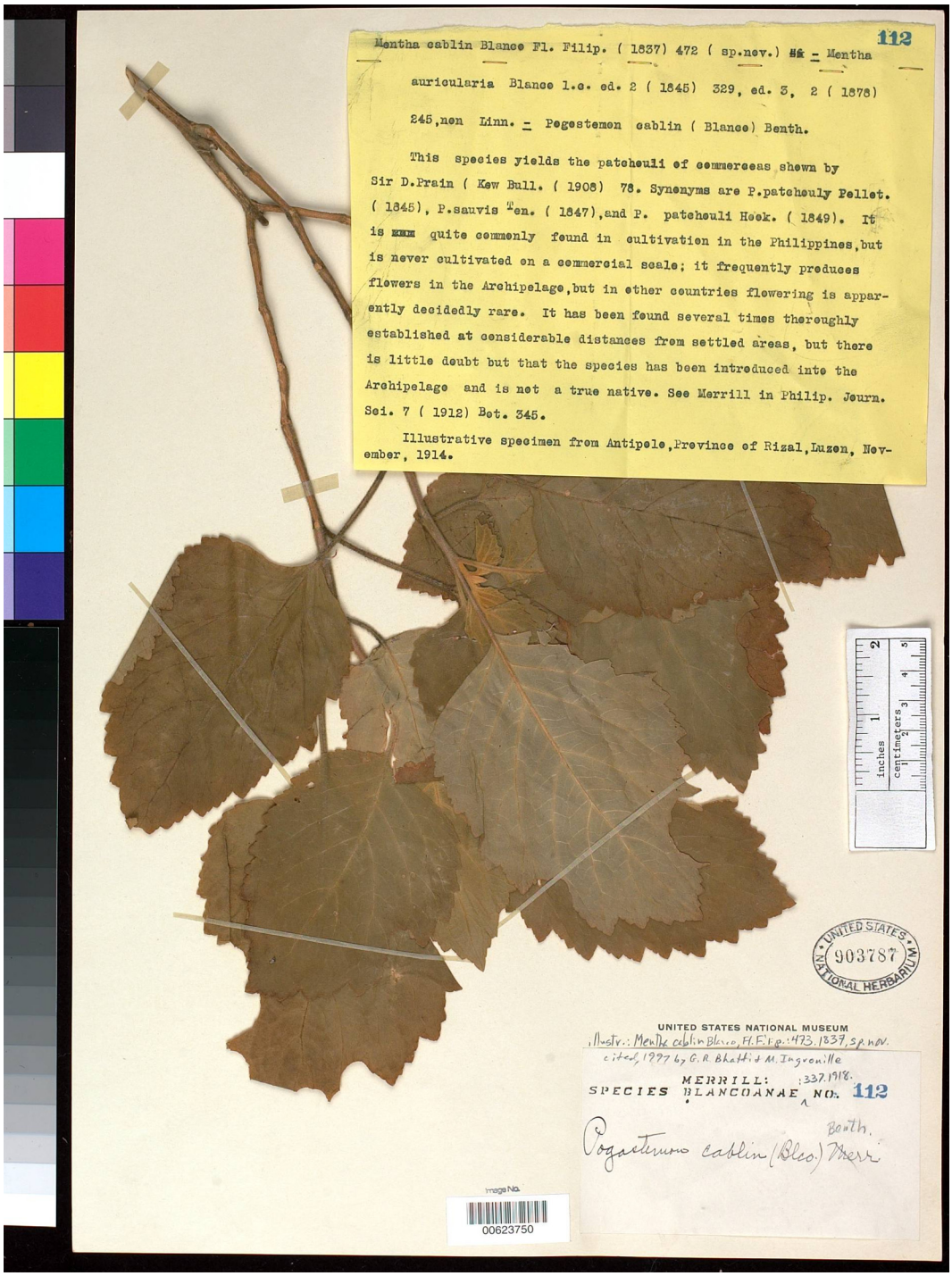

PLATE 3. Neotype of *Pogostemon cablin* (Blanco) Benth. (*"illustrative specimens" of Merrill, Spec. Blanc. (1918) 112*, US)

PLATE 4. Isotype of *Pogostemon chinensis* C. Y. Wu & Y. C. Huang (*T. N. Liou 22524*, PE)

PLATE 5. Isotype of *Pogostemon dielsianus* Dunn (*G. Forrest 875*. K)

PLATE 6. Isotype of *Pogostemon elsholtzioides* Benth. (*W. Griffith 3962*, P)

