

## *Mitreola luongii* (Loganiaceae), a new species from limestone hill in northern Vietnam

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### Abstract

A new species of *Mitreola* (Loganiaceae), *M. luongii*, is described from limestone area in Tuyen Quang Province, northern Vietnam. Morphologically, it is most similar to *M. crystallina*, but can be distinguished by its shrub habit, up to 1 m tall (vs. herb, up to 60 cm tall), having terminal and axillary inflorescences (vs. terminal), shorter internode 1.5–5.5 cm long (vs. 6–8 cm long), shorter peduncles 0.5–1.5 cm long (vs. ca. 6 cm long), smaller leaf size 5.5–10.5 × 2–4.5 cm (vs. 15–20 × 5–7 cm) and longer corolla tube 4–4.5 mm long (vs. 4 mm long).

**Key words:** Du Gia National Park, flora, Gentianales, hornpods, Indochina, taxonomy

### Introduction

*Mitreola* Linnaeus (1758: 214) is a small genus of Loganiaceae characterized by cymose inflorescences, 5-merous flowers, cleft styles, and bilobed capsules with two erect or incurved horns (Leeuwenberg 1974, Wang 2018, You *et al.* 2020, Hu *et al.* 2023). The genus comprises 22 species primarily distributed in Africa, America, Asia and Oceania (Li & Leeuwenberg 1996, POWO 2026).

China represents a major center of diversity for *Mitreola*, and 16 species have been currently recorded. Notably, seven of these species were only recently described on the basis of extensive field surveys and subsequent taxonomic studies, all of which are narrowly endemic to limestone areas in southwestern China (Shan *et al.* 2019, 2021, You

*et al.* 2020, Liao & Chen 2021, Liu *et al.* 2022, 2023, Hu *et al.* 2023). The fact indicates that this area serves as a diversification center for the genus of *Mitreola* (Hu *et al.* 2023). In Vietnam, five species have been recorded to date, namely *M. capitata* Nuraliev (2023: 40), *M. reticulata* Tirel (1969: 119), *M. sinhoensis* T.P.A. Tran, K.S. Nguyen, V.T. Bui, B.H. Quang & L. Wu in Tran *et al.* (2025: 88), *M. sphaerocarpa* (Leenhouts 1962: 417) Leenhouts ex Leeuwenbeg (1974: 25) and *M. petiolata* (1841: 45) (Pham 2003, Nuraliev *et al.* 2023, Tran *et al.* 2024, 2025). Given that northern Vietnam borders China and contains extensive limestone areas, and *M. capitata* and *M. sinhoensis* were only recently described, additional species are also expected to be discovered when more extensive botanical surveys are conducted in Vietnam's limestone regions.

During a floristic inventory on the limestone area of Du Gia National Park, located in Tuyen Quang Province, northern Vietnam near the border with China in 2025, we collected an unknown species of *Mitreola* that shows the characteristics of shrub habit, terminal and axillary inflorescences, and light-purple corollas. After reviewing the relevant literatures and morphological comparisons with the known species of *Mitreola*, we concluded that it represents a new species and we hereby describe it as *M. luongii* Moriwak., Tagane & V.S. Dang.

## Materials and methods

Voucher specimens of the new species were collected under the evergreen broad-leaved forest in the limestone area from Du Gia National Park in Mt. Khuoi Loa, Minh Son Commune, Tuyen Quang Province, northern Vietnam, in December 2025.

To verify the novelty of the new species, we reviewed taxonomic literatures of this genus (Pham 2003, Ma *et al.* 2010, Shan *et al.* 2019, 2021, You *et al.* 2020, Liao & Chen 2021, Liu *et al.* 2022, 2023, Hu *et al.* 2023, Nuraliev *et al.* 2023, Tran *et al.* 2024, 2025) and herbarium specimens at FOF, HN, KAG, TPKM, VNM as well as those images available online (e.g. JSTOR Global Plants, <https://plants.jstor.org/>). Morphological measurements and descriptions were performed based on dried voucher specimens, which were deposited at FOF, KAG, TKPM and VNM.

