

***Strobilanthes sherdukpenorum* (Acanthaceae), a new species from the East Himalayas**

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ABSTRACT. A new species, *Strobilanthes sherdukpenorum* D.Borah & J.R.I.Wood, is described from Arunachal Pradesh in the East Himalayas. The new species is illustrated with original photographs and its salient characteristics are indicated. It enjoys a degree of protection because of its presence in the Kameng Protected Area Complex.

Keywords. Arunachal Pradesh, Eaglenest Wildlife Sanctuary, Kameng protected area complex, taxonomy

Introduction

Arunachal Pradesh, the largest state in Northeast India, is exceptional in its forest cover and plant diversity. Settled within two biodiversity hotspots, the Himalayas and Indo-Burma, it boasts the largest expanse of undisturbed forest in the country, making it a critical biodiversity hotspot (Tripathi et al., 2016). The Kameng region, encompassing the districts of East Kameng, West Kameng, and Tawang, supports a diverse range of ecosystems, from tropical evergreen forest to alpine scrub. It includes the Kameng Protected Area Complex (KPAC), a vast network of three protected areas: Eaglenest Wildlife Sanctuary, Sessa Orchid Wildlife Sanctuary and Pakke Tiger Reserve. Together with the Nameri Tiger Reserve and Sonai Rupai Wildlife Sanctuary in Assam, as well as the reserved forests of Papum, Doimara, Amortola, and Shergaon, this landscape forms a contiguous forest expanse of approximately 3,500 km², providing a crucial habitat for diverse wildlife. KPAC shares its western border with Bhutan, its northern border with China, and its southern border with Assam (Sondhi & Kunte, 2016). The region's intricate topography, marked by deep valleys and rugged gullies, fosters diverse microhabitats that drive high plant speciation. Several botanists, including Thomas J. Booth, Frank Kingdon-Ward and K.P. Biswas, have explored this region in the past. More recently, the Botanical Survey of India (BSI) has conducted unpublished floristic studies in the region (Tiwari, 2018). Additionally, numerous scattered accounts of the region's vegetation composition and species discoveries have been published, including works by Sahni & Naithani (1980), Joe et

al. (2017), Bhuyan & Pangu (2020), and Chowlu et al. (2024). These studies highlight the region's exceptional biodiversity and endemism.

The genus *Strobilanthes* Blume is estimated to comprise approximately 160–170 taxa in India, with 78 species recorded in Northeast India (including the species newly described here) (Roy et al., 2023). Among the northeastern states, Arunachal Pradesh and Meghalaya have the highest diversity, each harbouring 44 species (Roy et al., 2023; Wood et al., 2024). A key difference, however, is that whereas the total number of *Strobilanthes* known from Meghalaya is quite stable, new species and records are constantly being reported from Arunachal Pradesh, four new species in the 1990s (Wood, 1994), and this century four new species and several new records (Wood et al., 2019, 2021, 2024; Chowlu et al., 2024). The Kameng region has been particularly productive. The first author has conducted multiple exploratory trips leading to the discovery of several new plant species across different families, including *Strobilanthes* (Wood et al., 2019, 2024). To date, 14 species of *Strobilanthes* have been documented from this region: *S. inflata* T.Anderson, *S. tibetica* J.R.I.Wood, *S. multident* C.B.Clarke, *S. rhombifolia* C.B.Clarke, *S. lamiifolia* (Nees) T.Anderson, *S. oligocephala* T.Anderson ex C.B.Clarke, *S. atropurpurea* Nees, *S. lachenensis* C.B.Clarke, *S. echinata* Nees, *S. gigantea* Chowlu et al., *S. hamiltoniana* (Steud.) Bosser & Heine, *S. helicta* T.Anderson, *S. elongata* C.B.Clarke and the new species described below.

Materials and methods

This paper is based on field collections and observations by the first author. Herbarium collections have been made for the species using standard methodology (Das, 2020), and field photographs were taken using a LUMIX G90 digital camera. The collection permit was obtained from the Department of Environment, Forests and Climate Change, Government of Arunachal Pradesh. Identification has relied on the examination of herbarium specimens in ASSAM, CAL and K, photographs of diverse species received over many years by J.R.I. Wood and studies of the literature cited in the list of references.

