

An annotated checklist of *Strobilanthes* (Acanthaceae) from the Bolaven Plateau, southern Laos

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ABSTRACT

Eleven species of *Strobilanthes* (Acanthaceae) are recorded from the Bolaven Plateau in southern Laos. A key to the species, photographs, vernacular names, taxonomic notes and information on distributions, habitat and phenology, are provided. In addition, two species (*S. dalzielii* and *S. glaucescens*) are lectotypified.

KEYWORDS: flora, Indochina, taxonomy, typification.

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INTRODUCTION

The genus *Strobilanthes* Blume is the second largest genus in the family Acanthaceae, consisting of approximately 450 species and is widely distributed in tropical and subtropical Asia (Wood & Scotland, 2009; Hu *et al.*, 2011; POWO, 2025). *Strobilanthes* is distinguished by having three morphological synapomorphies; the presence of rows of hairs on the inner corolla wall, a “rugula” or a fold on the inner surface of the posticous corolla wall, both of which purportedly function to retain the style, and a “strobilantheid” type of filament curtain, which comprises a transverse fusion of five filaments that form a ridge along the corolla wall (Manzitto-Tripp *et al.*, 2013; Manzitto-Tripp *et al.*, 2022).

In Laos, 30 species have been recorded to date (Benoist, 1935; Deng *et al.*, 2007; Wood & Scotland, 2009; Hu *et al.*, 2011; Newman *et al.*, 2017 onwards; Souladeth *et al.*, 2017; Nguyen *et al.*, 2018; Yamazaki *et al.*, 2021; Kladwong & Chantaranonthai, 2022, Thammarong *et al.*, 2022), but most of the information is based on a small number of specimens that were collected mainly in the early 20th century.

Fieldwork and subsequent taxonomic studies based on newly collected material are, therefore, required to clarify species diversity in Laos. Our recent botanical inventory work led us to report two new species of *Strobilanthes* from Laos: *S. bolavenensis* K. Yamaz., Tagane & Soulad. (Yamazaki *et al.*, 2021) and *S. namkadingensis* Soulad. & Tagane (Souladeth *et al.*, 2017).

This paper focuses on *Strobilanthes* species of the Bolaven Plateau, southern Laos, and reports eleven species based on our recent collections from 2018–2020 and the study of herbarium collections.

MATERIAL AND METHODS

Study site

The Bolaven Plateau, is located mostly in Champasak Province, and partly in Salavan, Sekong, and Attapeu Provinces and comprises ca 5,000 km² between the Mekong River in the west and the Annamite mountains on the border between Laos and Vietnam in the east (Fig. 1). The plateau has a relatively flat surface in its central part ranging from

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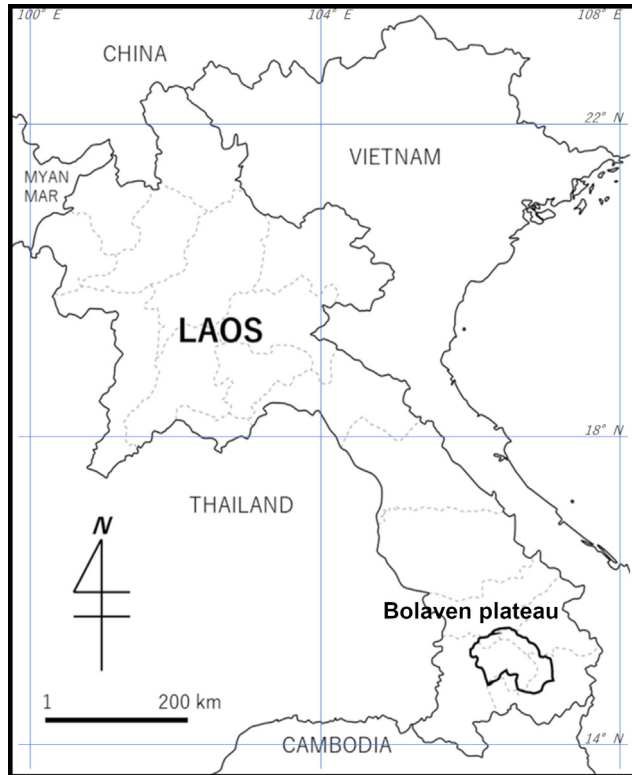


Figure 1. The location of the Bolaven Plateau.

1,000 m to 1,350 m elevation. The climate in the highland areas of the plateau is moist and cool all year round with average annual temperature of 20.2°C and annual rainfall of over 3,000 mm in Paksong Town at ca 1,290 m elevation (Climate-data.org, 2024). The lowland areas are relatively warm and dry, with distinct rainy and dry seasons, an average annual temperature of 25.7°C and annual rainfall of 2,063 mm in Pakse at ca 150 m elevation (Climate-data.org, <http://climate-data.org/>. Accessed 13 September 2021). Because of its topography and climate, there are many streams and waterfalls, as well as various vegetation types, from semi-evergreen forest at low to middle elevations to wet evergreen forest, open grassland, and sparse pine forest at higher elevations (Tagane *et al.*, 2020).

Field work

Fieldwork was conducted in December 2018 and February, July, and December 2019 and September 2020; and 19 specimens of *Strobilanthes*

were collected and photographed. The voucher specimens are deposited at herbaria of the Faculty of Forest Science, National University of Laos (FOF), Kagoshima University Museum (KAG), and partially those of the Department of National Parks, Wildlife and Plant Conservation in Thailand (BKF), and the National Museum of Nature and Science, Japan (TNS).

Herbarium studies

We gathered information on *Strobilanthes* species found on the Bolaven Plateau by reviewing taxonomic literature (e.g. Hô, 2000; Bennett & Scotland, 2003; Wood & Scotland, 2006; Bennett *et al.*, 2008; Hu *et al.*, 2011; Newman *et al.*, 2017 onwards; <https://padme.rbge.org.uk/laos/>), and by examining specimens in BKF, KAG, FOF and VNM, as well as digitalized images available on the web (e.g. Chinese Virtual Herbarium, <https://www.cvh.ac.cn/index.php>; JSTOR Global Plant, <https://plants.jstor.org/>; Royal Botanic Garden Edinburgh (E),

<https://data.rbge.org.uk/search/herbarium/>; Kew Botanic Garden (K), <https://apps.kew.org/hercat/>; Naturalis (L), <https://bioportal.naturalis.nl/>; Muséum national d'Histoire naturelle (P), <https://science.mnhn.fr/>).