For DNA barcoding of the new species, total genomic DNA was extracted from silica gel-dried leaf material using a modified CTAB (cetyltrimethylammonium bromide) protocol (Doyle & Doyle 1987). The nuclear ribosomal internal transcribed spacer (ITS) region was selected for DNA barcoding. PCR amplification was performed using the primers ITS-p5 (5'-CCTTATCAYTTAGAGGAAGGAG-3') and ITS-u4 (5'-RGTTTCTTTTCCTCCGCTTA-3') following Cheng *et al.* (2016). PCR product purification, sequencing, and subsequent processing followed the protocols described by Souvannakhoummane *et al.* (2025).

## Taxonomic treatment

*Mitreola luongii* Moriwak., Tagane & V.S. Dang, *sp. nov.* Figs. 1, 2

**TYPE:**—VIETNAM. Tuyen Quang Province, Minh Son Commune, Mt. Khuoi Loa, Du Gia National Park, under the ever-green broad-leaved forest on limestone hill, 22.831°N, 105.144°E, 1140 m elev., 11 December 2025, with flowers, S. Tagane, V.S. Dang, P. Souladeth, Q.T. Pham, T. Vongthavone, D. Kongxaisavath, H. Moriwaki, K. Yamazaki, H. Naito N2556 (holotype VNM [VNM00075741], isotypes FOF [FOF0010011, FOF0010012], KAG [KAG203718], TKPM [TKPM BSP 092662]).

**Diagnosis:**—*Mitreola luongii* is most similar to *M. crystallina* of China in having light-purple corollas, but can be readily distinguished by its shrub habit, up to 1 m tall (vs. herb, up to 60 cm tall), terminal and axillary inflorescences (vs. terminal), shorter internode 1.5–5.5 cm long (vs. 6–8 cm long), shorter peduncles 0.5–1.5 cm long (vs. ca. 6 cm long), smaller leaf size 5.5–10.5 × 2–4.5 cm (vs. 15–20 × 5–7 cm) and longer corolla tube 4–4.5 mm long (vs. 4 mm long). (Table 1).

**Description:**—**Shrubs**, up to 1 m tall, many-branched. **Young twigs** dark yellow-green, glabrous, shallowly 4-angled, old twigs dark grayish brown, terete; internodes 1.5–5.5 cm long. **Leaves** opposite; blades elliptic, elliptic-obovate, (3.2–)5.5–10.5 × (1.4–)2–4.5 cm, thinly papery, dark yellow-green adaxially, grayish green abaxially, glabrous on both surfaces, apex acuminate to acute, acumen up to 0.8 cm long, base cuneate, margins entire, slightly recurved when dry, midrib prominent on both surfaces, lateral veins 5–7(–8) pairs, free or weakly forming a broad loop near

the margin, prominent abaxially; petioles 0.4–1 cm long, glabrous; **Stipules** not seen. **Cymes** terminal and axillary, 1.5–5 cm long, 1–4-branched, 5–20-flowered; peduncles 0.5–1.5 cm long, glabrous; bracts and bracteoles ovate to narrowly ovate-triangular, 0.8–1.7 mm long, glabrous on both surfaces, apex acute, margin ciliolate; pedicels 3–5 mm long. **Calyx** yellow-brown *in vivo*, deep blackish blue to dark brown *in sicco*, glabrous, tube 0.5–0.8 mm long, lobes 5, triangular, 1 × 1 mm long, apex acute, margin ciliolate, tinged with light purple. **Corolla** urceolate, 5.5–6 mm long, 4–5.2 mm in diam., tube 4–4.5 mm long, 2–2.5 mm in diam., much longer than lobes, pale purple *in vivo*, outside glabrous, inside hairy at the 1/2–3/4 from the base and with a ring of long hairs at the throat, lobes 5, reflexed at anthesis, triangular, ca. 1.5 × 1 mm, light purple adaxially, pale purple abaxially *in vivo*, glabrous, apex obtuse to acute. **Stamens** 5, inserted above the middle of the corolla tube, glabrous, filaments basally adnate to corolla tube, free part 0.7 mm long, white, anthers broadly oblong-ovoid, ca. 0.5 mm long, yellow. **Ovary** semi-inferior, depressed globose, ca. 0.5 × 1.3 mm, smooth, glabrous, 2-carpellate, styles 2, almost completely connate, 1.5–1.7 mm long, glabrous, stigma clavate. **Capsules and seeds** not seen.

