

**NOTES ON TAXONOMY OF THE GENUS *Mitreola* L. (Loganiaceae)
IN THE FLORA OF VIETNAM WITH A NEWLY RECORDED
*Mitreola sphaerocarpa***

**Tran Thi Phuong Anh^{1,*}, Le Tuan Anh², Khang Sinh Nguyen³,
Tran Duc Binh³, Nguyen Thi Trung¹**

¹Graduate University of Science and Technology, Vietnam Academy of Science and Technology,
18 Hoang Quoc Viet, Ha Noi, Vietnam

²Mien Trung Institute for Scientific Research, Vietnam National Museum of Nature, Vietnam
Academy of Science and Technology, 321 Huynh Thuc Khang, Thua Thien Hue, Vietnam

³Institute of Ecology and Biological Resources, Vietnam Academy of Science and Technology,
18 Hoang Quoc Viet, Ha Noi, Vietnam

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ABSTRACT

Mitreola sphaerocarpa (Loganiaceae), a species occurring in Peninsular Malaysia, is newly reported for the flora of Vietnam. The description, photographs, information on ecology, preliminary conservation status and taxonomic notes are also presented. In order to facilitate identification, we provide an identification key and checklist for the 4 known *Mitreola* species in Vietnam.

Keywords: Loganiaceae, taxonomic, new record, *Mitreola*, Vietnam.

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*Corresponding author email: phuonganh@vnmn.vast.vn; <https://orcid.org/0000-0002-1758-903X>

INTRODUCTION

The genus *Mitreola* L. is of the family Loganiaceae with pantropical distribution (Leeuwenberg, 1974; Li & Leeuwenberg, 1996). The genus comprises about 17 species distributed in Africa, America, Asia, Oceania and the Pacific islands (Leeuwenberg & Vidal, 1972; Leeuwenberg 1974; Li & Leeuwenberg, 1996; Hu et al., 2023). In Vietnam Before this study, two species were known as *Mitreola petiolata* (J. F. Gmel.) Torr. & Gray and *Mitreola reticulata* Trel, have been recorded found in limestone areas (Trel, 1969; Leeuwenberg, 1974; Leeuwenberg & Vidal, 1972; Ho, 1999; Hop, 2017). One new species *Mitreola capitata* Nuraliev of this genus has been recently discovered and reported (Maxim et al., 2023). During our fieldwork in central Vietnam, we found a shady limestone mountain area, we found an interesting *Mitreola* species that had not seen before. We had collected the materials for flowering and fruiting several times. After consulted predecessor's literatures and specimens (Leeuwenberg, 1974; Trel, 1969; Ho, 1999; Hop, 2017). We determined that this species is *Mitreola sphaerocarpa*, which has not been recorded for the flora of Vietnam. In this study, we built a key, updated more species and added one more species belonging to *Mitreola*, increasing the total number of species of this genus in Vietnam to 4 species.

Key to species of genus *Mitreola* L. from the Vietnam

1. Capsule broadly ovoid, bilobed, not or slightly split at the apex.....*M. sphaerocarpa*
- Capsule horns usually with 2 inwardly curved horns or with 2 straight horns.....2
2. Inflorescence an umbel-like thyrsoid with several cymes, peduncle erect, 8.5–19.5 cm long; capitate (head like).....*M. capitata*
- Inflorescence partly terminating the stem and the few-leaved branches, partly lorescence terminal, congested; peduncle 1–2.5–15 cm long.....3
3. Stem erect. Stigma with 2 small styles. Capsule with 2 inwardly curved horns; seeds smooth.....*M. petiolata*
- Stem creeping. Stigma without style. Capsule with 2 straight horns; seeds reticulated.....*M. reticulata*

Mitreola capitata Nuraliev

Maxim S. Nuraliev, Dmitry F. Lyskov, Andrey N. Kuznetsov, Svetlana P. Kuznetsova

MATERIALS AND METHODS

The new record was collected during joint expeditions of the Mien Trung Institute for Scientific Research, the Vietnam Academy of Science and Technology. Institute of Ecology and Biological Resources and Graduate University of Science and Technology, in one locality of central Vietnam: Thuong Quang commune, Nam Dong district, Thua Thien Hue province. The morphological description is based on herbarium collections accompanied by photographs of living plants. During the determination of taxonomic identity of the studied specimens, the collections at HN, HNU, GH, K, L, MW, P and VNM were consulted.

RESULTS AND DISCUSSION

Genus *Mitreola* L.

L. 1758. Opera Varia. 214.

- *Cynoctonum* Gmel. 1791. Syst. Nat. ed. 13: 443.

