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Studies on the Gesneriaceae in Laos I: Three New Species of *Microchirita* from Khammouane Karst

KEOOUDONE SOUVANNAKHOUMMANE* AND SOULIVANH LANORSAVANH

Biology Department, Faculty of Natural Sciences, National University of Laos, Dong Dok Campus, Xaythany, Vientiane, LAOS
*Corresponding author. Keooudone Souvannakhoummane (k.souvannakhoummane@nuol.edu.la)
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ABSTRACT. – Three new species of *Microchirita* from the Khammouane Karst are here described as part of studies on the family Gesneriaceae in Laos. The description, habitat, phenology, vernacular name, initial IUCN assessment, illustration, and photographs of the new taxa are provided.

KEYWORDS: Hin Nam No National Park, limestone flora, new taxa, taxonomy

INTRODUCTION

The family Gesneriaceae, mainly distributed in tropical and subtropical regions, consists of about 150 genera and approximately 3500 species. General information about Gesneriad has been introduced on the Gesneriad Reference Web (https://gesneriads.info/). Several new genera and species were discovered in southeast Asia, while hotspots are reported in Thailand (Middleton et al., 2023; Puglisi and Middleton, 2017), Vietnam (Chen et al., 2017; Xin et al., 2022) and China (Wen et al., 2019-forward update). When searching for Laos, it appears that the data on Lao Gesneriads is poorly documented, with very few specimens collected after the work of Newman et al. (2017-foward) and only a few new data were published recently (Middleton, 2009; Phonepaseuth et al., 2021; Souvannakhoummane et al., 2018, 2021; Souvannakhoummane and Phonepaseuth, 2020).

The genus *Microchirita* (C.B. Clarke) Y.Z. Wang is found from India to Southeast Asia and shows a high degree of diversity, as evidenced by Puglisi and Middleton (2017), including approximately 47 species and six varieties worldwide (Middleton, 2018; Middleton et al., 2023; Middleton and Triboun, 2013; Puglisi et al., 2016; Puglisi and Middleton, 2017; Rafidah, 2017, 2019; Xin et al., 2022). In Laos only one native species was reported in the Checklist of the Vascular Plants of Lao PDR (Newman et al., 2017-foward).

MATERIALS AND METHODS

The Mahaxay and Hin Nam No karst were the sources of the study material from 2021 to 2022 as period. The measurements were carried out on living plants, as well as on herbarium and alcohol specimens, which were stored at the National Herbarium of Laos (HNL) and the Faculty of Forestry Science (FOF). Using the flora-related and taxonomical literature with Laos and the region mentioned above with treatment, and comparing it to digital specimens from AAU, BM, BKF, E, K, and P. The field notes included the habitat, phenology, photos, and common name. The IUCN conservation status follows the guidelines of the IUCN Standards and Petitions Committee (2022).

RESULTS

Taxonomic treatment

1. *Microchirita argostemmiflora* Souvann. & Lanors., ***sp. nov***.

Similar to *Microchirita personata* C.Puglisi in the habit, but differing in the inflorescence 2–6-flowered (vs more than 10-flowered), corolla lobes rotate (vs personate), anthers yellow, papillose (vs white, glabrous).
TYPE: Laos, Khammouane, Mahaxay District, Pha Nang Village, 250 m alt., 29 August 2022, *Lanorsavanh* et al., *LP140* (holotype **HNL**; isotypes **BKF**, **FOF**). (Figs. 1, 2).

Lithophytic, annual herb 10–25 cm tall, 1.5–3 mm in diameter near base, internodes 2–4 cm, unbranched. ***Stems*** fleshy, with sparse eglandular hairs, dark purple-brown at base, pale purple forward to top. ***Leaves*** opposite, except for the basal leaf; petioles 4–16 mm long, with sparse short eglandular, purple; blades lanceolate to ovate, 2–8 × 1–5 cm, base oblique rounded to obtuse, apex long acute, dark green adaxial with densely eglandular, pale green abaxial with sparsely eglandular, margin undulate to entire, secondary veins