The bracts are an important taxonomic character for identifying species of *Strobilanthes*. In this paper, outer bracts are referred to as “sterile bracts” and the inner ones as “fertile bracts”, following Hu *et al.* (2011). The ecological information refers to the Bolaven Plateau and was taken from our field observations and the label information on herbarium specimens.

RESULTS

Our studies revealed the presence of 11 species of *Strobilanthes* on the Bolaven Plateau. Among them, nine species were identified at species level, and one species could not be identified because the specimen was infertile - we treat this as ‘*S. sp. 1*’ in the list below. At the Paris Herbarium (P), there is another collection, *Poillane 28679*, tentatively identified as “*S. cf. torrentium*” or “*S. annamitica*?” by different researchers. We could not confirm its identity, because we have not found this species on the Bolaven Plateau yet and have not closely examined the specimen at P. In the present study, it is tentatively treated as *S. cf. torrentium*.

TAXONOMIC TREATMENT

1. *Strobilanthes bolavenensis* K.Yamaz., Tagane & Soulad., *Phytotaxa* 513(2): 154. 2021. Type: Laos, Champasak, Bolaven Plateau, Paksong, near Nong Luang Village, in lower montane forest, 15°04'22.14"N, 106°12'20.71"E, 1,167 m alt., 18 Dec. 2019, *Souladeth et al. L3452* (holotype **FOF**!; isotype **KAG** [KAG155816!]). Figs. 2A–D.

Distribution.— Laos (endemic to Bolaven Plateau).

Ecology and phenology.—In lower montane forest at 1,150–1,300 m alt. Flowering from September and December.

Vernacular name.— Hom bolaven (ຫ້ອມບໍລະເວນ).

Notes.— *Strobilanthes bolavenensis* is most similar to *S. guangxiensis* S.Z.Huang endemic to Guangxi, China in having an axillary simple spicate

inflorescence and purple corolla, but distinguished by its shorter height up to 30 cm tall (vs ca 1 m tall), inflorescence rhachis sparsely puberulent (vs densely pubescent), bracts and bracteoles covered with short appressed yellowish-brown hairs adaxially near the apex (vs glabrous), larger calyx 1.4–1.6 cm long (vs 1 cm long), and the calyx lobes acute at the apex (vs acuminate).

Specimens examined.— Champasak: Paksong, 1,167 m alt., 18 Dec. 2019, *Souladeth et al. L3452* (**FOF**, **KAG** [KAG155816!]); same locality, 15°04'24.8"N, 106°12'22.5"E, 1,260 m alt., 16 Sept. 2020, *Souladeth et al. L3871* (**FOF**).

2. *Strobilanthes dalzielii* (W.W.Smith) Benoist in Lecomte *et al.*, *Fl. Indo-Chine* 4: 679. 1935.— *Acanthopale dalzielii* W.W.Smith, *Notes Roy. Bot. Gard. Edinburgh* 11: 193. 1919. Type: China, Taiyong, a mountain valley, 2000 ft alt., 60 miles west from Swatow, July 1901, *Dalziel 71* (lectotype **E** [E00133348] photo seen, designated here; isolectotype **E** [E00133349] photo seen). Figs. 2E–H.

Distribution.— Myanmar, China, Thailand, Laos (Bolaven Plateau, Vientiane) and Vietnam.

Ecology and phenology.— In evergreen hill forest, at 1,100–1,250 m alt. Flowering from December to February.

Vernacular name.— Hom bai bieng (ຫ້ອມໃບບັ່ງ).

Notes.— *Strobilanthes dalzielii* is similar to *S. patula* Benoist, which is distributed in Laos and Vietnam, in having a spicate inflorescence, pubescent calyx, and acuminate to falcate leaf apex but is distinguished by its leaves strongly anisophyllous (vs. not strongly so), and flowers spreading from the inflorescence rhachis (vs flowers appressed to the rhachis).

Strobilanthes dalzielii was described based on a single collection number *Dalziel 71* (Smith, 1919), which consists of two sheets deposited in **E** [E00133348, E00133349]. We designate the sheet E00133348 with one mature corolla as the lectotype of *S. dalzielii* because it has well-developed zigzag stems and anisophyllous leaves in good condition that are characteristic of *S. dalzielii*. The specimen E00133349 has three corollas, but the zigzag stems and anisophyllous leaves are not so conspicuous.