Taxonomy

***Strobilanthes sherdukpenorum* D.Borah & J.R.I.Wood, sp. nov.**

This species shows affinities with various species and species groups in *Strobilanthes* without clearly belonging to any. It is a vigorous subshrub up to 5 m in height showing similarity to both *Strobilanthes mastersii* T.Anderson and *S. tenax* Dunn in the much branched inflorescence, equally lobed calyx and gently curved corolla but easily distinguished from both by the distinct pubescent exterior of the corolla and the shortly exerted anthers of the longer pair of stamens, a character it shares with *S. medogensis* (H.W.Li) J.R.I.Wood & Y.F.Deng. The inflorescence is compound, composed of erect

spikes, the flowers essentially opposite and well-separated, so differing from species of the *Semnostachya* group sensu Wood et al. (2024). Other notable features are the erect (not incurved) anthers of the shorter stamens, so differing from *S. paniculiformis* J.R.I. Wood, and the pubescent ovary and capsule. – TYPE: India, Arunachal Pradesh, West Kameng District, near Khellong, Eaglenest Wildlife Sanctuary, c. 1000 m, 3 November 2024, *D. Borah 6915* (holotype CAL; isotype ASSAM). (Figs 1–3)

Robust, much-branched perennial subshrub forming a rounded bush up to 5 m high (Fig. 2B); stems erect, virgate, dark green, terete when young, sulcate, 1–4 grooved, nodes swollen. **Leaves** petiolate; one in each pair caducous, petioles $2\text{--}6 \times c. 0.1$ cm, green, glabrous, terete; blades $13.5\text{--}17 \times 5.3\text{--}6.8$ cm, lanceolate, apex acute to attenuate, base attenuate to cuneate, margin entire to denticulate, adaxial surface green to dark green, puberulous, abaxial surface pale green, glabrous; midrib distinct, impressed adaxially and raised abaxially, venation pinnate, lateral veins 5–10 pairs. **Inflorescence** spicate, spikes 6–25 cm long, axillary as well as terminal; rachis glandular-pubescent, floral bracts persistent, $5\text{--}6 \times c. 2$ mm, lanceolate, apex acute, base rounded, margin entire, abaxially pubescent with glandular white hairs, adaxially pale green, glabrous; bracteoles $3\text{--}4 \times c. 1$ mm, linear, abaxially pubescent with white glandular hairs, adaxially pale green. **Flowers** opposite or, by abortion, alternate, 3–25 mm apart; *calyx* persistent, deeply 5-partite, lobes $6\text{--}10 \times c. 2$ mm, accrescent to 13 mm long in fruit, equal, linear, apex acute, abaxially greenish-brown, pubescent with white and yellow glandular hairs, adaxially pale white, glabrous; *corolla* 2.5–4 cm long, funnel-shaped, maroon, outside pubescent with white hairs, inside glabrous except for the hairs retaining the style, slender basal tube 1.4–2 cm long, almost white but becoming maroon upwards, gently bent 90° , expanded portion of the tube 1.5–2 cm long, mouth 1–1.2 cm wide, lobes $c. 5 \times 5$ mm, ovate, obtuse; *fertile stamens* 4, didynamous, longer filaments 2–2.2 cm long, violet, villous with long hairs, becoming glabrous upwards, the anthers shortly exserted, shorter filaments 1–1.5 cm long, included, villous with long white hairs, becoming glabrous upwards, anthers $2\text{--}3 \times c. 1$ mm, erect, oblong, glabrous; *style* filiform, $c. 3.3$ cm long, white, glabrous; *stigma* subulate; *ovary* cylindrical, $c. 3.5 \times 1$ cm, glandular-pubescent. **Capsules** $1.7\text{--}2.5 \times 0.4\text{--}0.5$ cm, oblanceolate in outline, apex acute to obtuse, outer surface glossy with dark brown apex, densely pubescent with white glandular hairs; *seeds* usually 4, $2\text{--}4 \times 3\text{--}4$ mm, brown, compressed, ovate, rounded, the base slightly cordate, densely tomentose with mucilaginous hairs except for the conspicuous areole.

Distribution. The new species was collected from Eaglenest Wildlife Sanctuary, which lies in KPAC (Fig. 1). The area falls within the Eastern Himalayan tropical evergreen forest ecoregion, which is characterised by extensive tracts of undisturbed forest and rugged terrain. It is, however, noted for its birdlife and has been designated an Important Bird Area (IBA IN344) by Birdlife International. It is also home to a wide range of rare fauna and flora.



Fig. 1. Map of Northeast India showing the type locality (red star) of *Strobilanthes sherdukpenorum*.