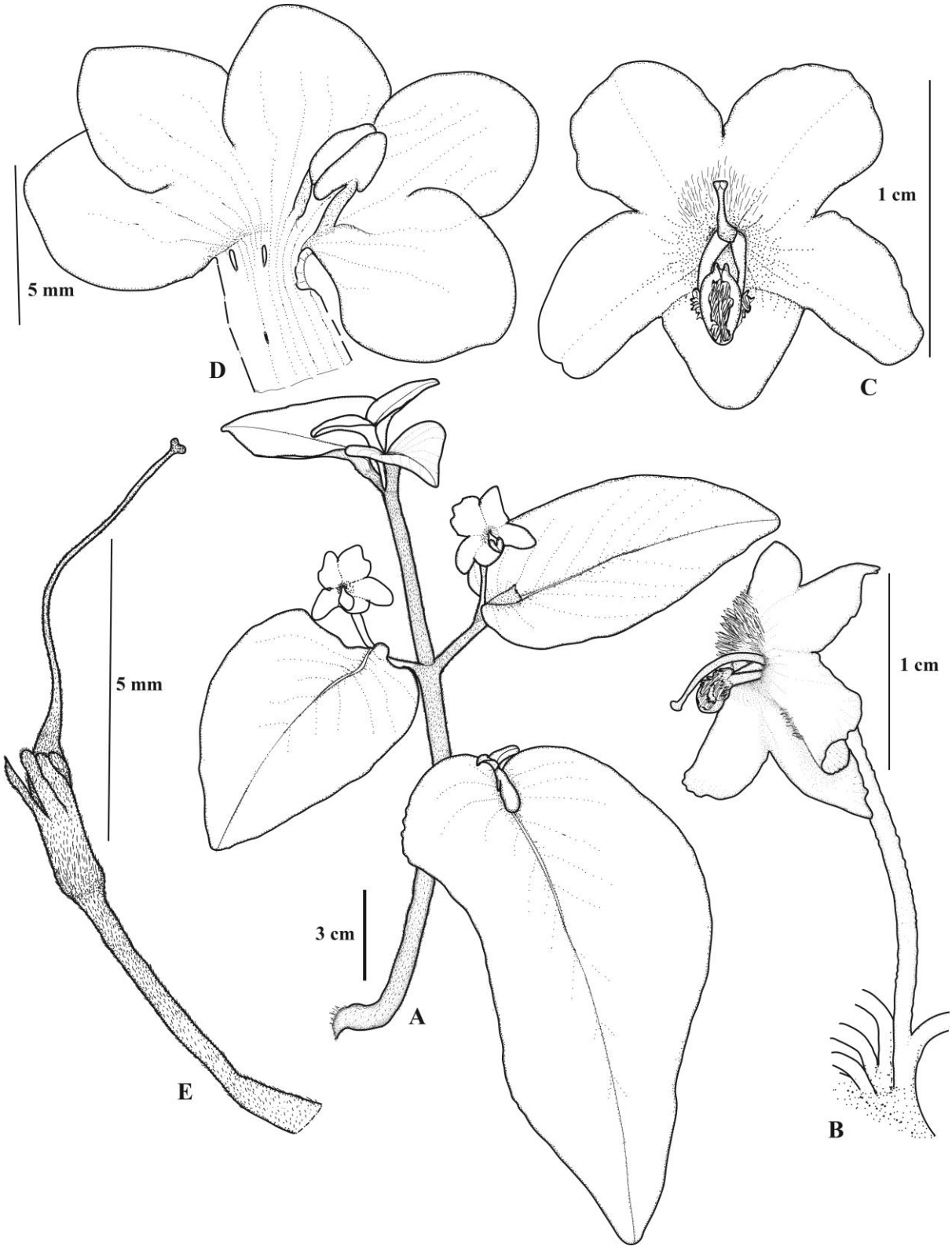

FIGURE 1. *Microchirita argostemmiflora* Souvann. & Lanors.: A. habit; B. flower, side view; C. flower, front view; D. dissected corolla showing anthers and staminodes; E. calyx and pistil. All from *LP140*. Drawn by K. Souvannakhoummane.

4–10 pairs. ***Inflorescences*** epiphyllous, 2–6-flowered, cristate, peduncles up to 1–2 mm long, fused with each other, with dense eglandular, bracts absent; pedicels 5–20 mm long, with dense eglandular. ***Calyx*** green, bilabiate; tube 0.5–1.2 mm dorsally, c. 0.3 mm ventrally, lobes narrowly lanceolate to linear, upper lobes 3–4 × 0.5–1.2 mm, lower lobes 2.8–3.8 × 0.8–1.5 mm, with dense eglandular, glabrous inside, apex