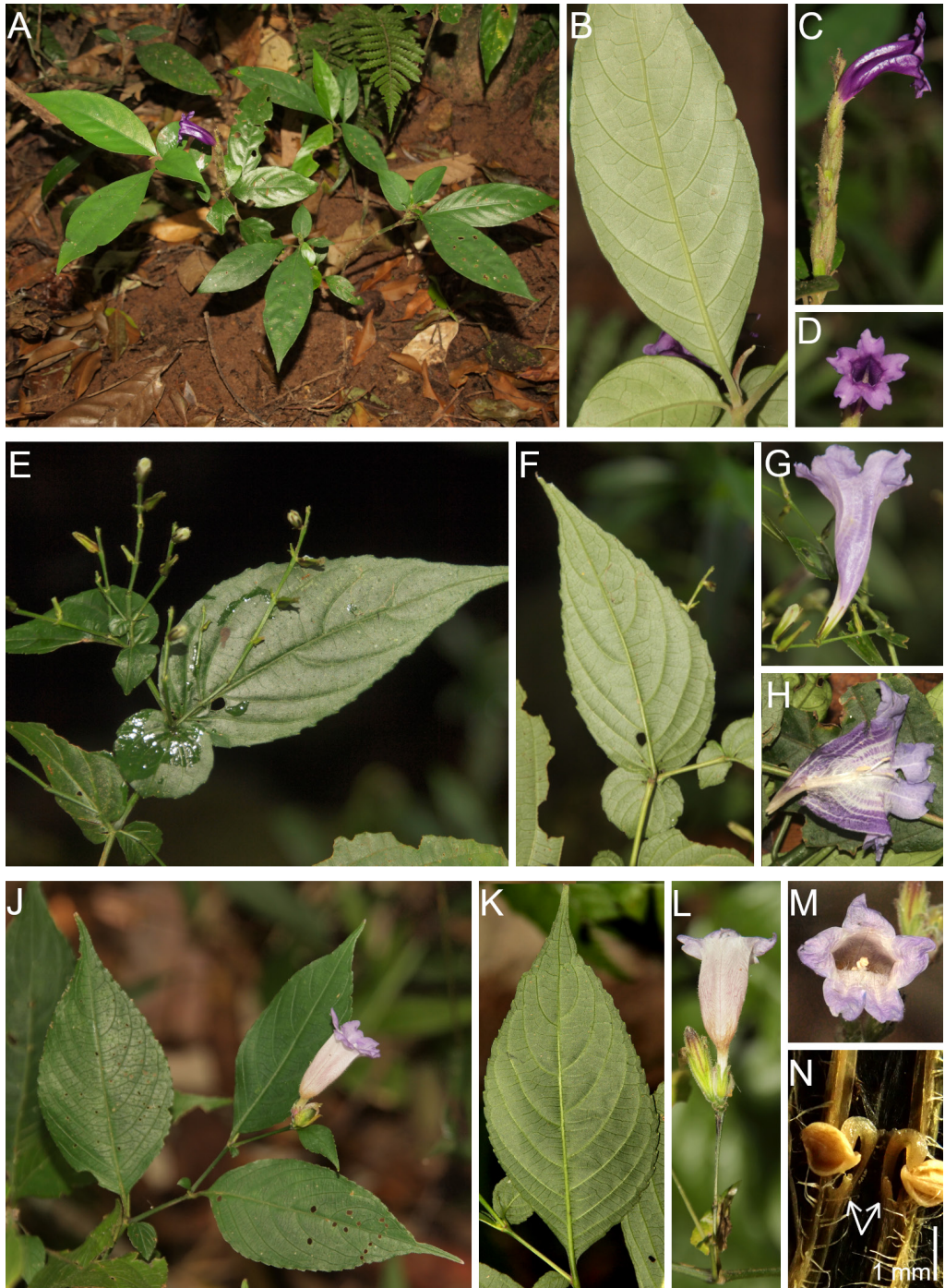


Figure 2. *Strobilanthes bolavenensis* K.Yamaz., Tagane & Soulad.: A. habit, B. lower surface of leaf, C. inflorescence, D. flower (front view); *Strobilanthes dalzielii* (W.W.Smith) Benoist: E. branch and inflorescences with flower buds, F. lower surface of leaf, G. flower (side view), H. corolla opened out; *Strobilanthes dimorphotricha* Hance: J. flowering branch, K. lower surface of leaf, L. inflorescence, M. flower (front view), N. shorter filaments with appendages (the two arrows).

Specimens examined.— Champasak: Paksong, near ban Nong Luang, 15°03'54.16"N, 106°12'50.41"E, 1,218 m alt., 11 Dec. 2018, *Tagane et al.* L2093 (FOF, KAG [KAG128193]); same locality, 15°04'02.06"N, 106°12'29.9"E, 1,147 m alt., 19 Feb. 2019, *Souladeth et al.* L2491 (FOF, KAG [KAG128740]), L2493 (FOF, KAG [KAG128742]), L2495 (FOF, KAG [KAG128744]); same locality, 15°04'10.38"N, 106°12'30.37"E, 1,208 m alt., 17 Dec. 2019, *Souladeth et al.* L3320 (FOF, KAG [KAG155685]).

3. *Strobilanthes dimorphotricha* Hance, J. Bot. 21: 355. 1883. Type: China, Lien-chau, in silvula umida ad Fuk-shan-man, 300 m alt., p. a Cantone, 25 Oct. 1881, *Henry 22110* (holotype BM [BM000884978] photo seen). Figs. 2J–N.

Distribution.— India, Bangladesh, Myanmar, China, Thailand, Laos (Bolaven Plateau, Houaphanh) and Vietnam.

Ecology and phenology.— In evergreen hill forest at 1,211 m alt. Flowering and fruiting in December.

Vernacular name.— Hom mounng mani (ຫ້ອມມ່ວງມະນີ).

Notes.— *Strobilanthes dimorphotricha* is a member of the “*S. penstemonoides* (Nees) T. Anderson group”, which is widely distributed along the Himalayan chain and through much of Southeast Asia and southern China (Wood & Scotland, 2006). Species in this group are characterized by having a capitate inflorescence, scarious, often caducous fertile bracts, reduced or absent (rarely present) bracteoles, unequally 5-lobed calyx which is accrescent in fruit and one of whose lobes slightly longer than others, shorter filaments with recurved ellipsoid anthers (Wood & Scotland, 2006; Hu *et al.*, 2011). The species in this group have been described as having continuous or subtle morphological differences such as anisophyllous or isophyllous plants, which vary in the size, shape, the indumentum of leaf blades, bracts, bracteoles, calyx and corolla and the presence or absence of bracteoles (Wood & Scotland, 2006). *Strobilanthes dimorphotricha* is distinguished from *S. penstemonoides* by its acuminate, relatively persistent fertile bracts (vs rounded, often caducous).

