

RESEARCH PAPER

Two new species of *Henckelia* (Gesneriaceae) from the Eastern Himalayan state Arunachal Pradesh, India

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Funding information

Board of Research in Nuclear Sciences; Department of Atomic Energy, Government of India

Abstract

Two new species of *Henckelia* from the Eastern Himalayan state Arunachal Pradesh, India, are described and illustrated. The first, *Henckelia dasii* Taram, D.Borah, R.Kr.Singh & Tag is allied to *H. umbellata* Kanthraj & K.N.Nair, the second, *H. lallanii* Taram, D.Borah, Tag & R.Kr.Singh is close to *H. urticifolia* (Buch.-Ham. ex D.Don) A.Dietr. (type species of the former *Chirita* sect. *Chirita*). The differences are given in Table 1 and 2, respectively. A key is presented for the 21 *Henckelia* species presently known from N and NE India.

KEYWORDS

Kurung Kumey district, Lower Subansiri district, new species, northeast India

1 | INTRODUCTION

The genus *Henckelia* Spreng. (Gesneriaceae), in the sense of Weber et al. (2011), presently includes about 73 species, distributed from China and N India to S India and Sri Lanka and from W India to Vietnam. In India, it is represented by 37 species, of which 21 species occur in western, eastern Himalaya and northeast India, and 16 species in the Western Ghats.

During the authors' work on the floristic diversity of the Eastern Himalayan state Arunachal Pradesh, India, specimens of two *Henckelia* species were collected in the Lower Subansiri and Kurung Kumey districts (Figure 1), that proved new on closer inspection. They are formally described here as new species.

2 | MATERIAL AND METHODS

Specimens of the two new species of *Henckelia* were collected during plant collection trips to Arunachal Pradesh from 2017 to 2019. Type specimens were deposited at ARUN and ASSAM. For comparison, material was studied from ARUN, ASSAM, BM, CAL, E, G, K, L, MH, P and PE. The number of mature individuals

found in the type locality was recorded for both species for assessment of the conservation status.

3 | TAXONOMIC TREATMENT

1. *Henckelia dasii* Taram, D.Borah, R.Kr.Singh & Tag, *sp. nov.* (Figure 2)

Type: India, Arunachal Pradesh, Lower Subansiri district, Ziro Valley, 27° 29' 04.7" N 93° 49' 47.5" E, 1950 m, 22 August 2018, *M. Taram 31878* (holotype ASSAM; isotypes ARUN).

Diagnosis: The species is different from all other species of *Henckelia* by its urceolate calyx, with the lobes fused up to more than 3/4 of its length and small calyx lobes. It is superficially similar to *H. umbellata* Kanthraj & K.N.Nair (Figure 3) in having large, broadly ovate bracts enclosing the flower buds and pedicels, but can be easily distinguished by the eglandular leaves, shorter peduncles, shorter pedicels, smaller urceolate calyx, fused up to more than 3/4 of its length, corolla smaller, white with light pinkish tinge, glabrous, eglandular, stamens glabrous, eglandular, shorter, staminodes shorter, glabrous, ovary smaller, style eglandular, disc annular, shorter. For details see Table 1.

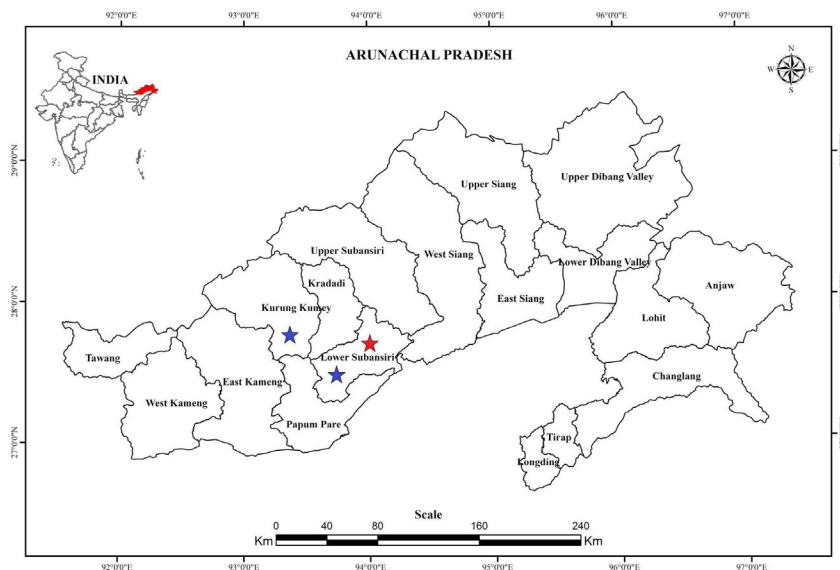


FIGURE 1 Map showing the collection site of *Henckelia dasii* (red) and *Henckelia lallanii* (blue) in Arunachal Pradesh, India