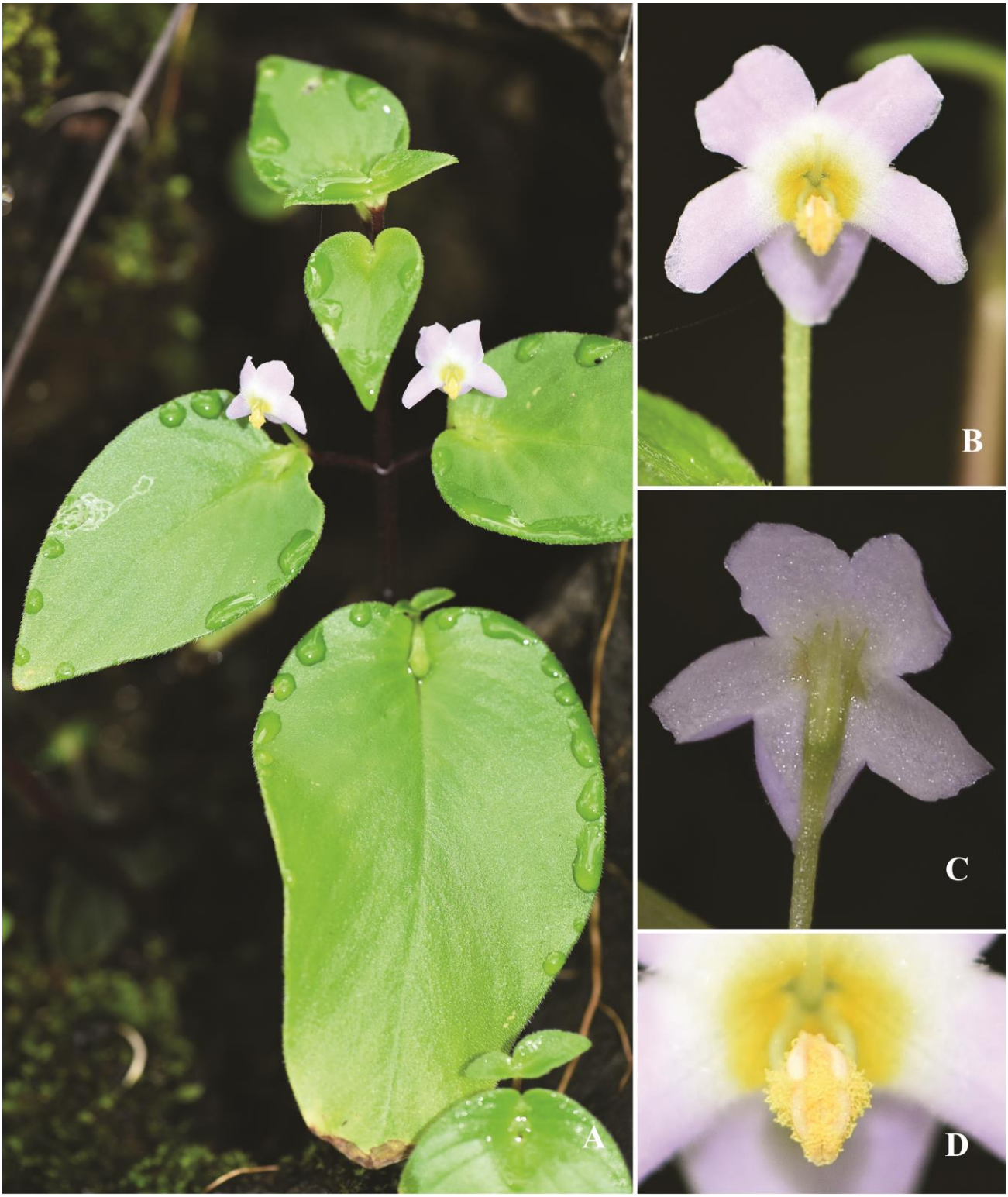

FIGURE 2. *Microchirita argostemmiflora* Souvann. & Lanors.: A. habit; B. flower, front view; C. flower, back view; D. anthers. All from *LP140*. Photos by K. Souvannakhoummane & S. Lanorsavanh.

acuminate. ***Corolla*** white to lilac, except for lips yellow, both side glabrous, except for lips eglandular tomentose with glandular at the basally inside lobes; tube 10–14 mm long, curved downwards at middle, salver shape to narrowly tubular; lobes rotate, broadly elliptic to orbicular, upper lobes 3.8–5 × 3.5–4.2 mm, lateral lobes c. 5 × 5 mm, lower lobe 5.5–6 × c. 6 mm. ***Stamens*** arising 4.5–5 mm long above the corolla base, with filaments straight, glabrous, 2–2.2 mm long, c. 0.8 mm wide; anthers papillose, yellow, 3–3.5 × 2–2.5 mm,

free or coherent by a weak ligature, thecae divergent; lateral staminodes c. 0.8 mm long, arising c. 3.5 mm at above corolla base, central staminode c. 0.3 mm long, arising near the corolla base. ***Disk*** partial, ventral, lobed, 0.2–0.5 mm long. ***Pistils*** c. 8 mm long; ovary 3.5–4 mm long, c. 0.4 mm diameter, with many ovules, covered with dense glandular and eglandular hairs; style 3.5–4 mm long, with sparse, short glandular hairs; stigma slightly bilobed, orbiculate, 0.4–0.6 mm long. ***Capsules*** when young green, with sessile glands at base, later becoming sparsely eglandular hairy, curved.

Distribution.— Central Laos (only known from type location in Mahaxay, Khammouane).

Habitat and phenology.— Growing on open karst, near the top, with *Impatiens semouensis* Hook.f. (Balsaminaceae) and *Begonia pseudobrandisiana* Souvann. & Lanors. (Begoniaceae). Flowering from August to September and fruiting from September to October.

Etymology.— The specific epithet refers to the flowers resembling the flower of *Argostemma* (Rubiaceae).

Vernacular name. — ດອກປີ້ນຂາວ [Dok Pin Khao].

Provisional conservation status.— There is just one known population of this species, which is found in the Mahaxay Karst. It is composed of about 100 individuals, and only a few seedlings grow next to adult plants. No risks have been noticed because there is no development plan for the habitat and no mention of the use of these plants by the local people. Mahaxay Karst Area has a surface area of around 1,000 km^2, which can be used as the EOO. As a result, we rate this species as Vulnerable (VU) according to IUCN criteria D.

2. *Microchirita flavofusca* Souvann. & Lanors. ***sp. nov.***

Similar to *Microchirita glandulosa* C.Puglisi in having bracts fused at the base, but differeng in the stem glabrous (vs stem sparsely glandular hairy), calyx tube 2.5–4 mm, hairy only outside (vs 1.5 mm, hairy on both sides), corolla 3–3.5 cm long, light yellow with brown-red patch (vs 15–18 mm, white), filaments minutely glandular (vs glabrous). It is also similar to *M. magniflora* Souvann., but differing by calyx sparsely eglandular pubescent, remote serrate with glandular margin (vs densely glandular pubescent, with some stellate hairs, and entire margin), corolla lightly yellow with brown-red patch inside (vs corolla dark purple, granite grey patch near mouth with yellow inside).