Type: *Mitreola petiolata* (J. F. Gmel.) Torr & Gray (= *Cynoctonum petiolatum* J. F. Gmel.). The genus comprises about 17 species distributed in Africa, America, Asia, Oceania and the Pacific islands (Leenhouts, 1962, 1972; Leeuwenberg & Vidal, 1972; Leeuwenberg, 1974; Li & Leeuwenberg, 1996; Hu et al., 2023). In Vietnam, there are currently 4 species.

& Long-Fei Fu, 2023. Phytotaxa 585(1): 039–047.

Type: -VIETNAM. Quang Binh province: Bo Trach district, Tan Trach commune, Phong

Nha-Ke Bang National Park, limestone rock, 17°24'41"N, 106°13'59"E, elev. 650 m, 30 March 2022, Nuraliev M.S., Lyskov D.F., Dac L.X., Ha L.M., Thang D.Q. *NUR 3614* (holotype: MW: MW0595774; isotype: MW: MW0595775).

Loc. class.: -VIETNAM. Quang Binh province: Bo Trach district, Tan Trach commune, Phong Nha-Ke Bang National Park, limestone rock. (Maxim et al., 2023).

Ecology: -On 30 March 2022, the plants were in full flower, and also bore completely withered fruiting inflorescences (with dehisced capsules) of the previous season. (Maxim et al., 2023).

Distribution: -VIETNAM, Quang Binh province: Bo Trach district, Tan Trach commune, Phong Nha-Ke Bang National Park, limestone rock, 17°24'41"N, 106°13'59"E, elev. 650 m, 30 March 2022.

Specimens examined: -VIETNAM, Quang Binh province: Bo Trach district, Tan Trach commune, Phong Nha-Ke Bang National Park, limestone rock, Nuraliev M.S., Lyskov D.F., Dac L.X., Ha L.M., Thang D.Q. *NUR 3614* (MW: MW0595774; MW: MW0595775).

Mitreola petiolata (J. F. Gmel.) Torr. & Gray

Torr. & A. Gray, 1841. Fl. N. Amer. 2: 45;

- *Cynoctonum petiolatum* J. F. Gmel. 1791. Syst. Nat. ed. 13: 443.

Type: -Java, Jawa Timur, Madura, Ins. Madura Indonesia *Wallich, N, 376, 304* meters L, L0005162. (BM, K K000883406).

Loc. class.: -Java, Jawa Timur, Madura, Ins. Madura Indonesia.

Ecology: -Flowering in May–July, fruiting in August–November. It grows scattered along roads, in bushes, abandoned fields, at an altitude of less than 600 m.

Distribution: -VIETNAM, Ha Noi (Ha Dong), Khanh Hoa (Nha Trang), Ba Ria-Vung Tau (Ba Ria: Nui Dinh), Tien Giang.

It is also found in India, China (Yunnan, Guangxi), Myanmar, Thailand, Laos, Cambodia, Malaysia, Indonesia, Philippines, and other tropical countries in the world.

Specimens examined: -VIETNAM, Ba Ria-Vung Tau (Nui Dinh), *Pierre sine num.* (VMN).

Mitreola reticulata Tirel

Tirel, 1969. *Adansonia*, 9: 119.

Type: -VIETNAM: Hoa Binh province, Muong Thon, *Pételot 6698* (P, holotype; isotypes: GH, K, L, VNM).

Loc. class.: -VIETNAM, Hoa Binh, Muong Thon.

Ecology: -Flowering in May–June, fruiting in October–December. Grows scattered in limestone mountains.

Distribution: -VIETNAM, Hoa Binh (Muong Thon), Ha Noi (Ha Dong), Hai Phong (Cat Ba).

It is also found in China.

Specimens examined: -VIETNAM, Hai Phong (Cat Ba), *Tran Ninh sine num.* (HNU); LX-VN 3534, 3739 (HN).

Mitreola sphaerocarpa (Leenh.) Leenh. ex Leeuwenb (Fig. 1)

Leenh., 1972. Fl. Males., Ser. 1, Spermat. 6(6): 960.

- *Cynoctonum sphaerocarpum* Leenh., Bull. Jard. Bot. Brux. 32:1962 and in Fl. Males. 1.6: 377, f.37. a–e. 1962.