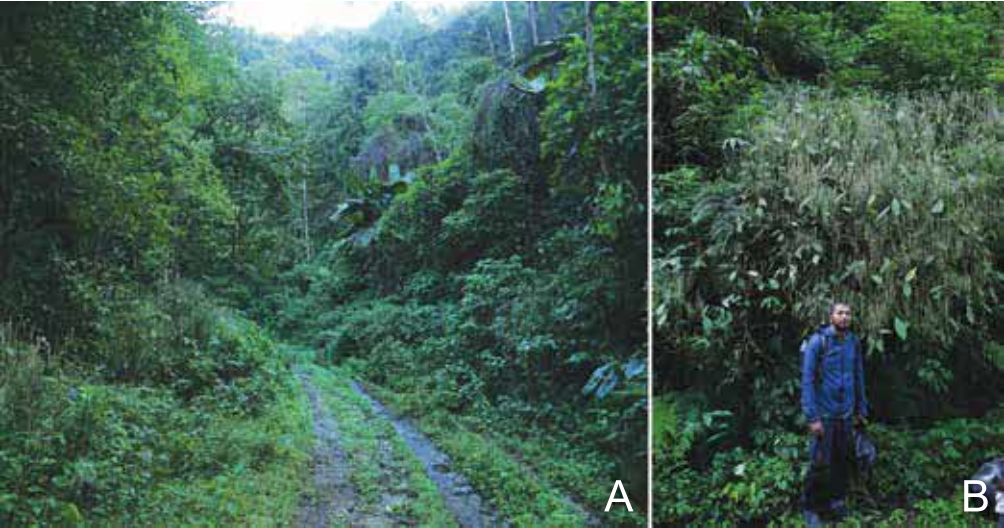


Fig. 2. *Strobilanthes sherdukpenorum* D.Borah & J.R.I.Wood. **A.** Habitat with access road. **B.** Habit. (Photos: A, D. Borah; B, A. Thapa)