PLATE 7. Isolectotype of *Pogostemon formosanus* Oliv. (*A. Henry 1178*, US)

PLATE 8. Holotype of *Pogostemon glaber* var. *tsingpingensis* (C.Y. Wu & Y.C. Huang) Gang Yao (*H.T. Tsai 52582*, KUN)

PLATE 9. Holotype of *Pogostemon latifolius* (C.Y. Wu & Y.C. Huang) Gang Yao (*Y.C. Du 580208*, KUN)

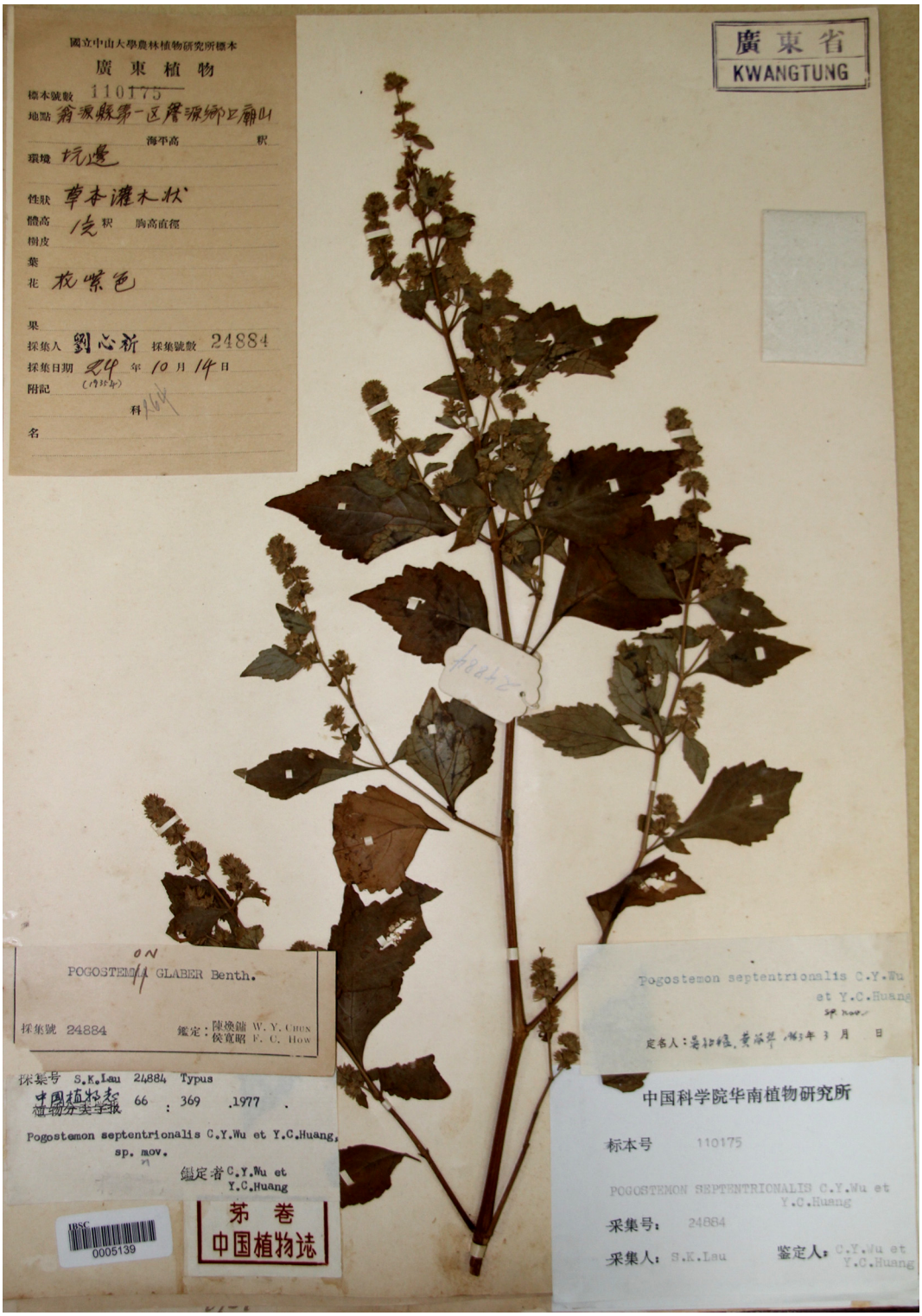

PLATE 10. Holotype of *Pogostemon septrionalis* C.Y. Wu & Y.C. Huang (*S.K. Lau 24884*, IBSC)