TYPE: Laos, Khammouane, Mahaxay District, Pha Nang Village, 220 m alt., 29 August 2022, *Lanorsavanh* et al., *LP139* (holotype **HNL**, isotypes **BKF**, **FOF**). (Figs. 3, 4).

Lithophytic, annual herb to 20–80 cm tall, 3–12 mm in diameter near base, with internodes up to c. 15 cm long, branched. ***Stems*** succulent, glabrous, purple-brown to pale green near apex. ***Leaves*** opposite, except for the basal leaf; petioles 1–6 cm long, glandular hairy, purple-brown; blades lanceolate to ovate, 5.5–12 × 1.5–7 cm, base oblique rounded to obtuse, apex acute to shortly acuminate, dark green adaxial, with densely glandular and eglandular hairy, pale green abaxially with eglandular hairs, margin remote serrate, secondary veins 6–9 pairs, dark purple on midrib adaxially, pale purple to green abaxially. ***Inflorescences*** arising from the petiole, at the axil or in close proximity, consisting of one main pedunculate inflorescence, each very compressed and thus appearing subumbellate and bearing 3–8 flowers; peduncles 2–8 cm long, with glandular hairs; bracts fused at the base about 1/3 of length and enclosing the pedicels, 2–6 × 0.7–3.2 cm, sessile or shortly petiolate, margin and indumentum as those of the leaves; pedicels 1.8–2.5 cm long, covered with minute glandular hairs. ***Calyx*** green, bilabiate; tube 2.5–4 mm dorsally, c. 2 mm ventrally, lobes narrowly lanceolate, upper lobes 8–9 × 2–3 mm long, lower lobes 5–7.5 × 2–2.5 mm, sparsely eglandular pubescent, remote serrate with glandular margin, glabrous inside, apex acuminate. ***Corolla*** lightly yellow with brown-red patch inside, glandular hairs outside, glabrous inside; tube 3–3.5 cm long, slightly curved downwards, funnelform; lobes spreading, broadly orbiculate, upper lobes 1.0–1.4 × c. 1.5 cm, lateral lobes 0.8–1 × c. 1 cm, lower lobe 1.2–1.5 × 1.5–1.8 cm. ***Stamens*** arising 1.7–2 cm at above the corolla base, filaments lightly green, straight, 4–6 mm long, 0.5–1 mm wide, minutely glandular; anthers glabrous, 1.5–1.8 × 0.9–1.2 mm, coherent by a weak ligature, thecae divergent; lateral staminodes 2–2.2 mm long, arising c. 1.2 cm at above the corolla base, central staminode c. 0.5 mm long, arising c. 6 mm above the corolla base. ***Disk*** ring-link, lobed, 0.3–0.5 mm long. ***Pistils*** c. 25 mm long; ovary 10–15 mm long, c. 1 mm in diameter, glabrous at base near disk, with many ovules, covered with dense glandular hairs; style c. 10 mm long, with sparse glandular hairs; stigma deeply bilobed, 1.5–1.8 mm long. ***Capsules*** when young green, with sparse eglandular hairs mixed with some glandular hairs, curved.

Distribution.— Central Laos (only known from type location in Mahaxay, Khammouane).

Habitat and phenology.— Growing on open limestone karst, with population *Shorea* sp. (Dipterocarpaceae), *Phyllanthus mirabilis* Müll.Arg. (Phyllanthaceae), *Melastoma* sp. (Melastomataceae) and *Hedyotis* sp. (Rubiaceae). Flowering from August to September and fruiting from September to October.

Etymology.— The specific epithet refers to the yellow flower with brown-red patch.

Vernacular name. — ດອກລະຄັງເຫຼືອງ [Dok La Khang Leung].