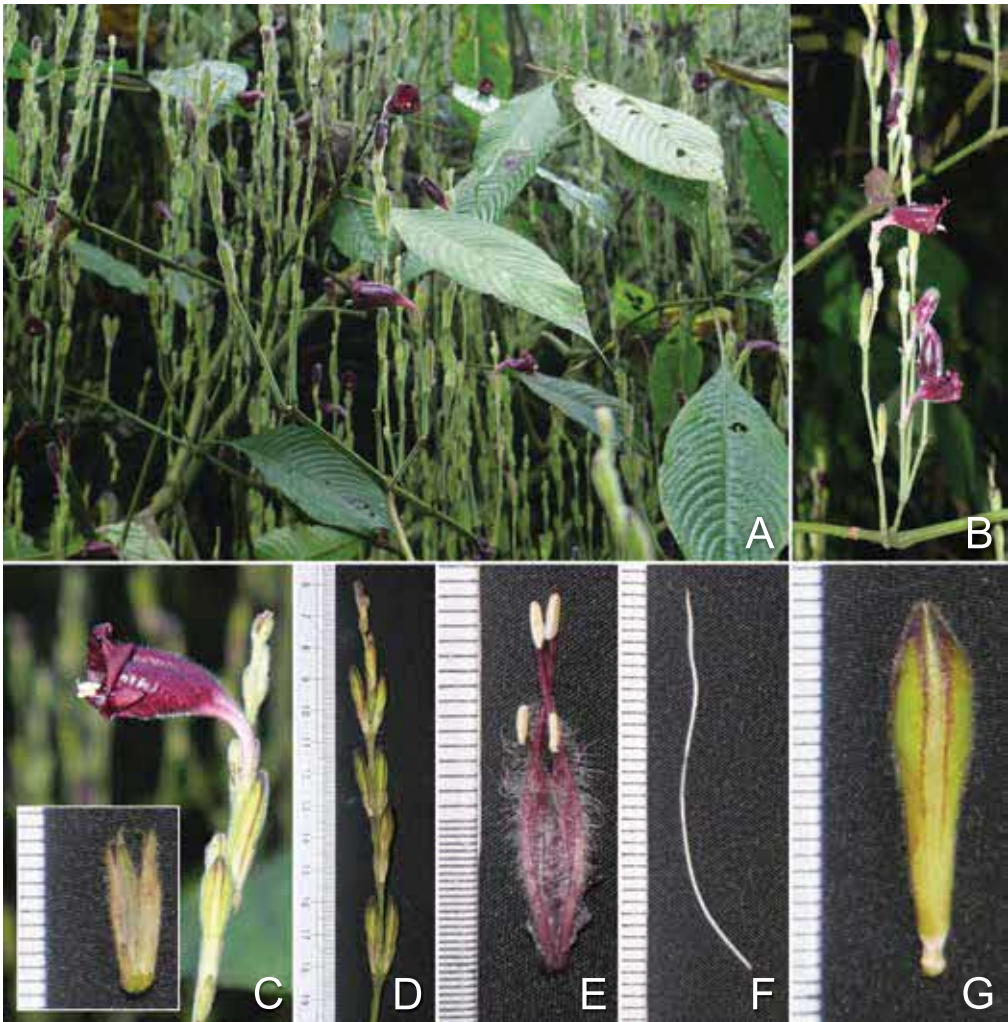


Fig. 3. *Strobilanthes sherdukpenorum* D.Borah & J.R.I.Wood. **A.** Plant showing inflorescence and leaves. **B.** Flower spikes. **C.** Corolla showing indumentum and exerted stamens (inset: close-up of calyx). **D.** Flower spike showing opposite flowers. **E.** Androecium showing erect anthers and villous filaments. **F.** Style. **G.** Capsule. (Photos: D. Borah)

Habitat and ecology. The new species was found growing along the roadside on the way to Bompou Camp from Doimara village passing Khellong (Fig. 2). The species was found growing in both shaded and semi-shaded conditions near this access road. It was also found in more open areas on the opposite side of the road, where the terrain drops off in a steep cliff. A substantial number of individuals was observed with at least 50–60 plants scattered along a 5 km stretch of the road, and many more were seen high up in the forest, hidden by the dense canopy shade. In the immediate vicinity of the new species, species of Urticaceae (*Elatostemma* sp., *Laportea* sp., *Boehmeria* sp.) and *Musa* were noteworthy, as well as *Impatiens arguta* Hook.f. & Thomson and species of *Henckelia* and *Begonia*.

Etymology. The specific epithet refers to the Sherdukpen people who were the original inhabitants of the land but left it to nature and wildlife. It was here where the species was collected and thrives. The Sherdukpen people still visit some parts of the area for religious purposes but cause no destruction or make any attempt to reclaim any part of the site from nature. Their name for the species is “Sein-banlo”.

Provisional IUCN conservation assessment. Only preliminary observations of the populations of *Strobilanthes sherdukpenorum* have been made and until more extensive studies of the extent of the populations have been carried out, this species can only be treated as Data Deficient (DD). The Eaglenest Wildlife Sanctuary is legally protected under the Wildlife Protection Act, 1972. The sanctuary is also physically protected from timber and animal poaching by its isolation, the absence of settlements in the reserve and the poor quality of the one-lane access road leading to it (Fig. 2A). It is administered by the Indian Forest Service, and it is hoped the Sherdukpen people might in the future participate in the conservation of this species and their ancient lands.

Notes. Although this species is not clearly anisophyllous, it is remarkable that one leaf in each pair is caducous, suggesting a tendency towards anisophylly. The range in corolla size is also noteworthy, suggesting that corolla size should only be used with caution as a diagnostic characteristic in *Strobilanthes*.

Other species. Various species of *Strobilanthes* are found in or near the type location; *Strobilanthes gigantea* grows nearby and slightly further away grow *S. echinata* and *S. elongata* and, at a higher altitude, *S. helicta*. To facilitate identification of *Strobilanthes* in the West Kameng District, a key to the species of *Strobilanthes* occurring in the district is provided below.

Key to the species of *Strobilanthes* in West Kameng District

- 1a. Inflorescence an open panicle; corolla straight, glabrous, often pendulous; bracts inconspicuous *S. hamiltoniana*
- 1b. Inflorescence subcapitate, spicate or of axillary flowers; corolla often bent, pubescent, rarely pendulous; bracts conspicuous or not 2
- 2a. Corolla ventricose, often strongly so; inflorescence of 1-sided axillary racemes or reduced to single flowers in the leaf axils 3
- 2b. Corolla not obviously ventricose; inflorescence capitate or spicate or not clearly structured, never in 1-sided racemes or reduced to axillary flowers 6
- 3a. Corolla glabrous on the exterior 4
- 3b. Corolla pubescent on the exterior 5