**Distribution and habitat:**—*Mitreola luongii* is currently known only from one locality in Tuyen Quang Province, northern Vietnam. It grows on the shaded limestone rock crevices under the evergreen broad-leaved forest, at the elevation of 1140 m.

**Phenology:**—Flowering specimens were collected in December.

**Etymology:**—The species epithet honors Mr. Vuong Dinh Luong, director of Du Gia National Park, who has made significant contributions to biodiversity conservation in the park.

**Vernacular name:**—Tiểu mạo Vương Đình Lương

**GenBank accession no.:**—PZ298175 (ITS, sequenced for *Tagane et al. N2556*).

**Preliminary conservation status:**—At present, only one population of *Mitreola luongii* with about 20 individuals, was found in limestone hill during our field surveys. This population is located within the protected area of the Du Gia National Park, where its habitat is well-preserved from human disturbance. Given the similar habitat is widely seen in the national park, more populations and individuals are likely to occur. Because no special exploration was carried out to study its distribution as well as number of populations and individuals, this species is temporarily assessed as Data Deficient (DD) according to the IUCN (2024).

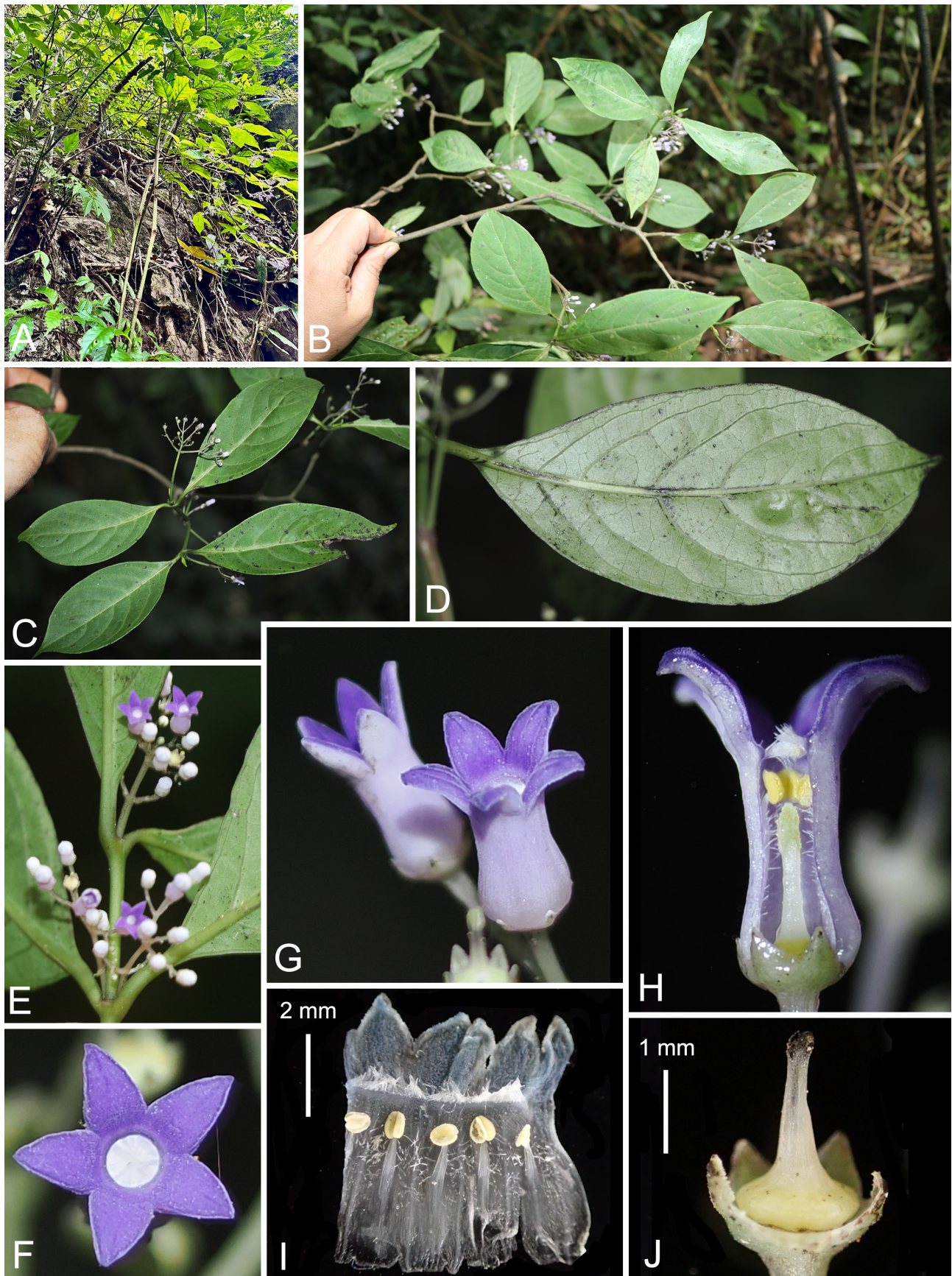
**Notes:**—In Vietnam, *M. luongii* is easily distinguished from other known species in the genus by its shrub habit and pale purple corolla.

