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MITREOLA LINCANGENSIS (LOGANIACEAE, LOGANIOIDEAE), A NEW SPECIES FROM YUNNAN, CHINA

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Abstract

Mitreola lincangensis, a new species of Loganiaceae from Yunnan, Southwest China, is described and illustrated. This new species is close to *M. reticulata* and *M. pedicellata* in morphological characters, but differs by its terete stem, leaf blade elliptic to oblong, 1–1.6 × 3–5 cm, papyraceous, apex pungent, interpetiolar stipules lanceolate and capsules with two horns curved inwards.

Key words: *Mitreola*, China, Taxonomy, Morphology, Loganiaceae.

Introduction

Mitreola was established by Linnaeus in Hortus Cliffortianus (1737), based on the species *Mitreola petiolata*, but in his Species Plantarum (1753), he changed his mind, reducing *Mitreola* to a synonym of *Ophiorrhiza* (Leeuwenberg, 1974). Soon after, *Ophiorrhiza* was transferred to the Rubiaceae. Later, he mentioned *Mitreola* again in Opera Varia (1758), in which the generic name *Mitreola* was published (Leeuwenberg, 1974). As the Opera Varia (1758) was an obscure book, there were multiple names used in a confused manner in this genus (Nelson, 1980) until Nelson (1980) confirmed *Mitreola* as a valid generic name.

Mitreola Linnaeus (1758: 214) (Loganiaceae) consists of approximately 15 species of annual or perennial herbs (Fang *et al*., 1995; Conn, 1996; Li & Leeuwenberg, 1996; Ma *et al*., 2010; Gibbons *et al*., 2012; Shan *et al*., 2019). These are predominantly distributed in Asia, America and Madagascar, one of them (*Mitreola minima*) appearing to be a geographic anomaly, which is distributed in Australia (Li and Leeuwenberg 1996; Gibbons *et al.*, 2012). About ten species are recorded in China and seven of them are endemic (Li, 1979; Fang *et al.*, 1995; Li & Leeuwenberg, 1996; Ma *et al.*, 2010; Shan *et al.*, 2019). There are three *Mitreola* species (*M. petiolata*, *M. petiolatoides* and *M. pedicellata*) distributed in Yunnan province (Li & Leeuwenberg, 1996).

Last year, during field work in Southwest Yunnan, China, Mr. Pan found an interesting population of *Mitreola*. Soon afterwards, Mr. Li collected the fresh materials according to the information given by Mr. Pan. After consulting literature and specimens from previous researchers, we describe it here as a new species.

Materials and Methods

The fresh materials for 10 individuals were collected by Mr. Li during March 2018. Afterwards, we measured the new species with a vernier caliper and observed its morphological character by a microscope and scanning electron micrograph. It has been compared with morphologically similar species with literature and other specimens from previous researchers. Protologues and images of type specimens were gathered from JSTOR Global Plants (http://plants.jstor.org).

Taxonomic treatment

Mitreola lincangensis Z. J. Mu, Z. J. Shan & B. Pan, sp. nov. (Figs. 1, 2 and 3).

Type:—CHINA. Yunnan: Lincang City, Zhenkang Country, Fengwei Town, Xuanlai checkpoint, on limestone, elevation 829.1 m, 23°52′33.03″N, 99°00′05.03″E, 23 Mar 2018, *R. N. Li and Z. Q. Hou JXCM20180323001* (Holotype: JXCM!; Isotypes: JXCM!, PE!).

Diagnosis:—*Mitreola lincangensis* is close to *M. reticulata* and *M. pedicellata* in morphological characters, but differs from them by its branchlets terete (vs. branchlets 4-angled and branchlets 4-angled when young, becoming terete, respectively), interpetiolar stipules lanceolate (vs. interpetiolar stipules liguliform and interpetiolar stipules reduced to a narrow rim, respectively), pilose except outside of corolla lobes (vs. glabrous expect stipule, the throat of corollas and corolla lobes inner surface and glabrous except sometimes for abaxial surface of young leaves, petioles and mouth of corollas respectively), capsules apex curved inwards.

Description:—Perennial herb 8–30 cm high. Stem creeping at the base and there, often with adventitious roots, terete, much branched; internodes 1–4.8 cm long. Pilose except corolla, two sides of blade with dense hairs. Interpetiolar stipules lanceolate, ca. 1 mm, tomentose at margin. Leaves opposite, petiolate; petiole 8–12 mm long, pilose; leaf blade elliptic to oblong, 1–1.6 × 3–5 cm, papery, base cuneate to

rounded, apex pungent, lateral veins 6–9 pairs, inconspicuous above, raised beneath. Inflorescences terminal or axillary, many flowered; peduncles 0.8–4.5 cm; bracts and bracteoles elliptic, ca. 1 mm, pedicels sparsely pilose, 1–2.5 mm. Calyx lobes 5, ovate to triangular, ca. 1 mm long. Corolla white, urceolate, ca. 3mm, tube ± as long as lobes; lobes 5, ligulate, glabrous outside and inside except with a villous ring at throat. Stamens 5, inserted at middle of corolla tube, glabrous, filaments ca. 0.2 mm, anthers broadly ovate, ca. 0.3 mm in diameter. Ovaries semi–inferior, bilocular, ovules numerous per locule; stigmas connate. Capsules bilobed, split near the middle, connate for 2/3 their length, two horns curved inwards; wall pubescent, sepals persistent at base. Seeds back, semi–globular, testa reticulate.