- 4a. Calyx lobes finely acuminate; corolla very strongly ventricose; bracts linear; inflorescence always of 1-sided spikes *S. helicta*
- 4b. Calyx lobes obtuse; corolla weakly ventricose; bracts foliose; inflorescence (in East Himalayas) usually reduced to axillary flowers *S. atropurpurea*
- 5a. Leaves and stems $\pm$ glabrous; rachis winged; leaves shortly acuminate *S. tibetica*
- 5b. Leaves and stems usually densely pilose; rachis unwinged; leaves caudate *S. inflata*
- 6a. Bracts large (c. 2 cm long), ovate or elliptic, conspicuous, persistent; large shrub or small tree 7
- 6b. Bracts small, inconspicuous, variously shaped, caducous or persistent; plants of varying habit 8
- 7a. Inflorescence subcapitate, arising on small leafy shoots, outer bracts sterile *S. echinata*
- 7b. Inflorescence elongate, spicate, bracts all fertile *S. gigantea*
- 8a. Flowers in elongate spikes; bracts persistent; anthers of shorter stamens oblong, erect 9
- 8b. Flowers capitellate or in heads at the branch tips, sometimes with flowers below; bracts deciduous at anthesis; anthers of shorter stamens elliptical, incurved 11
- 9a. Corolla glabrous; flowers imbricate *S. elongata*
- 9b. Corolla pubescent; flowers separated, although sometimes in opposite pairs 10
- 10a. Anthers exserted; corolla maroon; filaments villous *S. sherdukpenorum*
- 10b. Anthers included; corolla blue; filaments glabrous except at base *S. lachenensis*
- 11a. Corolla glabrous on the exterior; bracts sticky-glandular-pubescent ... *S. multident*
- 11b. Corolla pubescent on the exterior, at least in bud; bracts pubescent or glandular-pubescent but never sticky 12
- 12a. Flowers in dense terminal heads; bracts relatively persistent *S. lamiifolia*
- 12b. Flowers capitellate, commonly with other flowers on the peduncle below; bracts early caducous 13
- 13a. Leaves long-acuminate, falcate, discolorous; inflorescence from uppermost leaf axils only *S. oligocephala*
- 13b. Leaves rhomboid, acute or obtuse, green on both surfaces; inflorescence from middle and upper leaf axils *S. rhombifolia*

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References

- Bhuyan, L.R. & Pangu, Y. (2020). Preliminary report on the forest flora of East Kameng district, Arunachal Pradesh. *Bull. Arunachal For. Res.* 35(1&2): 29–43.
- Chowlu, K., Maity, R., Ray, A., Kabeer, K.A.A. & Dash, S.S. (2024). A new species, *Strobilanthes gigantea* (Acanthaceae), from India. *Nord. J. Bot.*: e04621.
- Das, A.P. (2020). Herbarium Techniques. In: Bhandari, J.B. & Gurung, C. (eds), *Instrumentations Manual in Biology*, pp. 78–94. New Delhi: Narosa Publishing House Pvt. Ltd.
- Joe, A., Jayakrishnan, T., Hareesh, V.S. & Sabu, M. (2017). *Zingiber arunachalensis* (Zingiberaceae): A new species from northeastern India. *Phytotaxa* 309(1): 95–98.
- Roy, D.K., Lytan, B., Sarma, J. & Odyuo, N. (2023). An annotated account of the genus *Strobilanthes* Blume (Acanthaceae) in Northeastern India. In: Sarma, J. & Roy, D.K. (eds), *Protected Areas in Indian Eastern Himalayan Region: Floristic Diversity and Conservation Strategy*, pp. 376–411. Guwahati: Assam Science and Technology Council, Guwahati.
- Sahni, K.C. & Naithanii, H.B. (1980). *Lithocarpus kamengii*, a new species from Arunachal Pradesh. *Indian Forester* 106(6): 441–443.
- Sondhi, S. & Kunte, K. (2016). Butterflies (Lepidoptera) of the Kameng Protected Area Complex, western Arunachal Pradesh, India. *J. Threat. Taxa* 8(8): 9053–9124.
- Tiwari, U.L. (2018). Additions to the flora of Arunachal Pradesh State, India. *J. Threat. Taxa* 11(8): 14075–14079.
- Tripathi, S.K., Roy, A., Kushwaha, D., Lalnunmawia, F., Lalnundanga, Lalraminghlova, H., Lalnunzira, C. & Roy, P.S. (2016). Perspectives of forest biodiversity conservation in Northeast India. *J. Biodivers. Bioprospect. Developm.* 3(2): 1–9.
- Wood, J.R.I. (1994). Notes relating to the Flora of Bhutan: Acanthaceae with special reference to *Strobilanthes*. *Edinburgh J. Bot.* 51(2): 175–273.
- Wood, J.R.I., Borah, D., Yama, L. & Mipun, P. (2019). *Strobilanthes twangensis* (Acanthaceae), a new species from the East Himalayas. *Kew Bull.* 74: 41.
- Wood, J.R.I., Borah, D. & Taram, M. (2021). The rediscovery of *Strobilanthes tubiflos* (Acanthaceae) in north east India. *Kew Bull.* 76: 333–338.
- Wood, J.R.I., Borah, D., Gammi, L., Taram, M. & Thungon, L.T. (2024). New records and a new species of *Strobilanthes* (Acanthaceae) from Arunachal Pradesh, East Himalayas. *Gard. Bull. Singapore* 76(2): 293–301.