Only one species, *Strobilanthes dimorphotricha*, of the *S. penstemonoides* group, is found in Laos. It includes two subspecies, subsp. *dimorphotricha* and subsp. *rex* (C.B. Clarke) J.R.I. Wood. Subspecies *dimorphotricha* differs from subsp. *rex* in having the leaves at each node quite unequal in size (vs (sub)equal), leaf blade ovate, elliptic, or elliptic-lanceolate (vs oblong to oblong-elliptic), and leaf apex acuminate to caudate (vs acute) (Hance, 1883; Wood & Scotland, 2006; Hu *et al.*, 2011). Our specimens from the Bolaven Plateau were identified as subsp. *dimorphotricha* in accordance with its strongly anisophylly and having ovate, elliptic, or elliptic-lanceolate leaf blades (Fig. 2J). Our specimens show several different characters from those previously known: the longer filaments are covered with pilose hairs (vs glabrous), the style is 2–2.1 cm long (vs 3.5 cm long), appendages are present under the shorter stamens (Fig. 2N) (vs absence of appendages) (Hance, 1883; Wood & Scotland, 2006; Hu *et al.*, 2011). We, however, conclude that these differences are merely intra-specific variation in subsp. *dimorphotricha*, as our collection is located isolated at the southern limit of the known distribution of subsp. *dimorphotricha*.

Specimens examined.— Sekong: Tatheng, Huay Saiy village, in hill evergreen forest, 15°24'16.9"N, 106°22'34.5"E, 1,211 m alt., 22 Dec. 2019, *Souladeth et al.* L3749 (FOF, KAG [KAG156109]).

4. *Strobilanthes echinata* Nees, Pl. Asiat. Rar. (Wallich) 3: 85. 1832. Type: India. Meghalaya, *da Silva in Wallich 2356* (lectotype K-W [K001115724] photo seen, designated by Bennett *et al.* (2008)). Figs. 3A–D.

Distribution.— India, Bhutan, Myanmar, China, Thailand, Laos (Sekong, Vientiane, Xieng Khouang), Cambodia, Vietnam, Malaysia (Malay Peninsula, Sarawak), Singapore and Indonesia (Kalimantan, Sumatra).

Ecology and phenology.— forest edges, open grassland, at 400–1,300 m alt. Flowering and fruiting from July to September.

Vernacular name.— Hom paksong (ຫ້ອມປາກຊ່ອງ).

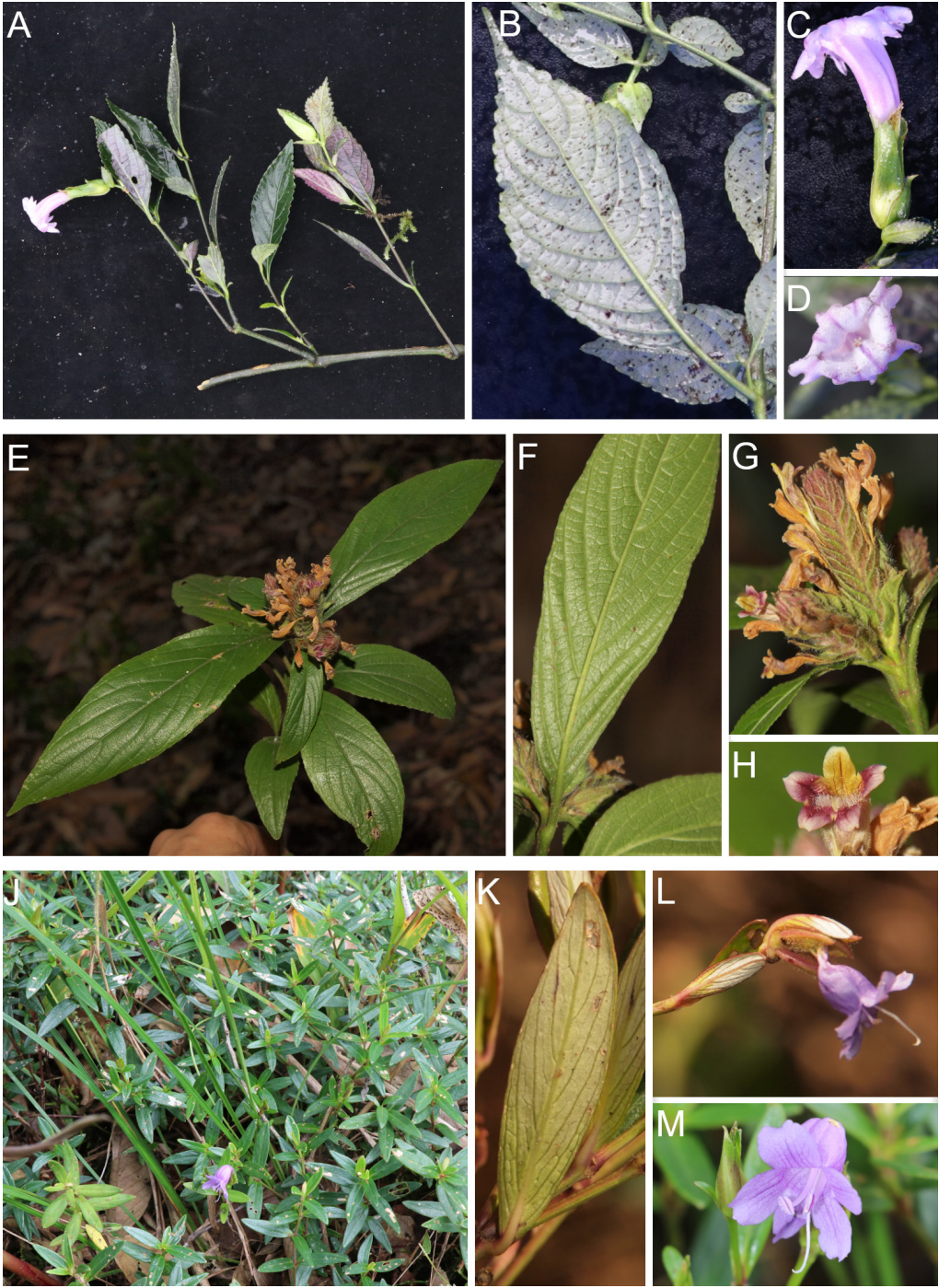


Figure 3. *Strobilanthes echinata* Nees: A. branches with flower, B. lower surface of leaf, C. flower with inflorescence bracts (side view), D. flower (front view); *Strobilanthes glaucescens* Nees: E. habit, F. lower surface of leaf, G. inflorescences, H. flowers (front view); *Strobilanthes hypomalla* Benoist: J. habit, K. lower surface of leaf when glabrescent, L. flowering branch, M. flower (front view).

