

NORDIC JOURNAL OF BOTANY

Research article

Henckelia davidwoodii (Gesneriaceae), a new species from Indian eastern Himalayas

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Nordic Journal of Botany

2024: e04662

doi: [10.1111/njb.04662](https://doi.org/10.1111/njb.04662)

Subject Editor: Harsh Singh

Editor-in-Chief: Torbjörn Tyler

Accepted 01 November 2024

Published 9 December 2024

Henckelia davidwoodii (Gesneriaceae) is described here as a new species based on collections made from the Shi-Yomi district in the eastern Himalayan state of Arunachal Pradesh, India. This new species resembles *H. lallanii* Taram, D.Borah, Tag and R.Kr. Singh in its habit, infundibuliform corolla without flaps or flanges, and stamens with slightly geniculate filaments, but it can be differentiated by having 2-flowered cymes (versus solitary in *H. lallanii*), ovate bracts with undulate margins (versus narrowly ovate-lanceolate bracts with entire margins in *H. lallanii*), non-reflexed 5-veined calyx lobes (versus reflexed calyx lobes without veins in *H. lallanii*), and a cupular disc (versus tubular in *H. lallanii*). It also superficially resembles *H. urticifolia* (Buch.-Ham. ex D.Don) A.Dietr., however, it can be differentiated by its distinct sessile to sub-sessile bracts with undulate margins and a round to cordate base, often recurved at the base and overlapping to form a conical to cupulate structure, and stamens that are slightly geniculate (versus bracts with serrate margins and cuneate bases, never forming the aforementioned structures; stamens distinctly geniculate in *H. urticifolia*). A detailed taxonomic description is provided for this new species, accompanied by photographs and ecological information.

Keywords: *Henckelia*, Indian flora, Indian Himalayan Region (IHR), northeast India, taxonomy

Introduction

Henckelia Spreng. is one of the most diverse genera in the family Gesneriaceae, inhabiting moist, shady, and damp locations in mid-elevational tropical to temperate forests. Accounted with about 77 species, this genus is found across Sri Lanka, southern and northeastern India, Nepal, Bhutan, southern China, northern Vietnam, northern Laos, and northern Thailand (GRC 2024, continuously updated). Though synonymized under *Didymocarpus* Wall. (Gesneriaceae) for a long time, it has been resurrected as a distinct genus and finally Weber et al. (2011) remodeled the genus based on molecular data. The newly circumscribed *Henckelia* is characterized by the presence of a chiritoid stigma and orthocarpic or plagiocarpic capsules. It is the largest genus of Gesneriaceae



in India, with 42 species documented to date (Moller et al. 2017, GRC 2024, continuously updated). Of these, 25 species occur in northeastern India (Sinha and Datta 2016, Krishna and Lakshminarasimhan 2018, Borah et al. 2019, Kanthraj et al. 2020, 2023, Nampy et al. 2021, Taram et al. 2020, 2021, 2022, 2024, Maity et al. 2024, Taram and Borah 2024), and 16 species are found in southern India (Janeesha and Nampy 2020, Mathew et al. 2022).

Arunachal Pradesh, often referred to as the 'cradle of flowering plants,' is renowned for its rich botanical diversity. The state is home to over 5000 species of flowering plants, making it one of the most biodiverse regions in India. Its varied habitats, ranging from tropical forests to alpine meadows, support a vast array of endemic and rare species, many of which have yet to be explored. The genus *Henckelia* flourishes well in the diverse terrains of the state, boasting 20 species, of which five have been recently described as new for science, and four have been reported for the first time for the country (Krishna and Lakshminarasimhan 2018, Borah et al. 2019, Kanthraj et al. 2020, Taram et al. 2020, 2021, 2022, 2024, Taram and Borah 2024).

This species newly described here adds another count to the diversity of *Henckelia* for the Indian flora as well as in the plant diversity of Indian Himalayan Region (IHR) which is considered as one of the diversity centres for this genus.

Material and methods

While conducting routine botanical explorations for collection of members of Gesneriaceae in Arunachal Pradesh we encountered an interesting specimen of *Henckelia*. After comparison with all the species found in India and neighboring regions using relevant literature (Wood 1974, Wang et al. 1998, Ranasinghe et al. 2016, Sinha and Datta 2016, Krishna and Lakshminarasimhan 2018, Borah et al. 2019, Sirimongkol 2020, Kanthraj et al. 2020, 2023, Taram et al. 2020, 2021, 2022, 2024, Nampy et al. 2021, Maity et al. 2024, Taram and Borah 2024), we found it to be an undescribed species. Herbarium specimens were prepared following standard methods (Jain and Rao 1977) and will be deposited in CAL and ASSAM. Morphological observation and measurement of floral parts were carried out from fresh samples using a stereo microscope and photographed using a digital camera. Acronyms of herbaria used in this article follow the index herbariorum.