Perennial erect herbs, caulescent, 40–150 cm tall. Stem terete, unbranched, green, pubescent when young, later glabrescent. Leaves opposite decussate, elliptic-ovate, 8–25 × 4–11 cm, apex acute, base rounded or slightly oblique, margins crenate-dentate, adaxially dark green, abaxially light green, adaxially puberulent, abaxially pubescent along veins; mid vein depressed adaxially, prominent abaxially; lateral veins 8–14 pairs, subopposite, depressed adaxially, raised abaxially; petioles terete, 2–6.5 cm long, slightly bulged at base, pubescent-glabrescent. Inflorescences axillary, 1–5 flowered cymes; peduncles 1–2.5 cm long, light green, pubescent; pedicels 0.3–0.8 cm long, enclosed within the bracts, light green, puberulent; bracts 2, free, opposite, green, orbicular-broadly ovate, 1.2–2.5 × 1–2.5 cm, concealing the flower buds, apex acute, margins subentire-serrate, pubescent-glabrescent, veins prominent. Calyx urceolate, 1.7–2.3 cm long, fused up to more than 3/4 of its length, white, puberulent outside, glabrous inside, 5-lobed; tube 1.4–1.7 cm long; lobes unequal, ovate-triangular, 0.2–0.6 cm long, apex acute, margins entire. Corolla funnel shaped, 4–5 cm long, white with light pinkish tinge and with two yellow flanges from centre of the tube to the lower lip, glabrous on both sides, distinctly 2-lipped, lips divergent; tube 3–4 cm long, bulged at basal part, constricted in middle, widening towards apex; upper lip 2-lobed; lobes equal, sub-orbicular, 0.6–1.1 × 0.7–1.2 cm, apex rounded, margins entire; lower lip 3-lobed; lobes subequal, broadly ovate, 0.8–1.3 × 0.5–0.8 cm, apex obtuse, margins entire. Stamens 2, inserted 1.8–2 cm above from the corolla base; filaments 0.6–0.9 cm long, white, glabrous, geniculate; anthers 0.1–0.2 × 0.2–0.3 cm, cohering face to face, dark purple; staminodes 2, on either side of the stamens, inserted 1.6–1.8 cm above from the corolla base,

divergent; filaments 0.5–0.7 cm long, curved, glabrous; antherodes c. 0.1 cm across, white. Pistil 2.8–3.2 × 0.2–0.3 cm, glabrescent or glabrous; ovary 1.4–1.6 cm long, pale white or creamy; style 1.2–1.3 cm long, pale white; stigma flabellate, 0.2–0.3 cm long. Disc annular, 0.1–0.2 × 0.2–0.4 cm, pale white or creamy. Capsules linear, 7–13.5 × 0.2–0.3 cm, dark purple-maroon, glabrous.

Phenology: Flowering from July to August and fruiting from August to October.

Etymology: The species is named in honour of Dr. Abhaya Prasad Das, Retired Professor, University of North Bengal, Siliguri, Darjeeling district, West Bengal, India, for his immense and invaluable contributions to the angiosperm taxonomy of Eastern Himalaya.

Distribution: So far, only known from the type locality.

Habitat and ecology: The species is a component of the subtropical forest of Ziro valley. It grows on the forest floor in association with other members of Gesneriaceae such as *Aeschynanthus stenosepalus* J. Anthony (epipetric), *Boeica fulva* C.B. Clarke, *Henckelia pumila* (D. Don) A. Dietr. and *Rhynchotechum vestitum* Wall. ex C.B. Clarke, and *Galeola nudifolia* Lour. (Orchidaceae), *Impatiens latiflora* Hook. f. & Thomson (Balsaminaceae), *I. porrecta* Wall. ex Hook. f. & Thomson, *Lobelia nicotianifolia* Roth (Campanulaceae) and *Pilea umbrosa* Wedd. ex Blume (Urticaceae) as well as various ferns.