Notes.— *Strobilanthes echinata* shows large infraspecific variation in both vegetative and reproductive traits (e.g. the shape of leaves and sterile bracts, the presence or absence of hairs on the leaves and inflorescences) but is easily distinguished from other species by its capitate inflorescences subtended by large sterile bracts 3–5 × 2–2.5 cm in Bolaven Plateau (Bennett *et al.*, 2008) (Fig. 3C). *Strobilanthes involucrata* Blume native to Indonesia (POWO, 2025), has large sterile bracts and shows somewhat similarity. However, *S. echinata* can be distinguished from *S. involucrata* by its longer corolla (4–)5–5.5 cm long (vs 4.5–5.1 cm in *S. involucrata*), bracts without purple markings (vs bracts with purple markings) and purple corolla (vs. white) (Bennett & Scotland, 2003; Hu *et al.*, 2011).

Specimens examined.— Champasak: Paksong, Houei Champi, July 1949, *Vidal 998b* (L [L2833771] photo seen, **P** [P00218535] photo seen); *ibid.*, near Nong Luang Village, 15°03'38.57"N, 106°12'31.10"E, 1278 m alt., 4 July 2019, *Souladeth et al. L2957* (**FOF**, **KAG** [KAG129234]); *ibid.*, Ban Nong Luang, 15°06'75.9"N, 106°21'44.9"E, 1,253 m alt., 17 Sept. 2020, *Souladeth et al. L3933* (**FOF**), *L3944* (**FOF**).

5. *Strobilanthes glaucescens* Nees, Pl. Asiat. Rar. (Wallich) 3: 85. 1832. Type: Myanmar, Mt. Prome, 1826, *Wall. Cat. no. 7155* (lectotype **K-W** [K001126800] photo seen, designated here; isolectotypes **BM** [BM000810181] photo seen, **K-W** [K000883165] photo seen, and possibly **GZU** [GZU000249618] photo seen). Figs. 3E–H.

Distribution.— India, Myanmar, Thailand, Laos (Luang Prabang, Bolaven Plateau) and Vietnam.

Ecology and phenology.— In seasonally dry evergreen forest at 300 m alt. Flowering and fruiting in December.

Vernacular name.— Kham (ຄຳມ).

Notes.— *Strobilanthes glaucescens* is distinguished from other species by being entirely hairy with a very dense terminal, shortly spicate inflorescence, and creamy yellow and dull pink corolla on the exterior but purplish-red and partially yellow on the interior. It is similar to *S. schomburgkii* (Craib) J.R.I. Wood from Thailand and Vietnam, but is

distinguished by its broader leaf blades (length/width ratio 2–4 in *S. glaucescens* vs more than 6 in *S. schomburgkii*). Bremekamp (1944) classified this species as *Sericocalyx glaucescens* (Nees) Bremek. but Moylan *et al.* (2004) demonstrated that *Sericocalyx* is polyphyletic in the subtribe Strobilanthinae, based on phylogenetic analyses using ITS and *trnL-F* sequences and morphology. Therefore, a single monophyletic *Strobilanthes s.l.* is accepted (Moylan *et al.*, 2004; Deng *et al.*, 2006).

Strobilanthes glaucescens was based on *Wallich 7155* (Nees, 1832), and we found one sheet in **BM** and two sheets in **K-W**. We designate the sheet in **K-W** [K001126800] as the lectotype of *S. glaucescens* because it has more inflorescences and leaves than the other two and is in good condition overall. The specimen at **GZU** [GZU000249618], although the information on the collector(s) and collection number are missing on the specimen label, could be a syntype of *S. glaucescens* since the collection locality and year perfectly match the information in the original paper. We have rejected the specimens at **GZU** from consideration as a lectotype, as Nees is known to have relied on Wallich's collections for his descriptions during his visit to London (Candolle & Radcliffe-Smith, 1981; Wood & Scotland, 2021), although he seldom left annotations on those collections.

Specimens examined.— Attapeu: Samakhixay, Sox Village, 15°03'23.30"N, 106°59'08.10"E, 300 m alt., 19 Dec. 2019, *Souladeth et al. L3483* (**FOF**, **KAG** [KAG155845]).

6. *Strobilanthes hypomalla* Benoist, Bull. Mus. Natl. Hist. Nat. 27: 543. 1921. Type: Vietnam, Lam Dong, Dalat, 27 Nov. 1911, *Lecomte & Finet 1524* (lectotype **P** [P00218435] photo seen, designated by Kladwong & Chantaranonthai (2022)). Figs. 3J–M.

Distribution.— Thailand (Bueng Kan), Laos (Bolaven Plateau), Cambodia (Mt. Bokor), and Vietnam (Dalat).

Ecology and phenology.— In open grassland with exposed bedrock or at the edge of evergreen forest, at 1,200–1,300 m alt. Flowering and fruiting from September to November.

Vernacular name.— Hom nong luang (ໜ່ວຍໜອງຫລວງ).

Notes.— *Strobilanthes hypomalla* is most similar to *S. aprica* (Hance) T. Anderson, which is widely distributed from China to the Indochina Peninsula (Hu *et al.*, 2011) in having small, ovate to lanceolate leaves, leaf abaxial surface densely covered with white appressed hairs, short dense subcapitate spicate inflorescence, and lilac-colored corolla, but is distinguished by its coriaceous, glabrous, adaxially glossy leaf blades (vs herbaceous, scabrous to hispid, and dull in *S. aprica*) (Figs. 3J–M).

Kladwong & Chantaranothai (2022) highlighted the presence of white appressed hairs on the abaxial leaf surface as an important identifying trait for *S. hypomalla*. However, individuals collected in the Bolaven Plateau lack the white appressed hairs and we currently consider this as an example of plasticity in this species. Further research based on more specimens is warranted to fully understand this variation.