**TABLE 1.** Morphological comparisons among *Mitreola luongii* and *M. crystallina*.

| Characters               | <i>M. luongii</i>                                   | <i>M. crystallina</i> (You <i>et al.</i> 2020) |
|--------------------------|-----------------------------------------------------|------------------------------------------------|
| Habit                    | shrub, many-branched                                | perennial herb, usually unbranched             |
| Plant height             | up to 1 m tall                                      | up to 60 cm tall                               |
| Internode length (cm)    | 1.5–5.5                                             | 6–8                                            |
| Leaf blade               | elliptic, elliptic-obovate, apex acuminate to acute | elliptic, apex acute                           |
| Leaf size (cm)           | 5.5–10.5 × 2–4.5                                    | 15–20 × 5–7                                    |
| Petiole length (cm)      | 0.4–1                                               | 1–2                                            |
| Inflorescence            | terminal and axillary                               | terminal                                       |
| Peduncle length (cm)     | 0.5–1.5                                             | ca. 6                                          |
| Calyx lobe size (mm)     | 1 × 1                                               | 2 × 1                                          |
| Corolla tube length (mm) | 4–4.5                                               | 4                                              |
| Corolla lobe size (mm)   | ca. 1.5 × 1                                         | ca. 1.5 × 2                                    |
| Stamens                  | inserted above the middle of the corolla tube       | inserted at base of corolla tube               |



FIGURE 1. Holotype of *Mitreola luongii* (Tagane et al. N2556, VNM [VNM00075741]).



**FIGURE 2.** *Mitreola luongii*. A. Habit, B–C. Flowering branches, D. Abaxial leaf surface, E. Terminal and axillary inflorescences, F. Corolla, front view, G. Corolla, lateral view, H. Partly dissected flower, showing stamens, style and stigma. I. Opened corolla, showing inner hairs and stamens, J. Pistil. Photos: A by Quoc Trong Pham, B & E by Phetlasy Souladeth, C, D, F–J by Shuichiro Tagane.

## Key to the species of *Mitreola* in Vietnam

1. Shrubs; corolla pale purple.....*Mitreola luongii* sp. nov.
- Herbs; corolla white or yellow green .....2
2. Inflorescence compound or thyrsoid cymes .....3
- Inflorescence helicoid cymes .....4
3. Leaf blades narrowly to linearly lanceolate; inflorescence compound cymes, with bearing 7 flowers.....*M. sinhoensis*
- Leaf blades elliptic or elliptic-obovate; inflorescence compact-thyrsoïd headlike cymes with bearing numerous flowers.....*M. capitata*
4. Capsules broadly ovoid, bilobed, not or slightly split at the apex.....*M. sphaerocarpa*
- Capsules ellipsoid or ovoid-conical, with horns usually with 2 inwardly curved horns or with 2 straight horns .....5
5. Annual herbs; stem erect; corolla tube as long as lobes; capsule with 2 inwardly curved horns; seeds smooth .....*M. petiolata*
- Perennial herbs; stem creeping; corolla tube longer than lobes; capsule with 2 straight horns; seeds reticulated ..... *M. reticulata*

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