Conservation status: In the type locality, in 2018, about 300 mature individuals were recorded. No anthropogenic threats have been noticed in this area. However, based on its limited distribution range and number of mature individuals, it is provisionally assessed as vulnerable according to the criteria D of the IUCN (2019) guidelines.

2. *Henckelia lallanii* Taram, D. Borah, Tag and R. Kr. Singh, *sp. nov.* (Figure 4)



FIGURE 2 *Henckelia dasii*. (a) Habit. (b–d) Closer view of flower in different angles. (e) Dissected floral parts with scale. (f) Closer view of stamens and staminodes. (g) Closer view of disc and pistil. (h) Capsule

Type: India, Arunachal Pradesh, Lower Subansiri district, Potin, 27° 33' 88.75" N 93° 79' 79.64" E, 980 m, 21 July 2019, *M. Taram 8016* (holotype ASSAM; isotypes ARUN).

Diagnosis: The species is different from all other species of *Henckelia* by its reddish orange corolla and only 1-flowered cyme. It superficially resembles *H. urticifolia* (Buch.-Ham. ex D. Don) A. Dietr. (Figure 5) in having elliptic-ovate leaves, narrowly triangular-ovate calyx lobes, apex acuminate, reflexed and yellow, tubular disc, but can be easily distinguished by shorter peduncles, longer pedicels, calyx smaller, fused up to 3/4 of its length, longer calyx tube, shorter calyx lobes,

corolla reddish orange, glabrous, corolla lobes 1/4–1/5 size of corolla tube, ovary longer, glabrous, style shorter, glabrous. For details see Table 2.

Perennial erect herbs, caulescent, 50–100 cm tall. Stem terete, unbranched, green, glabrous, rooting from the base; internodes 7–18 cm long. Leaves opposite decussate, elliptic-ovate, 3–7.5 × 2–4 cm, apex acute, base obtuse-rounded or broadly cuneate or slightly oblique, margins crenate-dentate, adaxially dark green, adaxially light green, adaxially sparsely or densely pilose or glabrescent, abaxially sparsely pubescent along veins; mid vein depressed adaxially, prominent abaxially; lateral veins 7–11 pairs, subopposite, depressed



FIGURE 3 *Henckelia umbellata*. (a) Habit. (b–d) Closer view of flower in different angles

TABLE 1 Comparison of selected diagnostic morphological characters of *Henckelia dasii* and *H. umbellata*

Characters	<i>H. dasii</i>	<i>H. umbellata</i>
Habitat	On the forest floor at an elevation of 1950 m	On muddy slopes and along forest margins at an elevation of 770–1700 m
Leaves	Eglandular	Abaxially with white sessile glands
Peduncles	1–2.5 cm long, pubescent	3–6 cm long, densely hairy
Pedicels	0.3–0.8 cm long, puberulent	1.2–2.2 cm long, glabrous
Calyx	1.7–2.3 cm long, urceolate, fused up to more than 3/4 of its length, white; tube 1.4–1.7 cm long; lobes 0.2–0.6 cm long, ovate-triangular, apex acute	3.5–3.7 cm long, campanulate, fused up to middle, light purplish; tube 1.7–2.0 cm long; lobes 1.7–1.8 cm long, narrowly triangular, apex acuminate
Corolla	4–5 cm long, white with light pinkish tinge, glabrous on both sides; tube bulged at basal part, constricted in middle, widening towards apex; upper lobes 0.6–1.1 × 0.7–1.2 cm; lower lobes 0.8–1.3 × 0.5–0.8 cm	5–7 cm long, bluish-purple, sparsely pubescent outside, glandular pubescent inside; tube constricted below middle, widening above middle; upper lobes 1.0–1.5 × 1.5–1.8 cm; lower lobes 0.8–1.2 × 1.0–1.4 cm
Stamens	Inserted 1.8–2 cm above from the corolla base; filaments 0.6–0.9 cm long, glabrous; anthers 0.1–0.2 cm long	Inserted 2.5–2.7 cm above from the corolla base; filaments 1.0–1.2 cm long, glandular pubescent; anthers 0.2–0.4 cm long
Staminodes	Inserted 1.6–1.8 cm above from the corolla base; filaments 0.5–0.7 cm long, glabrous; antherodes pale white.	Inserted 2–2.2 cm above from the corolla base; filaments 1–1.2 cm long, pubescent; antherodes greenish
Ovary	1.4–1.6 cm long	2–2.3 cm long
Style	Glabrous	Glandular pubescent
Disc	Annular, 0.1–0.2 cm long, creamy	Tubular, 0.7–0.8 cm long, greenish