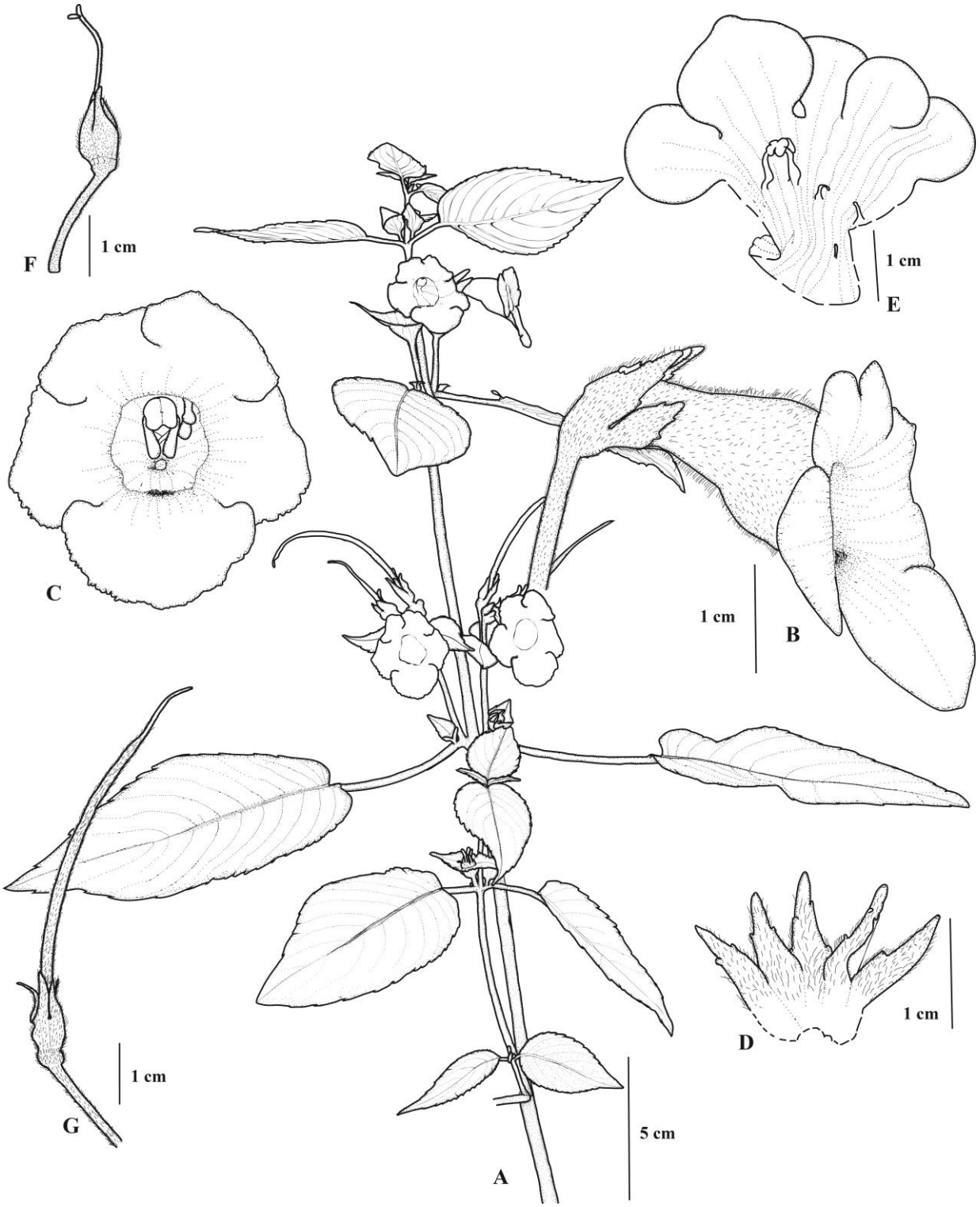

FIGURE 3. *Microchirita flavofusca* Souvann. & Lanors.: A. habit; B. flower, side view; C. flower, front view; D. dissected calyx; E. dissected corolla tube showing position of stamens and staminodes; F. calyx and pistil; G. young fruit. All from *LP139*. Drawn by K. Souvannkhoummane.

***Provisional conservation status*.—** The only population of this species is known from the Mahaxay Karst, and it includes about 500 individuals. A lot of seedlings develop next to mature plants in this area. No risks have been noticed because there is no development plan for the habitat and no mention of using these plants by the local people. Mahaxay Karst Area has a surface area of around 1,000 km^2, which can be used as the EOO. As a result, we rate this species' status as Least Concern (LC) according to IUCN criteria D.

FIGURE 4. *Microchirita flavofusca* Souvann. & Lanors.: A. habitt; B. flower, front view, and slightly back view; C. inflorescence withflowers and young fruits; D-E. dissected corolla tube showing anthers and staminodes; F. calyx and pistil; G. young fruit. All from *LP139*. Photos by S. Lanorsavanh.

Notes. — In herbarium specimens, the indumentum of the peduncle was mainly fallen, with few glandular hairs, while on living plants it is densely glandular hairy.