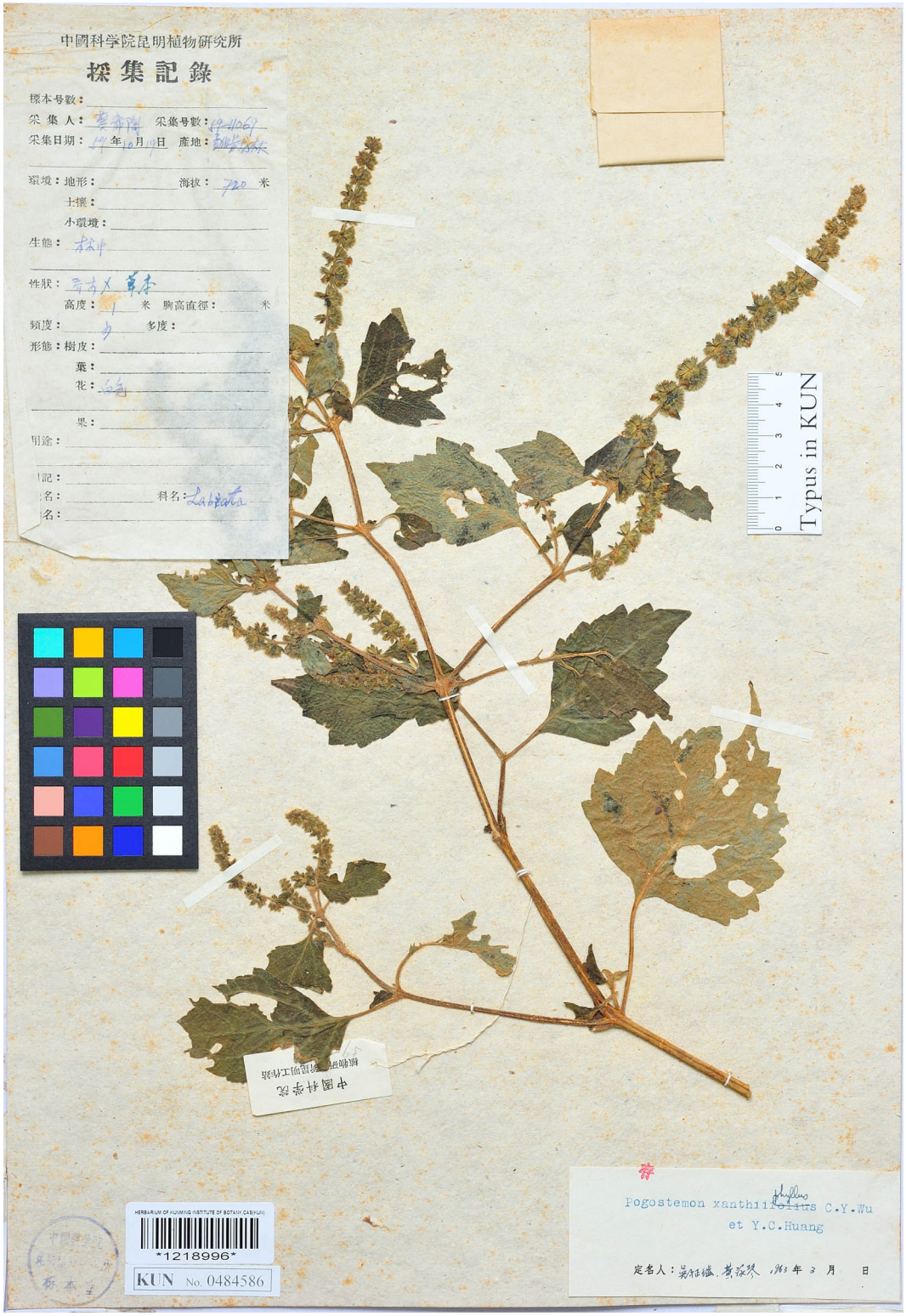

PLATE 11. Holotype of *Pogostemon xanthiiphyllus* C.Y. Wu & Y.C. Huang (*H.T. Tsai 59-11069*, KUN)

PLATE 12. Holotype of *Pogostemon hispidocalyx* C.Y. Wu & Y.C. Huang (*H.T. Tsai 58679*, KUN)