Taxonomic treatment

Henckelia davidwoodii D.Borah, Taram and R.Maity, sp. nov. (Fig. 1–2)

A species closely allied to *H. lallanii* by having similar habit, infundibuliform corolla without any flaps or flanges, and stamens with slightly geniculated filaments, but differentiated by having 2-flowered cymes (versus solitary

in *H. lallanii*), ovate bracts with undulate margin often forming a cupulate structure at base (versus narrowly ovate-lanceolate bracts with free base never forming any such structure), non-reflexed 5-veined calyx lobes (versus reflexed and without any veins), pink to purplish corolla (versus reddish-orange) and a cupular disc (versus tubular). It is also closely allied with *H. urticifolia*, but can be differentiated based on its bracts with undulate margin and cordate base, often recurved at base and sometimes joined to form a cupulate or conical shaped structure; stamens with indistinct white or slight pink-purplish geniculation (versus bracts with serrate margin and cuneate base, never forming aforementioned structures; stamens with distinct yellow geniculation in *H. urticifolia*) (Table 1).

Type: India, Arunachal Pradesh: Shi-yomi District, Tato, 28°31'49"N, 94°23'30"E, 1487 m a.s.l., 3 Aug. 2022, M. Taram and D. Borah 9722 (holotype: CAL, isotype: ASSAM).

Etymology

The species is named after David Wood, a renowned plant taxonomist, from United Kingdom, for his significant contribution to taxonomic studies on the genus *Henckelia*, formerly known as *Chirita*.

Description

Caulescent, erect to decumbent herbs, 45–100 cm tall; stems terete, 7 mm in diameter, tomentose. Leaves simple, opposite, petiolate; petiole 2–6 cm long, tomentose; lamina ovate to ovate-elliptic, 5.5–12 × 3–8 cm, rugulose, obliquely rounded to obliquely cordate at base, with serrate ciliolate margin, broadly acute to obtuse at apex, adaxially uniformly sparsely puberulent, abaxially densely pubescent on lamina and tomentose on veins; venation unicostate, reticulate with lateral veins in 5–7-pairs, depressed adaxially, raised abaxially. Inflorescence an axillary, 2-flowered cyme, 1 opening at a time; peduncle 5–10 mm long, tomentose; bracts sessile to very shortly stipitate, subopposite, 1 per flower, ovate, 1.2–1.6 × 1.1–1.5 cm, pale green, pubescent, with undulate margin, recurved, sometimes variously lobed, acute at apex, cordate at base, often recurved and jointed forming a conical to cupulate structure; pedicels 0.5–2.0 cm long, pubescent. Calyx campanulate, 3.0–3.5 cm long, pale green to reddish green, sparsely short-pubescent outside, glabrous inside; tube 1.8–2.0 cm, with 5 ribs continuing as mid-veins of lobes; lobes lanceolate to narrowly triangular, 1.2–1.7 cm long, acute to acuminate at apex. Corolla infundibuliform, shortly eglandular-pubescent outside and glandular-pubescent inside, pink to purplish-lilac, pale whitish towards base; tube 4–5 cm × 0.7–0.9 cm, with a single inward fold on floor with two yellow lines beside that throughout the throat till the attachment of stamens, then spreading near the staminal zone and fading towards base; dark purple and white lines alternating throughout both the sides of yellow lines on inside of tube on the lower floor with dark purple coloration throughout the sides and upper floor fading to white towards base; upper lip bilobed with lobes 9 × 6 mm; lower lip 3-lobed, 12 ×