Specimens examined.— Bolaven Plateau: 1,100–1,200 m alt., 27 Nov. 1938, *Poilane 28634* (L [L2841927] photo seen, P [P00218499] photo seen). Champasak: Paksong, near Nong Luang Village, 15°04'36.40"N, 106°12'20.64"E, 1,268 m alt., 19 Feb. 2019, *Souladeth et al. L2479* (FOF, KAG [KAG128728]); *ibid.*, 15°04'34.7"N, 106°12'21.2"E, 1,271 m alt., 16 Sept. 2020, *Souladeth et al. L3844* (FOF).

7. *Strobilanthes paniculata* (Nees) Miq., Fl. Ned. Ind. 2: 802. 1858.— *Goldfussia paniculata* Nees, Companion Bot. Mag. 2: 313. 1837. Type: Indonesia, *Hooker s.n.* (lectotype E [E00749036] photo seen, designated by Wood (1994)). Figs. 4A–E.

Distribution.— Myanmar, Thailand, Laos (Bolaven Plateau), Malaysia and Indonesia (Java, south Sumatra).

Ecology and phenology.— on the margins of evergreen forest, near waterfalls, at 900–1,300 m alt. Flowering and fruiting in September and October.

Vernacular name.— Hom khao champasak (ໜ້ອມຂາວຈຳປາສັກ).

Notes.— *Strobilanthes paniculata* is distinguished from other species in Laos by a combination of its capitate inflorescences arranged in panicles of

2–3 heads, the heads small, 0.4–1 × 0.4–0.9 cm with 3–4 white or pale blue flowers, and ciliate fertile bracts (Bennett & Scotland, 2003; Wood *et al.*, 2003). Leaves show considerable variation in size (1–19 × 1–7 cm) and shape, the blade broadly ovate, elliptic, lanceolate, with margins undulate to crenate and apex acute, acuminate, caudate, or obtuse (Bennett & Scotland, 2003; Wood *et al.*, 2003).

Our collection matches *Strobilanthes microcephala* Benoist, described from the Bolaven Plateau (*Poilane 15853*, holotype P [P00719373], isotypes A [A00286779], P [P00719376]), which has been treated as a synonym of *S. paniculata* (Wood *et al.*, 2003). However, on examination, our collection shows morphological similarities to both *S. paniculata* and *S. barbigera* J.R.I. Wood, Nuraliev & Scotland, from Vietnam (Wood *et al.*, 2017), as it possesses stipitate glands on the floral bracts and bracteoles (vs. glabrous in *S. paniculata*). Moreover, *Poilane 1583* and our collection have ovate to suborbicular floral bracts, which is one of the characteristics of *S. barbigera* (vs. floral bracts lanceolate in *S. paniculata*). Wood *et al.* (2017) identified the spheroidal, not ellipsoidal, pollen as a distinct characteristic of *S. barbigera*. In contrast, the pollen of our collection is ellipsoidal, clearly distinguishing it from *S. barbigera* (Fig. 4E). Therefore, though we currently identify our collection as *S. paniculata*, further studies are needed to clarify its taxonomic identity.

Specimens examined.— Champasak: Bassac, Nong Bak Kao, 900 m alt., 6 Oct. 1928, *Poilane 15853* (A [A00286779] photo seen, P [P00719373], P00719376] photo seen); Paksong, 15°04'24.8"N, 106°12'22.5"E, 1,260 m alt., 16 Sept. 2020, *Souladeth et al. L3872* (FOF).

8. *Strobilanthes pateriformis* Lindau, Bull. Herb. Boissier. 5: 653. 1897. Type: Vietnam, Tonkin, Mt Bavi, 450 m alt., Nov. 1887, *Balansa 4280* (holotype P [P00719393] photo seen; isotypes P [P00719395], P00719396] photo seen). Figs. 4F–J.

Distribution.— China, Thailand, Laos (Bolaven Plateau, Bolikhamsai, Luang Prabang), Vietnam and Indonesia.

Ecology and phenology.— In mixed evergreen forest, near Tad Tayicseua Waterfall, at 634 m alt. Flowering from November to February.