Description: Perennial herbs 20–30 cm tall. Stem erect, scarcely branched, dark green, 0.5–0.6 cm in diam., villous sparsely pubescent or pilose above and more or less sparsely pilose beneath on stems, simple or branched at base, 4-angled with angles rounded to acute or winged, internodes 1.5–7.5 cm long. Leaves opposite, blade elliptic, oblanceolate to obovate, 14–20 × 6–8.3 cm, sparsely pubescent, acute to acuminate at the apex, cuneate at the base or decurrent into the petiole; petiole 1–3 cm long, green, stipules reduced to interfoliar obtriangular sheath which is adnate to base of lamina pair, 4–5 mm long; lateral veins 8–10 pairs, impressed above, prominent beneath; stipules triangular, ca. 1–1.5 mm long. Inflorescence terminal and axillary, 1–4.0 cm long, yellow-green,

sparsely pilose or glabrescent, 3 or more branched, branches scorpioid; bracts small, triangular 1.2–2.0 mm long, usually more than 20 flowered. Flowers shortly pedicellate, 1.5–2 mm long; bracts triangular 1.2–2.0 mm long. Flowers many-flowered, flowers shortly pedicellate, 1.5–2.1 mm long. Calyx lobes 5, triangular, ca. 1.2–1.4 mm long, papillose to almost glabrous on both sides. Corolla white, 1.5–2 mm long, inside sometimes also pilose in the tube; tube ca. 2.5–3.0 × 1–1.5 mm; lobes broadly ovate, ca. 1.0 × 1.0 mm, obtuse at apex, glabrous except have a ring of long hairs at throat. Stamens 5 ca. 0.2–0.6 mm inserted at middle of corolla tube, glabrous; filaments ca. 0.3–0.4 mm; anthers broad ovate, mostly deeply cordate at the base. Ovary semi-inferior, bilocular, ca. 0.5–1 - 0.8–1 mm; style ca. 0.2 mm long; stigma subsessile, very soon cleft after fecundation. Capsule 2-lobed or broadly ovoid, bilobed, not or slightly split at the apex, ca. 4 mm long, ca. 3.5 mm wide, glabrous, light green; sepals persistent at base.

Type: -Sabah: Mt. Kinabalu, Tenompok, in Minitindok Gorge, J. & M. S. Clemens 29649 (L, holotype; isotypes: A, BM, K).

Loc. class.: -Sabah (Malaysia): Mt. Kinabalu, Tenompok.

Ecology: -Flowering in June, fruiting in June. Grows scattered in limestone mountains. Mountains. at an altitude of less than 100–1,500 m.

Distribution: -VIETNAM. Thua Thien Hue province: Nam Dong district, Thuong Quang commune.

There is also known from two collections from Sabah (one seen) and one from Sarawak in Malaysia.

Specimens examined: -VIETNAM. Thua Thien Hue province: Nam Dong district, Thuong Quang commune, 16°07'22.1"N, 107°35'41.3"E, ± 450 m a.s.l., 7 June 2018. Thanh Hung Tran, Tuan Anh Le, *LTA sine num* (VNMN) Thua Thien Hue province: Nam Dong district, Thuong Quang commune, 16°07'22.1"N, 107°35'41.3"E, 450 m a.s.l., 10 June 2024. Tran Thi Phuong Anh, Tran Duc Binh, Bui Hong Quang, *TTPA 100* (HN).

Preliminary conservation status: -*M. sphaerocarpa* is found only in its type locality Thua Thien Hue province, Nam Dong district, Thuong Quang commune. Further detailed investigation of similar habitats is needed to better understand the natural distribution and abundance of the species. *M. sphaerocarpa* is provisionally assessed as Data Deficient (DD) by IUCN (IUCN, 2019). In the type locality of *M. sphaerocarpa*, there are only small areas of scattered native vegetation on limestone mountains. Mountains at altitudes below 100–1,500 m, some areas are being quarried for building stone from limestone mountains. The habitat of *M. sphaerocarpa* is extremely fragile. Therefore, this species deserves close attention.

Table 1. Morphological comparisons among, *Mitreola sphaerocarpa* and *Mitreola pedicellata*

Characters	<i>Mitreola sphaerocarpa</i>	<i>Mitreola pedicellata</i>
Perennial herbs tall	20–30 cm	5–80 cm
Stem	1.3–4.2 cm	1.5–7.5 cm
Leaf blade and size	6.0–14.0 x 3–6 cm	14–20 × 6–8.3 cm
Lateral veins	8–10 pairs	11–14 pairs
Petioles	0.8–1.0 cm	1.3–3.1 cm
Inflorescence	terminal or axillary, less flowers	terminal or axillary, many flowers
Calyx	1–1.3 mm	1.5–2 mm
Capsule	2-lobed or broadly ovoid, bilobed, not or slightly split at the apex	2-lobed or mitre-shaped, laterally compressed