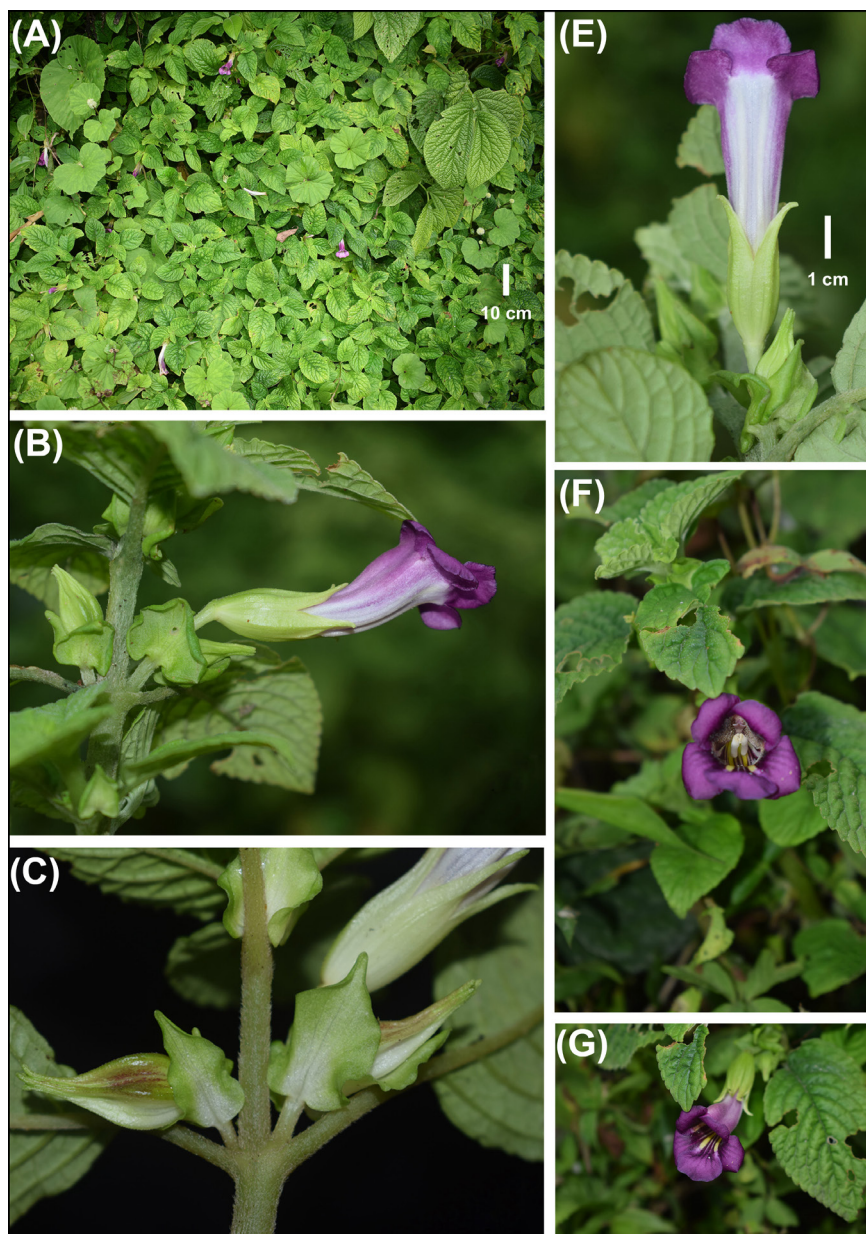


Figure 1. *Henckelia davidwoodii* sp. nov. (Gesneriaceae) from Arunachal Pradesh, India. (A) Habit and habitat, (B)–(C) flowers showing conical to cupular bracts, (E)–(G) different views of the flower. Photos by Dipankar Borah.

8 mm; all lobes rounded at apex, glabrous. Stamens 2; filaments 1.3–1.6 cm long, white, mostly glabrous, glandular-hairy towards apex, inserted 1.8–2.2 cm above the base of the corolla, slightly geniculate; geniculation white to pink or purple-tinged. Anthers cohering face-to-face, 2–3 mm across. Staminodes 3, central one minute, 3 mm long, lateral ones 2, 7–9 mm long, glabrous to densely pubescent; antherodes 1 mm long. Disk cupular, ca 2 mm deep, with undulate margin, 5-lobed, creamy yellow. Gynoecium 3.5–4.2 cm long; ovary cylindrical, 1.2–1.5 cm long, pale green, glabrescent, gradually passing into style; style 1.8–2.0 cm long, pubescent, greenish white to purplish green; stigma chiritoid, its lower lobe bilobed, 0.5–0.6 × 0.3 cm, pubescent, green.

Phenology

Henckelia davidwoodii was observed flowering and fruiting from July to November.