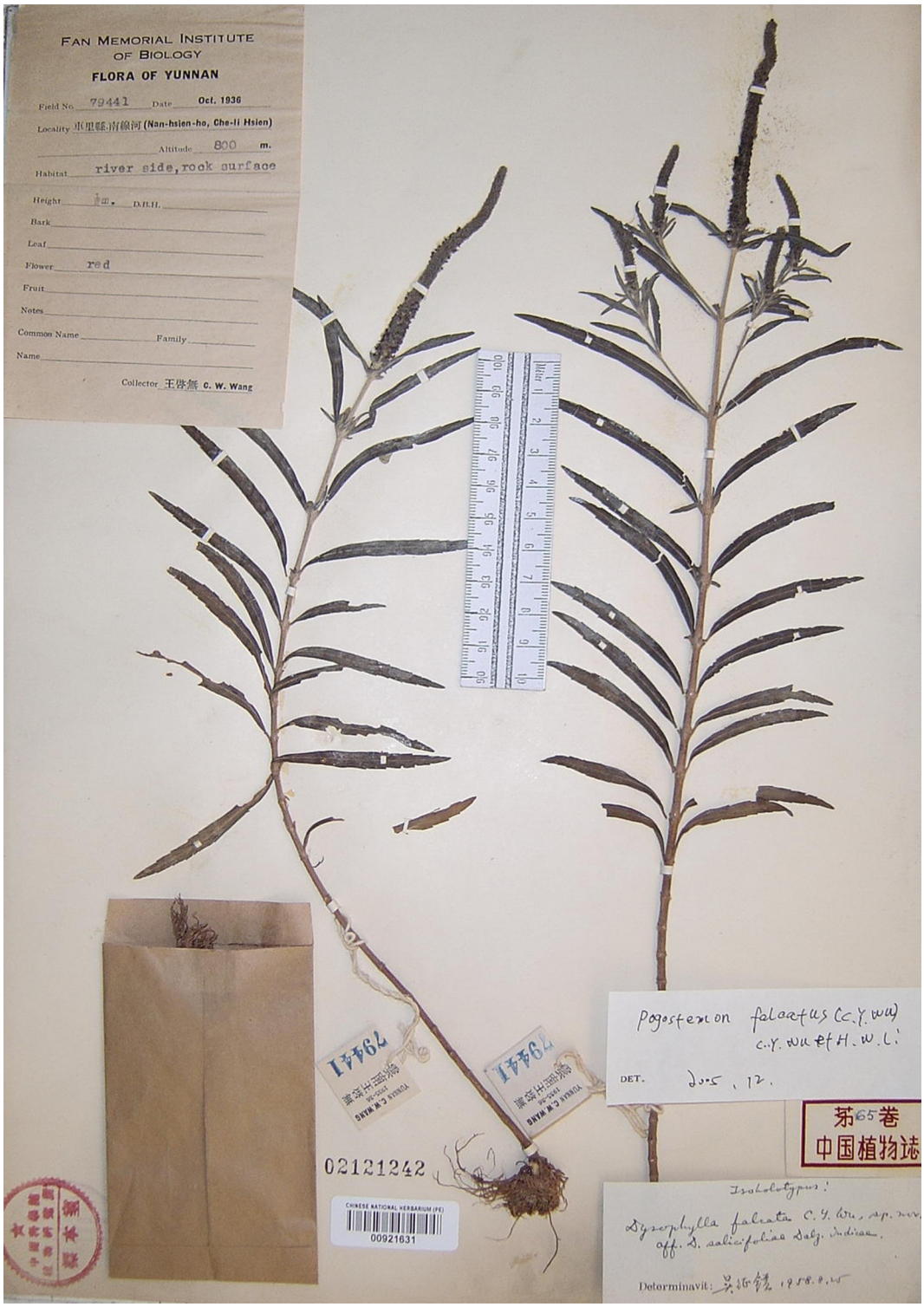

PLATE 13. Holotype of *Pogostemon falcatus* (C.Y. Wu) C.Y. Wu & H.W. Li (*C.W. Wang 79441*, PE)

PLATE 14. Isolectotype of *Pogostemon cruciatus* (Benth.) Kuntze (*N. Wallich 1541*, P)

PLATE 15. Holotype of *Pogostemon henanensis* Gang Yao *(Expedition for Plant Resource 20263*, PE)