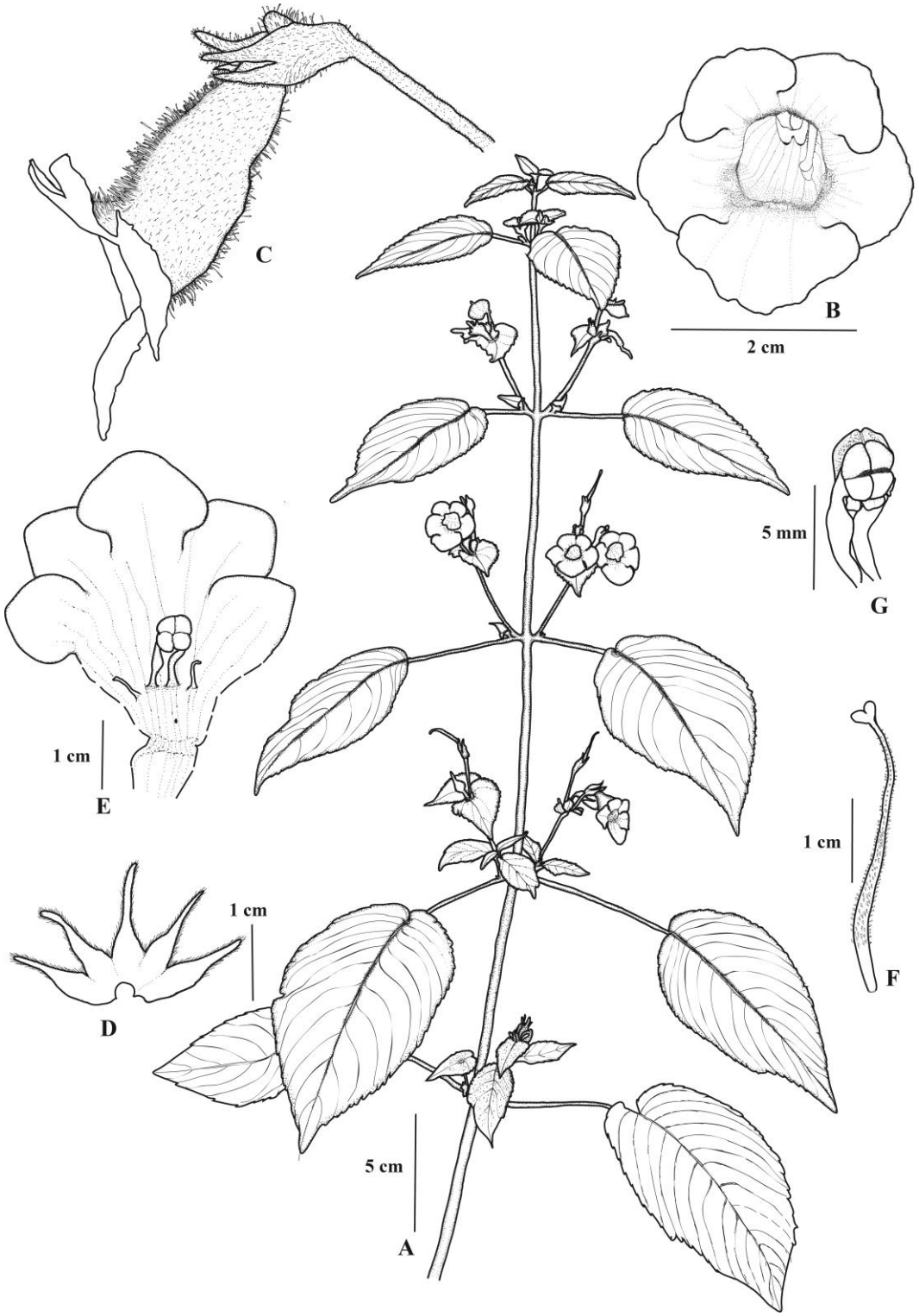

FIGURE 5. *Microchirita magniflora* Souvann.: A. habit; B. flower, front view; C. flower, side view; D. calyx; E. dissected corolla tube showing anthers and staminodes; F. pistil. G. anthers. All from *PMHNN0209*. Draw by K. Souvannakhoummane.

3. *Microchirita magniflora* Souvann., ***sp. nov.***

Similar to *Microchirita involucrata* (Craib) Yin Z.Wang in the habit and morphology of flower form, but differing in bracts fuse at the base (vs free), calyx covered by glandular hairs with some stellate hairs outside (vs only glandular hairs), corolla 35–40 mm long, yellow inside throat (vs 18–21 mm long, not yellow inside), filaments minutely glandular (vs glabrous). TYPE: Laos, Khammouane, Boualapha District, Vangmaner Village, 250 m alt., 18 September 2022, *Souvannakhoummane* et al., *PMHNN0209* (holotype **HNL**, isotypes **BKF**, **FOF**). (Figs. 5, 6).