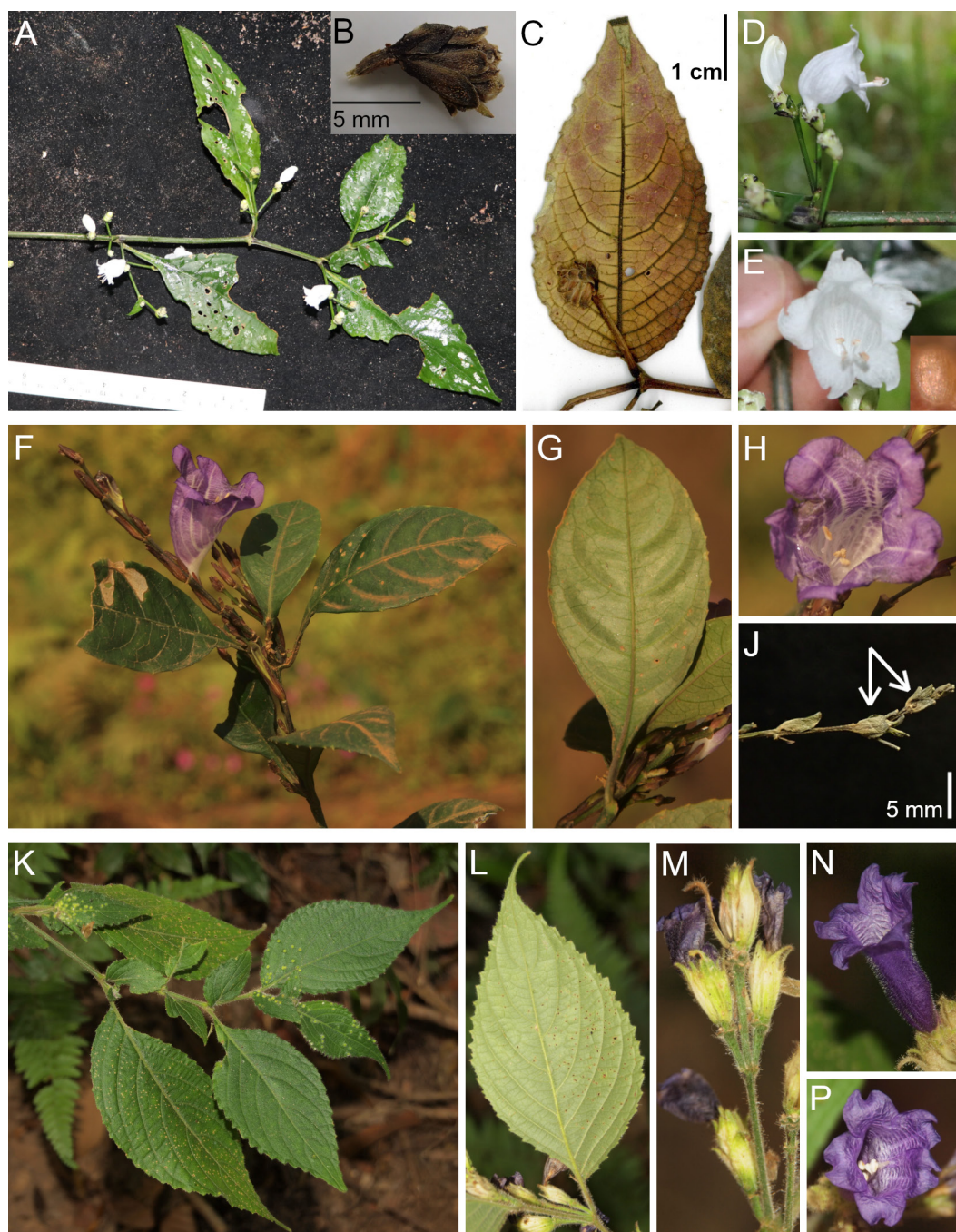


Figure 4. *Strobilanthes paniculata* (Nees) Miq.: A. branches with flowers and flower buds, B. stipitate glands at tip of floral bracts and bracteoles, C. lower surface of leaf, D. inflorescences with flowers (side view), E. flower (front view) and pollen; *Strobilanthes pateriformis* Lindau: F. branches with flower and flower buds, G. lower surface of leaf, H. flower (front view), I. inflorescence with fertile bracts (the two arrows); *Strobilanthes speciosa* Blume: K. branches, L. lower surface of leaf, M. inflorescences, N. flower (side view); O. flower (front view).

Vernacular name.— Hom bai na (ໂອມໄບໜາ).

Notes.— *Strobilanthes pateriformis* is most similar to *S. truncata* D.Fang & H.S.Lo from China and Vietnam in having inflorescences with paired flowers on two sides of the spike and fertile bracts ovate to oblong-elliptic and somewhat caducous, but it is distinguished by its smaller height up to 50 cm tall (vs 3 m tall), leaf blades oblong-ovate to lanceolate 6–13 × 2.5–5.5 cm (vs broadly ovate to ovate 10–19 × 5–11.5 cm), fertile bracts acute to obtuse at the apex (vs fertile bracts with truncate at the apex), and calyx glabrous (vs sparsely pubescent) (Hu *et al.*, 2011).

This species is a widely distributed species, and variation in the development of wings on the branches (1.5–4 mm wide or absent) and in corolla color (violet to white) has been reported (Terao, 1981; Hu *et al.*, 2011). The specimen *Souladeth et al.* L2572 from the Bolaven Plateau has poorly developed wings on its branches (Fig. 4J) and the pale purple to purple corolla (Fig. 4H).

The specimen *Munzinger 281* (L [L3720553], P [P00217367]) collected in Champasak, Laos, was annotated as *Strobilanthes patula* Benoist by S. Hul in 1999. However, we consider it to be *S. pateriformis*. *Strobilanthes pateriformis* is distinguished from *S. patula* by its having distinct petioles (vs leaves almost sessile) and glabrous inflorescences (vs pubescent).

Specimens examined.— Attapeu: near Tad Tayicseua Waterfall 15°05'03.2"N, 106°35'39.7"E, 634 m alt., 20 Feb. 2019, *Souladeth et al.* L2572 (FOF, KAG [KAG128821]). Champasak: Vat Phou, Mt Phou Kao 14°52'27"N, 105°47'27"E, 30 Nov. 1998, *Munzinger 281* (L [L3720553] photo seen, P [P00217367] photo seen).

9. *Strobilanthes speciosa* Blume, Bijdr. Fl. Ned. Ind. 14: 799. 1826. Type: Indonesia, West Java, Megamendung, *Blume 1802* (lectotype L [L0537293] photo seen, designated by Bennett & Scotland (2003)). Figs. 4K–P.

Distribution.— Myanmar, China, Thailand, Laos (Bolaven Plateau, Khammouane, Oudomxay, Vientiane), Cambodia, Vietnam, Malaysia and Indonesia.

Ecology and phenology.— In evergreen hill forest, at 1,211 m alt. Flowering and fruiting in December.

Vernacular name.— Hom tha theng (ໂອມທ່າແຕງ).

Notes.— *Strobilanthes speciosa* is similar to *S. capitata* (Nees) T.Anderson in having capitate inflorescence, but it is distinguished by its leaf blade and inflorescence densely covered with soft whitish hairs (vs glabrous or sparsely hairy) and straight and lanceolate bracts (vs curved and ovate or oblong-elliptic) (Bennett & Scotland, 2003; Hu *et al.*, 2011; Kladwong & Chantaranothai, 2024). The corolla colour of *S. speciosa* was reported to vary from purple, pale purple, pure white, white to bluish lilac (Bennett & Scotland, 2003), while Kladwong & Chantaranothai (2024) reported its colour as purple or white (not bluish to purplish blue) for Thai materials.

Specimens examined.— Sekong: Tatheng, Huay Saiy village, 15°24'16.9"N, 106°22'34.5"E, 1,211 m alt., 22 Dec. 2019, *Souladeth et al.* L3750 (FOF, KAG [KAG156110]).