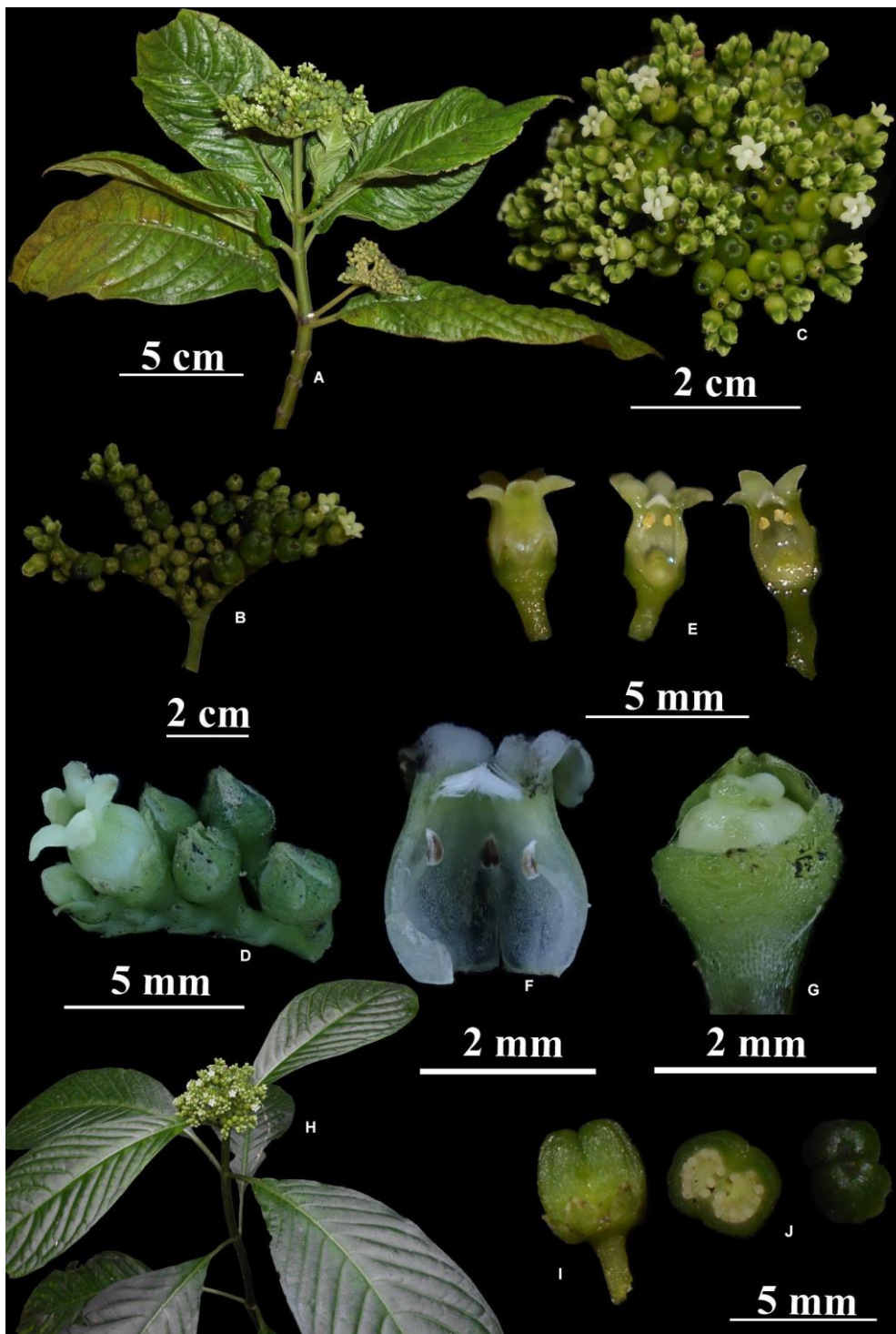


Figure 1. *Mitreola sphaerocarpa*: A. flowering branch; B. inflorescence frontal view; C. inflorescence top view; D. flower; E. petals; F. stamens; G. Mesosoma, lateral view; H. leaves and inflorescence. G. ovaries and styles I. fruit; J. fruit (anatomic structure)
[Photos by: L.T. Anh, designed by L.T. Anh]

Taxonomic relationships: *Mitreola sphaerocarpa* is distinct from the other known species of the genus in lateral veins and capsule. It is most similar to *Mitreola pedicellata* according to their cymes, 5-merous flowers, and erect 4-angled stems, but differs in its Lateral veins 8–10 pairs (vs. 11–14 pairs). Petioles 0.8–1.0 cm (vs. 1.3–3.1 cm). Calyx 1–1.3 mm (vs. 1.5–2 mm). Capsule 2-lobed or broadly ovoid, bilobed, not or slightly split at the apex (vs. 2-lobed or mitre-shaped, laterally compressed) (Table 1). To better identify the species of *Mitreola* in Vietnam, we provide the following key.

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