Distribution and ecology

Henckelia davidwoodii is found near streamsides in two localities of Shi-Yomi district, Arunachal Pradesh India at an elevation of 1400–1500 m a.s.l. It grows on the forest floor in association with *Impatiens latifolia*, *Elatostema sessile* J.R.Forst. and G.Forst. (Urticaceae), *Pilea* sp. (Urticaceae), *Hydrocotyle himalaica* P.K.Mukh. (Apiaceae), *Pseudodissochaeta assamica* (C.B.Clarke) Nayar (Melastomataceae), *Begonia* sp. (Begoniaceae), *Musa* sp. (Musaceae), *Cyathea* sp.

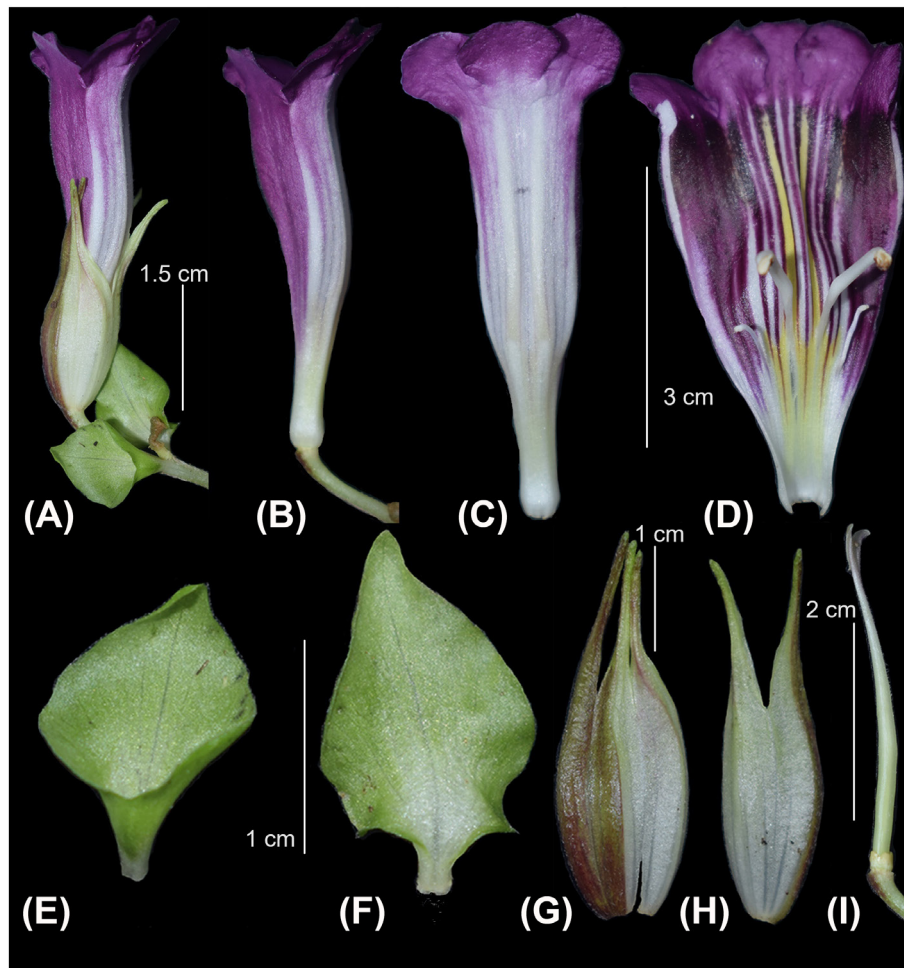


Figure 2. *Henckelia davidwoodii* sp. nov. (Gesneriaceae) from Arunachal Pradesh, India. (A) side view of a flower with calyx and bracts intact, (B)–(C) side view and back view of a flower with calyx and bracts removed, (D) dissected corolla showing stamens and staminodes, (E)–(F) bracts, (G)–(H) calyx lobes, (I) pistil. Photos by Dipankar Borah.

Table 1. Comparison of morphological characters between *Henckelia davidwoodii*, *H. urticifolia*, *H. umbellata* and *H. lallanii*.