10. *Strobilanthes cf. torrentium* Benoist. Figs. 5A–C.

Distribution.— Laos (Bolaven Plateau).

Ecology and phenology.— at 1,100 m alt. Flowering and fruiting in November.

Notes.— There is a specimen from the Bolaven Plateau at P (*Poilane 28679*), which we have been unable to examine. It has been identified with doubt as either *S. torrentium* or *S. anamitica* Kuntze. It is included here provisionally until the specimen can be firmly identified or the plant rediscovered.

Specimens examined.— Champasak: Paksong, 1,100 m alt., 27 Nov. 1938, *Poilane 28679* (P [P00218541, P00218553] photo seen).

11. *Strobilanthes* sp. 1. Figs. 5D–E.

Description.— Anisophyllous herbs to 1 m tall. Stems white-pubescent with linear cystoliths. Leaves with petioles 0.2–1.1 cm long, whitish hairy; blades lanceolate, larger of each pair 6.3–13 × 1.9–3.7 cm, the smaller 2.5–8.3 × 1–2.7 cm, apex acuminate or caudate, margin serrate and ciliate,



Figure 5. Unknown species. *Strobilanthes* cf. *torrentium* Benoist: A. herbarium sheet of *Poilane* 28679 (P00218553, <http://coldb.mnhn.fr/catalognumber/mnhn/p/p00218553>), B. lower surface of leaf, C. inflorescences. Reproduced with permission of the Muséum national d'Histoire naturelle. *Strobilanthes* sp. 1: D–E. leafy twig.

Table 1. Distribution of nine *Strobilanthes* species.

Species	India	Bangladesh	Bhutan	China	Myanmar	Thailand	Laos	Cambodia	Vietnam	Malaysia	Singapore	Indonesia
<i>Strobilanthes bolavenensis</i> ^{7,9}							•					
<i>Strobilanthes dalzielii</i> ^{1,6,7,8}				•	•	•	•		•			
<i>Strobilanthes dimorphotricha</i> ^{1,4,6,7}	•	•		•	•	•	•		•			
<i>Strobilanthes echinata</i> ^{1,5,6,7,8}	•		•	•	•	•	•	•	•	•	•	•
<i>Strobilanthes glaucescens</i> ^{1,7,8}	•				•	•	•		•			
<i>Strobilanthes hypomalla</i> ^{1,7,8}							•	•	•			
<i>Strobilanthes paniculata</i> ^{2,3,7,8}					•	•	•			•		•
<i>Strobilanthes pateriformis</i> ^{1,6,7,8}				•		•	•		•			•
<i>Strobilanthes speciosa</i> ^{2,6,7,8}				•	•	•	•	•	•	•		•

¹H6, 2000; ²Bennett & Scotland, 2003; ³Wood *et al.*, 2003; ⁴Wood & Scotland, 2006; ⁵Bennett *et al.*, 2008; ⁶Hu *et al.*, 2011; ⁷Newman *et al.*, 2017 onwards; ⁸POWO, 2025; ⁹Yamazaki *et al.*, 2021.

base cuneate, adaxially green, densely covered with cystoliths, abaxially pale green, both surfaces sparsely covered with white hairs on the veins, the veins prominent abaxially, secondary veins 5–8 pairs. (Figs. 5D–E).

Ecology.— In evergreen hill forests, at ca 1,250 m alt.

Notes.— This species is similar to *Strobilanthes involucrata* Blume distributed in Laos, Vietnam and Indonesia in having ovate to lanceolate leaf blades whose margin is serrate and ciliate, and secondary veins arising at ca 45 degrees from midvein (Bennett & Scotland, 2003; Newman *et al.*, 2017 onwards; POWO, 2025). However, it is insufficient for us to conclude that they are conspecific. Further material with flowers is needed to confirm its identity.

Specimens examined.— Champasak: Paksong, near ban Nong Luang, 15°04'19.26"N, 106°12'38.67"E, 1,248 m alt., 10 Dec. 2018, *Tagane et al.* L1944 (FOF, KAG [KAG128048]).

DISCUSSION

Five species, *Strobilanthes dalzielii*, *S. dimorphotricha*, *S. glaucescens*, *S. pateriformis*, and *S. speciosa*, have been previously recorded from Laos, but all were known from northern or central areas of the country and are newly recorded from the southern area. Moreover, our collections of *S. dalzielii*, *S. dimorphotricha*, and *S. glaucescens* were the second records for the country. Eight species listed here are widespread occurring in more than three countries, while one species, *S. bolavenensis*, is endemic to the Bolaven Plateau. The Plateau appears not to function as a hotspot of endemism in *Strobilanthes*. Only *S. bolavenensis* was assessed as CR according to IUCN criteria due to its narrow distribution range and small number of individuals (Yamazaki *et al.*, 2021), whereas the other species are assessed as Least Concern due to their wide distribution range (e.g. Wood *et al.*, 2003; Kladwong & Chantaranothai, 2024).

Table 1 shows the wider distribution of the *Strobilanthes* species found on the Bolaven Plateau. Zhu (2017) reported that the flora of Laos had the highest affinity at species level with Vietnam 60%, Thailand 42% and Myanmar 40%, and our results

follow this trend. It is notable that the *Strobilanthes* species in the Bolaven Plateau has somewhat high affinity with China but low with Cambodia. This pattern may be explained by the more extensive and organized botanical surveys conducted in China, as well as the presence of hilly and mountainous habitats that *Strobilanthes* primarily prefer. In contrast, field work in Cambodia has been limited (Middleton *et al.*, 2019), and the country lacks substantial mountainous areas suitable for *Strobilanthes* species.

Recently, several species of *Strobilanthes* have been described from Laos and surrounding countries (Souladeth *et al.*, 2017; Wood *et al.*, 2017; Hai *et al.*, 2023; Kladwong & Chantaranothai, 2024), indicating many more species are awaiting discovery and description. To enhance our understanding of *Strobilanthes* in these areas, further field surveys to collect specimens and subsequent taxonomic studies are needed.

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