adaxially, raised abaxially; petioles terete, 1–4 cm long, pubescent-glabrescent. Inflorescences axillary, 1-flowered cyme; peduncles 1–2.5 cm long, terete,

stout, green, glabrous; pedicels 1.5–3.5 cm long, green, glabrous; bracts 2, free, foliaceous, opposite, narrowly ovate-lanceolate, 1–2.5 × 0.3–0.8 cm, apex



FIGURE 4 *Henckelia lallanii*. (a) Habit. (b–d) Closer view of flower in different angles. (e) Dissected floral parts with scale. (f) Closer view of calyx and pistil. (g) Closer view of stamens and staminodes. (h) Capsule



FIGURE 5 *Henckelia urticifolia*. (a) Habit. (b–d) Closer view of flower in different angles

acute, sparsely puberulent or glabrescent adaxially, abaxially puberulent on veins, dark green adaxially, pale green abaxially, entire or with 2–4 teeth confined to the

apex. Calyx campanulate, fused up to 3/4 of its length, 1.8–2.6 cm long, light green, sparsely pilose outside, glabrous inside, 5-lobed; tube 1.3–1.7 cm long; lobes

TABLE 2 Comparison of selected diagnostic morphological characters of *Henckelia lallanii* and *H. urticifolia*

Characters	<i>H. lallanii</i>	<i>H. urticifolia</i>
Habitat	On the forest floor at an elevation of 600–1000 m	Along streams sides at an elevation of 1200–1900 m
Leaves	3–7.5 × 2–4 cm, elliptic-ovate	4–17 × 2.5–10 cm, ovate or elliptic-oblong or obovate
Inflorescences	1-flowered cyme	1–3-flowered cymes
Peduncles	1–2.5 cm long, glabrous	1.5–5.5 cm long, puberulent
Pedicels	1.5–3.5 cm long, glabrous	0.8–2.2 cm long, puberulent or pilose or glabrescent
Calyx	1.8–2.6 cm long, fused up to 3/4 of its length; tube 1.3–1.7 cm long; lobes unequal, 0.5–0.9 cm long	2.5–3.5 cm long, fused up to middle; tube 1–1.5 cm long; lobes 1–2 cm long, subequal
Corolla	Reddish orange, glabrous outside; tube 4.3–5.4 cm long; upper lips 0.6–1 cm long; lower lips 0.7–1.1 cm long	Pinkish-purple, puberulent or pilose or villous outside; tube 3.5–4 cm long; upper lips 1.5–2 cm long; lower lips 2.2–2.5 cm long
Stamens	1.2–1.5 cm long	1.8–2 cm long
Ovary	2.4–2.6 cm long, glabrous	1.8–2 cm long, puberulent
Style	0.9–1.1 cm long, glabrous	1.2–1.4 cm long, puberulent or pubescent
Stigma	0.2–0.3 cm long	0.6–0.7 mm long

unequal, 0.5–0.9 cm long, narrowly triangular-ovate, apex acuminate, reflexed, margins entire. Corolla infundibuliform, 5–6.5 cm long, glabrous on both sides, 2-lipped; tube 4.3–5.4 cm long, abruptly tapering towards base, slightly curved, reddish orange outside above the middle and pale white or creamy towards base, pale white or creamy inside with yellow flange from centre to the base of lower lips; upper lip 2-lobed, reddish orange on both sides; lobes equal, suborbicular, 0.6–1 × 1–1.4 cm, apex rounded, margins entire; lower lip 3-lobed, reddish orange on both sides; lobes equal or slightly subequal, broadly obovate, 0.7–1.1 × 0.9–1.3 cm, apex obtuse-rounded, margins entire. Stamens 2, creamy, inserted 1.7–2 cm above from the corolla base, glabrous; filaments 1–1.2 cm long, geniculate, tapering towards base; anthers 0.2–0.3 cm across, cohering face to face; staminodes 2, on either side of the stamen, pale white, inserted 1.3–1.5 cm above from the corolla base; filaments 0.6–0.8 cm long, sparsely pilose; antherodes c. 0.1 cm across, pale white. Pistil 3.5–4 cm long, pale green, glabrous; ovary 2.4–2.6 cm long; style 0.9–1.1 cm long; stigma bilobed, 0.2–0.3 cm long, pale white. Disc tubular, 4–5 mm long, yellow. Capsules linear, 12–16.5 cm long, pale green, without persistent disc and calyx, glabrous.