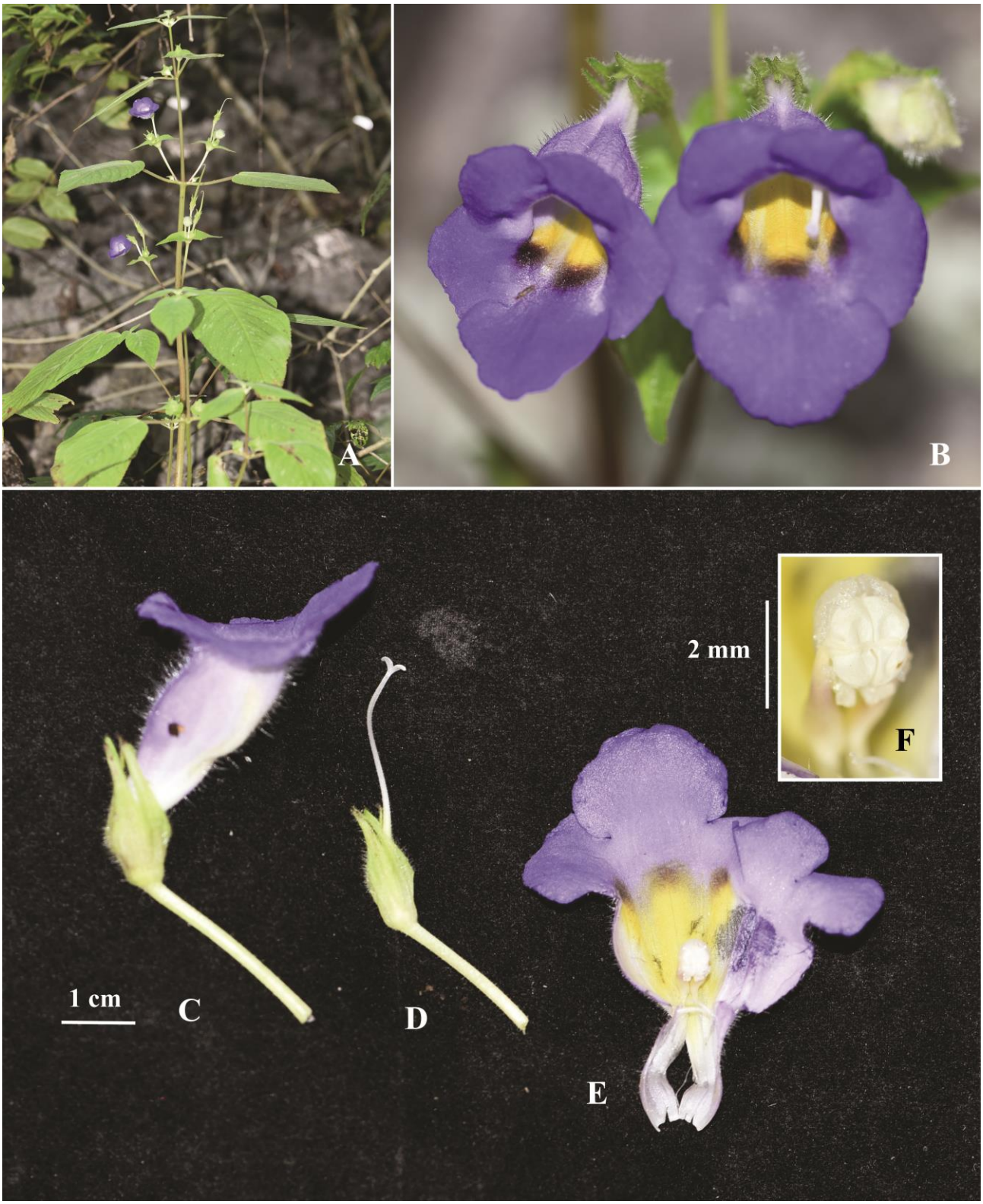

FIGURE 6. *Microchirita magniflora* Souvann.: A. habit; B. flowers; C. flower, side view; D. calyx and pistil; E. dissected corolla tube showing anthers and staminodes; F. anthers. All from *PMHNN0209*. Photos by K. Souvannakhoummane.

Lithophytic, cylindrical, annual herb, 60–120 cm tall, 5–15 mm in diameter near base, with internodes 3–15 cm long, branched. ***Stems*** succulent, with glandular hairs, purple-reddish to green forward to apex, branching. ***Leaves*** opposite, the basal leaf not seen; petioles 1.5–8.5 cm long, brownish to pale green, with multicellular glandular hairs; blades broadly lanceolate, 4–14 × 1.5–8 cm, base oblique rounded to obtuse, apex acuminate, dark green adaxial with densely glandular hairs mixed with eglandular hairs,

pale green abaxial with glandular hairs, margin remote serrate, secondary veins 5–10 pairs. ***Inflorescences*** arising from the petiole, near the axil or in close proximity, consisting of one main pedunculate inflorescence, each very compressed and thus appearing subumbellate and bearing 2–4-flowers; peduncles 4.5–7 mm long, with glandular hairs; bracts fused at the base and enclosing the base of pedicels, 2–6 × 1–2.5 mm, sessile or shortly petiolate, margin and indumentum as those of the leaves; pedicels 1.5–2.2 cm long, covered with minute glandular hairs. ***Calyx*** green, bilabiate; tube 5–6 mm dorsally, c. 4 mm ventrally, lobes narrowly lanceolate, upper lobes 7–8 × 2–3.5 mm long, lower lobes 4–6.5 × 1.8–2.5 mm, with dense glandular hairs and some stellate hairs outside, glabrous inside, apex acuminate with fuscous. ***Corolla*** dark purple on dorsal to lobes with slight paler on ventral to base, granite grey patch near lips with yellow inside throat, outside glandular hairs, inside shortly glandular puberulous; tube 3.5–4 cm long, slightly curved downwards, funnelform; lopes spreading lobes, broadly reniform, upper lobes 1.0–1.2 × c. 1.4 cm, lateral lobes 0.8–1.2 × c.1.8 cm, lower lobe 1.2–1.5 × 1.8–2.2 cm. ***Stamens*** arising 14–16 mm above the corolla base, filaments white, straight, 7–10 mm long, 0.8–1 mm wide, minutely glandular; anthers glabrous, c. 5 × 5 mm, coherent by a weak ligature, thecae divergent; lateral staminodes c. 4.5 mm long, arising c. 15 mm at above the corolla base, near apex slightly curved, central staminode c. 1 mm long, arising c. 8 mm at above the corolla base. ***Disk*** ring-link, lobed, 0.5–0.8 mm long. ***Pistils*** c. 34 mm long; ovary 10–12 mm long, c. 1.2 mm diameter, with many ovules, densely glandular hairy; style c. 24 mm long, with separate glandular hairs; stigma deeply bilobed, 1.8–2 mm long. ***Capsules*** in young green, sparsely eglandular hairy, with some glandular hairs, curved.