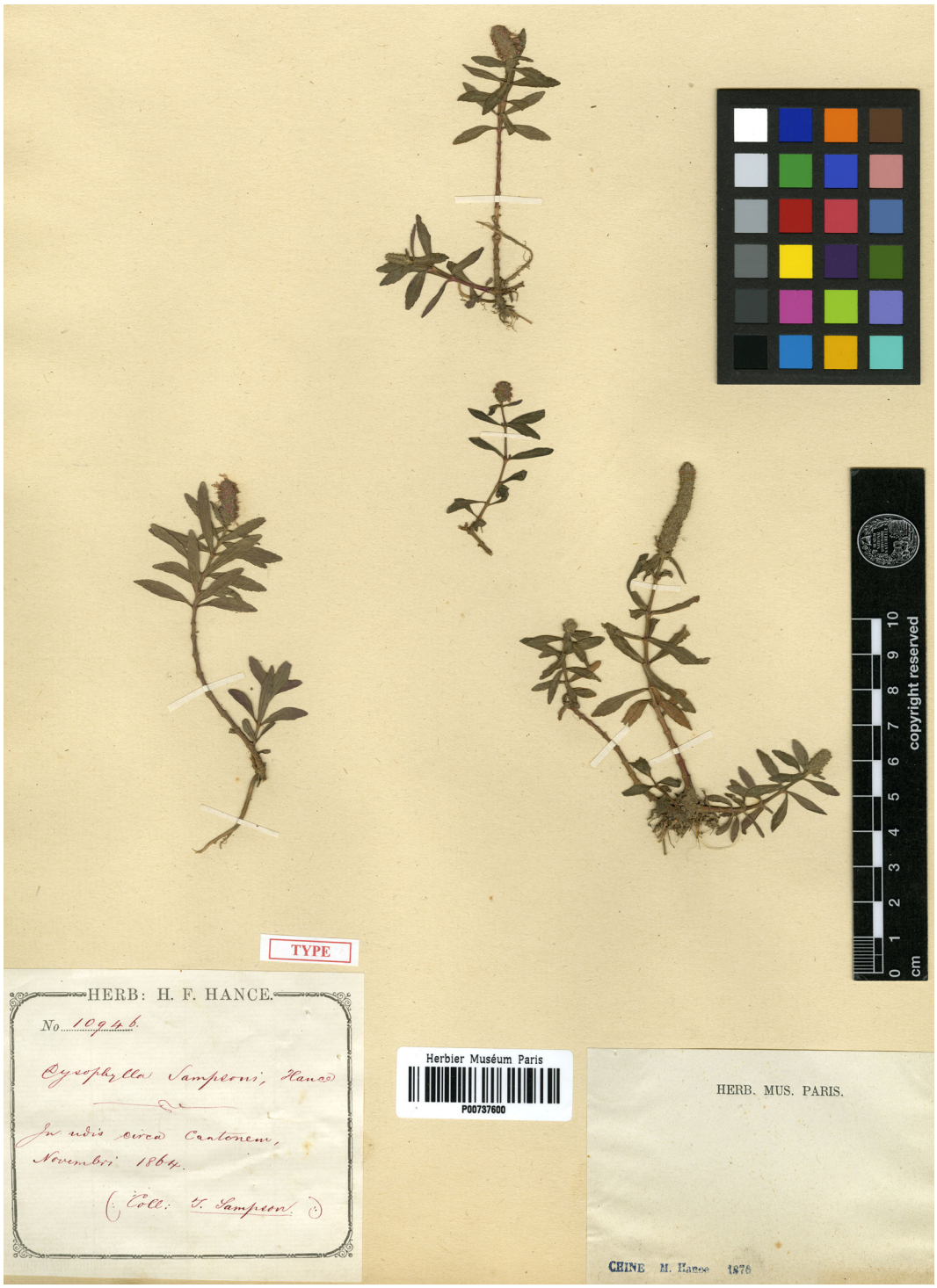

PLATE 16. Isolectotype of *Pogostemon sampsonii* (Hance) Press (*G.T. Sampson in herb. H.F. Hance 10946*, P)

PLATE 17. Isotype of *Dysophylla benthamiana* var. *intermedia* C.Y. Wu & S.J. Hsuan (*F.C. How & N.K. Chun 70209*, IBK)

PLATE 18. Isotype of *Dysophylla benthamiana* Hance (*G. T. Sampson in herb. H.F. Hance 11448*, P)

PLATE 19. Holotype of *Pogostemon szemaoensis* (C.Y. Wu & S.J. Hsuan) Press (*Y. Tsiang 12713,* NAS)

PLATE 20. Isolectotype of *Pogostemon parviflorus* Benth. (*N. Wallich 1531*, P)