Paratypes: India, Arunachal Pradesh, Kurung Kumey district, Koloriang, 650 m, 12 August 2017, *D. Borah 9986* (ASSAM).

Phenology: Flowering from July to August and fruiting from August to September.

Etymology: The species is named after Shri Lallan Singh, a great nature lover and father of corresponding author, who died battling Covid-19 on 28 April 2021.

Distribution: Currently only known from the two localities cited above.

Habitat and ecology: A component of the moist tropical forest of Kurung Kumey and Lower Subansiri districts. It grows on the forest floor in association with *Henckelia oblongifolia* (Roxb.) D.J.Middleton & Mich.Möller (Gesneriaceae), *Hydrocotyle javanica* Thunb. (Araliaceae), *Impatiens* spp. (Balsaminaceae), *Mackaya neesiana* (Wall.) Das (Acanthaceae), *Musa mannii* H.Wendl. ex Baker (Musaceae), *M. sanguinea* Hook.f., *Pilea* spp. (Urticaceae), *Pseudodissochaeta assamica* (C.B.Clarke) M.P.Nayar (Melastomataceae), *Tacca integrifolia* Ker Gawl. (Dioscoreaceae), *Urtica* spp. (Urticaceae) and Ferns.

Conservation status: From in the Koloriang locality about 30 mature individuals were recorded in 2017, and in the Potin locality, about 250 mature individuals were recorded in 2019. No anthropogenic threats have been noticed in this area. However, based on its limited distribution range and number of mature individuals, it is provisionally assessed as vulnerable according to the criteria D of the IUCN (2019) guidelines.

Key to the species of *Henckelia* in northeast India

- 1a. Acaulescent or stoloniferous herbs; leaves alternate or whorled 2
- 1b. Caulescent, erect herbs; leaves opposite 6
- 2a. Stoloniferous herbs; leaves alternate 3
- 2b. Acaulescent herbs; leaves whorled 4
- 3a. Leaves broadly ovate-suborbicular, base cordate; inflorescences 1-flowered cyme; calyx 1.7–2 cm long; corolla 5–6.5 cm long; corolla tube funnel shaped,

constricted in lower half; filaments inserted 1.5–2 cm above from the corolla base *H. burttii*

3b. Leaves ovate or elliptic-lanceolate, base oblique; inflorescences 1–5-flowered cyme; calyx 1–1.4 cm long; corolla 2.5–4.5 cm long; corolla tube campanulate; filaments inserted 0.7–1 cm above from the corolla base *H. lachenensis*

4a. Bracts absent; flowers solitary *H. mishmiensis*

4b. Bracts present; flowers 2–6 on a peduncle 5

5b. Leaves oblong-elliptic; margins doubly serrate; corolla 4–5 cm long, white; filaments inserted 0.8–1 cm above from the corolla base *H. primulacea*

5a. Leaves broadly ovate-suborbicular, margins dentate-serrate or crenate; corolla 5–7 cm long, lilac-purplish; filaments inserted 1.4–1.7 cm above from the corolla base *H. speciosa*

6a. Plants with 2 leaves, one large and one small *H. bifolia*

6b. Plants with several leaves 7

7a. Leaves margins entire *H. calva*

7b. Leaves margins crenate or dentate-serrate or denticulate-serrulate 8

8a. Bracts fused to form a cup *H. pathakii*

8b. Bracts free 9

9a. Calyx 5-winged *H. siangensis*

9b. Calyx unwinged 10

10a. Bracts concealing the flower buds and pedicels; pedicels smaller than the bracts 11

10b. Bracts not concealing the flower buds and pedicels; pedicels longer than the bracts 12

11a. Leaves eglandular; peduncles 1–2.5 cm long; calyx urceolate, 1.7–2.3 cm long, white, fused up to more than 3/4 of its length; corolla white with light pinkish tinge, glabrous, eglandular; stamens glabrous, eglandular; style eglandular ***H. dasii***