Distribution.— Central Laos (only known from type location in Hin Nam No National Park, Khammouane)

Habitat and phenology.— Growing on open karst mixed with the population of *Impatiens chamchumroonii* Suksathan & Ruchis. (Balsaminaceae), *Hedyotis* sp. (Rubiaceae) and *Kopsia* sp. (Apocynaceae). Flowering from August to September and fruiting from September to October.

Etymology.— The specific epithet refers to large flowers.

Vernacular name.— ດອກລະຄັ້ງຫຼວງ [Dok La Khang Louang].

Provisional conservation status.— Only one population of this species is known from the Hin Nam No karst. This population includes around 100 individuals, and only a few seedlings grow next to adult plants. No risks have been noticed because there is no development plan for the habitat and no mention of the use of these plants by the local people. The EOO can be the area of the Hin Nam No Karst Area, which is around 360 km^2. As a result, we determine that this species is Vulnerable (VU) according to IUCN criteria D.

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LITERATURE CITED

Chen, W. H., Middleton, D. J., Nguyen, H. Q., Nguyen, H. T., Averyanov, L. V., Chen, R. Z., Nguyen, K. S., Möller, M., and Shui, Y. M. 2017. Two new species of *Oreocharis* (Gesneriaceae) from Northwest Vietnam. Gardens' Bulletin Singapore, 69(2): 295–305.

IUCN Standards and Petitions Committee. 2022. Guidelines for Using the IUCN Red List Categories and Criteria. Version 15.1. Prepared by the Standards and Petitions Committee.

Middleton, D.J. 2009. A Revision of *Aeschynanthus* (Gesneriaceae) in Cambodia, Laos and Vietnam. Edinburgh Journal of Botany, 66(3): 391–446.

Middleton, D.J. 2018. A New Combination in *Microchirita* (Gesneriaceae) from India. Edinburgh Journal of Botany, 75(3): 305–307.

Middleton, D.J., Tetsana, N., Suddee, S., and Puglisi, C. 2023. Eight new species of *Microchirita* (Gesneriaceae: Didymocarpoideae) from Thailand. Thai Forest Bulletin (Botany), 51: 54–70.

Middleton, D.J., and Triboun, P. 2013. New species of *Microchirita* (Gesneriaceae) from Thailand. Thai Forest Bulletin (Botany), (41): 13–22.

Newman, M.F., Pullan, M., Souladeth, P., Ketphanh, S., Svengsuksa, B., Thomas, P., Sengdala, K., Lamxay, V. and Armstrong, K. 2017–present. A Checklist of the Vascular Plants of Lao PDR. Online database available at https://padme.rbge.org.uk/laos/

Phonepaseuth, P., Souvannakhoummane, K., Tagane, S., Souladeth, P., and Yahara, T. 2021. A new species of *Paraboea* and a new species record of *Middletonia* (Gesneriaceae) from a limestone karst in Central Laos. Thai Forest Bulletin (Botany), 49:135–141.

Puglisi, C., and Middleton, D. J. 2017. A revision of *Microchirita* (Gesneriaceae) in Thailand. Gardens' Bulletin Singapore, 69(2): 211–284.

Puglisi, C., Middleton, D. J., and Suddee, S. 2016. Four new species of *Microchirita* (Gesneriaceae) from Thailand. Kew Bulletin, 71(1): 2–7.

Rafidah, A. R. 2017. Taxonomy and conservation status of *Microchirita* (Gesneriaceae) in Peninsular Malaysia. Gardens' Bulletin Singapore, 69(1): 1–31.

Rafidah, A.R. 2019. *Microchirita hairulii* (Gesneriaceae), a new species from Perlis, Peninsular Malaysia. PhytoKeys, 118: 65–73.

Souvannakhoummane, K., Lanorsavanh, S., Tagane, S., Souladeth, P., Phonepaseuth, P., Pongamornkul, W., and Lamxay, V. 2021. Six new species and eight new records of Gesneriaceae from Laos. Gardens' Bulletin Singapore, 73(2): 427–456.

Souvannakhoummane, K., and Phonepaseuth, P. (2020). *Didymocarpus albiflorus* (Gesneriaceae), a new species from Vientiane capital, Lao PDR. Taiwania, 65(2):109–113.

Souvannakhoummane, K., Souladeth, P., Tagane, S., Yang, C.-J., and Yahara, T. (2018). Flora of Nam Kading National Protected Area VI: *Didymocarpus middletonii* (Genseriaceae), A New Species from Limestone. Edinburgh Journal of Botany, 76(1): 45–54.

Wen, F., Xin, Z., Fu, L.-F., Hong, X., Cai, L., Qin, J., Pan, B., Pan, F., and Wei, Y.-G. 2019. The Updated Plant List of Gesneriaceae in China under the New Chinese Naming Rules [Guangxi Sciences].

Xin, Z.-B., Li, R.-F., Maciejewski, S., Fu, L.-F., Do, T. V., and Wen, F. 2022. *Microchirita minor* (Gesneriaceae), a new species from north-western Vietnam. PhytoKeys, 215: 65–71.