Characters	<i>H. davidwoodii</i>	<i>H. urticifolia</i> (Wood 1974)	<i>H. umbellata</i> (Kanthraj et al. 2020)	<i>H. lallanii</i> (Taram et al. 2021)
Inflorescence	2-flowered cyme	2-3-flowered cyme	4-6 flowered umbel like cyme	1-flowered cyme
Bracts	ovate, with undulate margins and cordate base often joint to form a cupular structure, short pubescent, not concealing flower buds	elliptic to ovate, with serrate margins, base free, never forms any cupular structure, pubescent, not concealing flower buds	orbicular to elliptic oblong, pilose, concealing flower buds	narrowly ovate-lanceolate, puberulent or glabrescent, not concealing flower buds
Calyx	campanulate; calyx lobes not reflexed; calyx lobes with prominent midveins	campanulate; calyx lobes reflexed; veins in lobes absent	campanulate or tubular; calyx lobes not reflexed; mid veins in lobes absent	campanulate; calyx lobes reflexed; mid veins in lobes absent
Corolla	pink to purple, eglandular pubescent outside, glandular pubescent inside, flanges absent	pink to purple, pilose to hispid outside flanges absent	white to purple or yellow, flanges absent	reddish orange, flanges absent
Stamens	slightly geniculate, geniculation white to pinkish-purplish tinge	strongly geniculate, geniculation yellow	strongly geniculate, geniculation yellow	slightly geniculate, geniculation white
Disk	less than 3 mm	less than 3 mm	ca 7 mm high	ca 5 mm high

(Cyatheaaceae), *Amomum* sp. (Zingiberaceae), *Mollineria* sp. (Hypoxidaceae).

Conservation status

Henckelia davidwoodii is only known from its type localities in Shi-Yomi district of Arunachal Pradesh. We observed this species with around 89 mature individuals only, cumulatively at two localities near streamsides, not more than 2 km from each other. Hence, when the known distribution localities were plotted using web tool GeoCat (available at <https://geocat.kew.org>). Area of Occupancy (AOO) were analyzed by using the same online platform BETA version (Bachman et al. 2011); the AOO is calculated less than 4 km² (AOO based on a grid size of 2 × 2 km²) during the present study. Therefore, both can be considered as two sub-populations of a single population of this species. This newly described species faces threat due to continuous degradation of the known habitat because of heavy anthropogenic activities such as road expansion. The AOO, the numbers of known locations as per population 1) and continuous decline in habitat quality meet the threshold of the 'Critically Endangered' category under criterion B (B2abiii) of IUCN as per guidelines (IUCN 2024). Therefore, this newly described species has been assigned to the 'Critically Endangered' (CR) category based on the IUCN criteria B [B2abiii] (IUCN 2024).

Notes

Henckelia davidwoodii falls within the *H. urticifolia* complex. Two new species, viz., *H. umbellata* Kanthraj and K. Narayanan (Kanthraj et al. 2020) and *H. lallanii* Taram, D. Borah, Tag and R. Kr. Singh (Taram et al. 2021) were described from the region in recent past. Whereas *H. umbellata* can be differentiated from all the other aforementioned species by its umbel like cyme, and large bracts with distinct parallel convergent veins, enclosing pedicel and flower buds, *H. lallanii* can be differentiated from these species by its solitary inflorescence and characteristic reddish-orange corolla. *Henckelia urticifolia* differs from all the above by absence of such character combinations but presence of 1–3-flowered cyme, densely pilose to hispid calyx with reflexed lobes, similar hairy pinkish purple corolla with two raised yellow flanges, yellow-orange inner tube and distinctly geniculate stamens. The newly discovered *H. davidwoodii* differs from all its congeners by presence of single-bracteate flowers, triangular bracts with undulate margin and sometimes overlapped from base forming conical to cupular structures (Table 1).

Acknowledgements – The authors express their gratitude to Ojar Taku for his assistance in field collection. RM is thankful to Botanical Survey of India, Ministry of Environment, Forest & Climate Change, Government of India for their support in herbarium verification.

Funding – The work is supported by Elvin McDonald Research Endowment Fund 2023 grant, Gesneriad Society.

Author contributions

Dipankar Borah: Conceptualization (equal); Data curation (equal); Formal analysis (equal); Funding acquisition (equal); Investigation (equal); Methodology (equal); Project administration (equal); Resources (equal); Writing - original draft (equal); Writing - review and editing (equal). **Momang Taram:** Conceptualization (equal); Data curation (equal); Formal analysis (equal); Investigation (equal); Methodology (equal); Resources (equal); Visualization (equal); Writing - original draft (equal). **Rohan Maity:** Formal analysis (equal); Writing - review and editing (equal).

Data availability statement

This article has no additional data.

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