11b. Leaves glandular abaxially; peduncles 3–6 cm long; calyx campanulate, 3.5–3.7 cm long, light purplish, fused up to middle; corolla bluish-purple, sparsely pubescent outside, glandular pubescent inside; stamens glandular pubescent; style glandular pubescent *H. umbellata*

12a. Corolla glandular hairy inside; filaments glandular hairy 13

12b. Corolla eglandular, glabrous inside; filaments eglandular, glabrous or puberulent 14

13a. Leaves up to 15 cm long; bracts margins crenate-serrate; pedicels 0.5–1.5 cm long; corolla 3.5–4.5 cm long; corolla lobes white or pale yellow; capsules 4.5–6 cm long *H. adenocalyx*

13b. Leaves up to 25 cm long; bracts margins entire; pedicels 1.5–3 cm long; corolla 5–6 cm long; corolla lobes dark violet-purple; capsules 6.5–11 cm long *H. hookeri*

14a. Leaves glandular; calyx lobes equal *H. oblongifolia*

14b. Leaves eglandular; calyx lobes unequal 15

15a. Plants perennial 16

15b. Plants annual 18

16a. Leaves base cordate; calyx glabrous; calyx lobes apex acute, straight; corolla white or pale yellow *H. grandifolia*

16b. Leaves base obtuse-rounded or broadly cuneate or slightly oblique; calyx hairy; calyx lobes apex reflexed, acuminate; corolla pinkish-purple or reddish orange ... 17

17a. Calyx fused up to 3/4 of its length; calyx lobes 0.5–0.9 cm long; corolla reddish orange, glabrous outside, tube 4.3–5.4 cm long; upper lips 0.6–1 cm long; lower lips 0.7–1.1 cm long; ovary 2.4–2.6 cm long, glabrous ***H. lallanii***

17b. Calyx fused up to middle; calyx lobes 1–2 cm long; corolla pinkish-purple, puberulent or pilose or villous outside; tube 3.5–4 cm long; upper lips 1.5–2 cm long; lower lips 2.2–2.5 cm long; ovary 1.8–2 cm long, puberulent *H. urticifolia*

18a. Leaves abaxially purple spotted; calyx pilose outside; calyx lobes spreading outward at apex, hornlike *H. pumila*

18b. Leaves abaxially green throughout, not purple spotted; calyx glabrous or sparsely puberulent outside; calyx lobes straight at apex, not hornlike 19

19a. Leaves glabrous; calyx 0.6–1.2 cm long; anther 1–2 mm across *H. dibangensis*

19b. Leaves puberulent-pubescent; calyx 1.5–2.5 cm long; anther 2.5–3.5 mm across 20

20a. Peduncles 0.3–2.2 cm long; corolla bluish-purple *H. dimidiata*

20b. Peduncles 2.5–8.5 cm long; corolla white or yellow *H. anachoreta*

ACKNOWLEDGEMENTS

The authors are thankful to Ojar Taku for his help during plant collections, Saroj Kumar Kasaju and Khopey Joram for providing their images and to the Board of Research in Nuclear Sciences (BRNS), Department of Atomic Energy, Government of India for funding support through a research project. Thanks are due to Anton Weber, Cai Lei, Han Meng-Qi and Yin-Zheng Wang for confirming the identity of the species as well as for their valuable suggestions. The authors are also grateful to the Department of Botany, Rajiv Gandhi University, Arunachal Pradesh and to the Director, Botanical Survey of India, Kolkata, for providing facilities to carry out the study.

CONFLICT OF INTEREST STATEMENT

The authors declare that we do not have any financial/commercial conflicts of interest.

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REFERENCES

- IUCN. 2019: Guidelines for using the IUCN Red List categories and criteria, version 14. – Prepared by the Standards and Petitions Committee. Available at: <http://www.iucnredlist.org/documents/RedListGuidelines.pdf> (accessed 16 November 2020)
- Weber, A.; Middleton, D. J.; Forrest, A.; Kiew, R.; Lim, C. L.; Rafidah, A. R.; Sontag, S.; Triboun, P.; Wei, Y. G.; Yao, T. L. & Möller, M. 2011: Molecular systematics and remodelling of *Chirita* and associated genera (Gesneriaceae). – *Taxon* 60: 767–790.