Phenology:—Flowers from March to April, fruit from April to May.

Distribution and habitat:—*Mitreola lincangensis* is currently only found in the type locality. It grew in mainly limestone areas together with such species as *Pteris vittata* f. *vittata*, *Lindenbergia philippensis* and *Adiantum capillus-veneris*.

Etymology:—The species is named after the type locality, Lincang city, in Yunnan Province, China.

Conservation status:—Only about 150 individuals from a sigle population had been found during our fieldwork in Lincang city. In order to build the hydropower station, the habitat was destroyed. In addition, the harsh environment of the limestone area also limits the spread of population. Taking into consideration all of this, we assessed *M. lincangensis* as Critically Endangered (CR B1ab(iii)+B2ab(iii); D) (Anon., 2017).

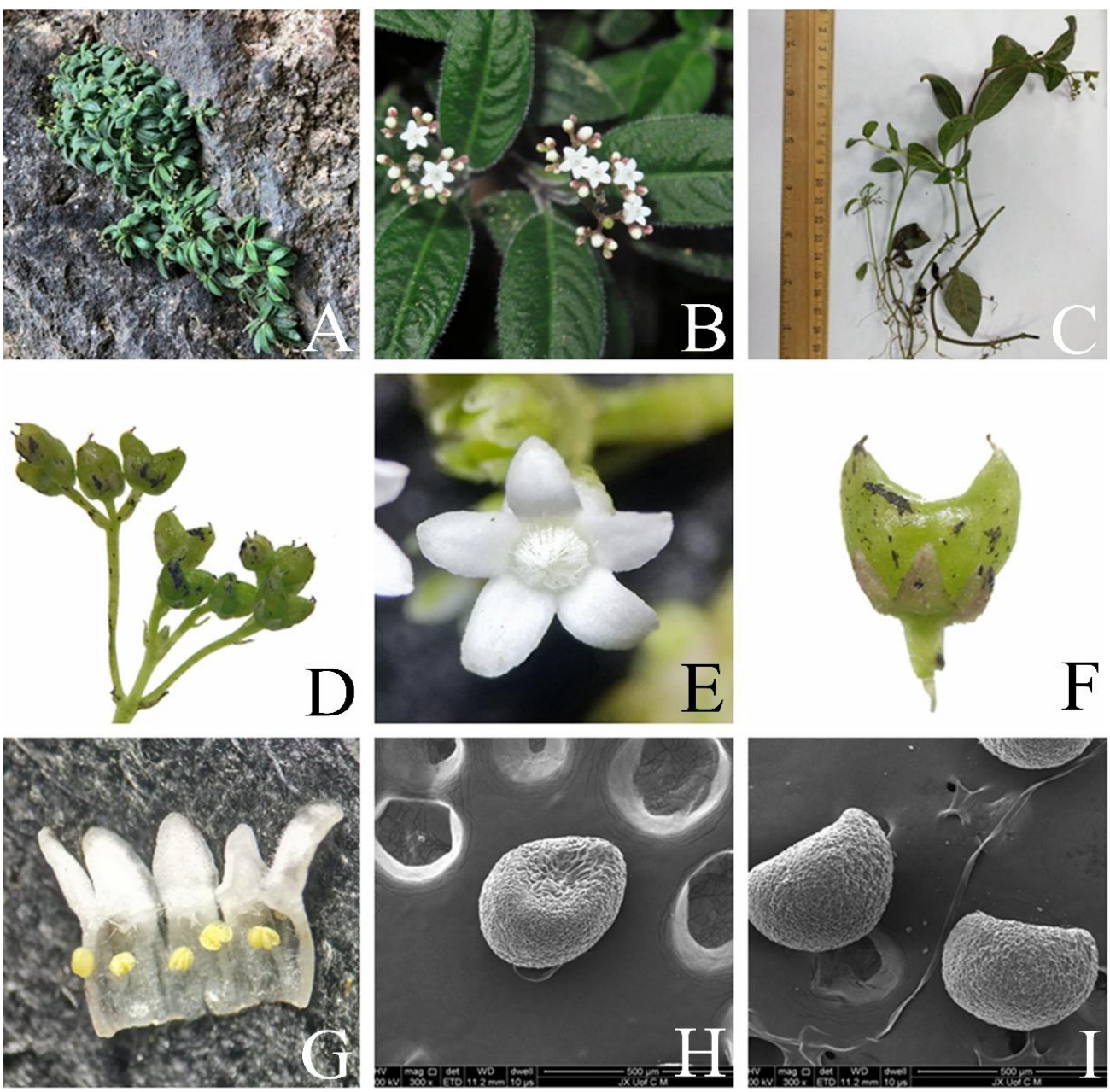

Fig. 1. *Mitreola lincangensis*. A. Habitat; B. Inflorescence; C. Plant; D. Infructescence; E. Flower; F. Fruit; G. Floral anatomy; H and I. Seeds. Photographed by Z. J. Mu & R. N. Li.

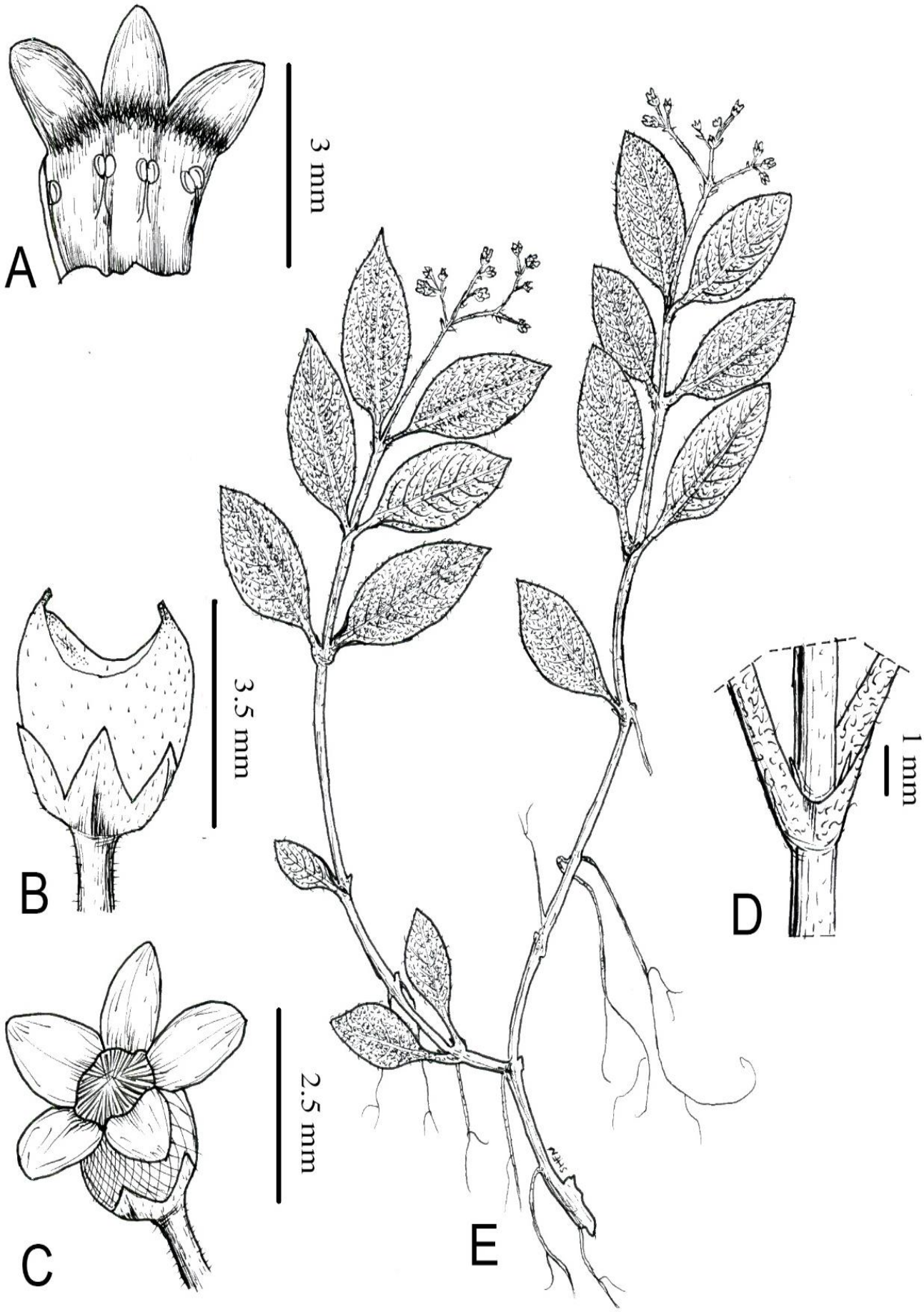

Fig. 2. *Mitreola lincangensis*. A. Flower cutaway view; B. Fruit; C. Flower; D. Stipule; E. Plant. Drawn by Jia-Hao Shen.

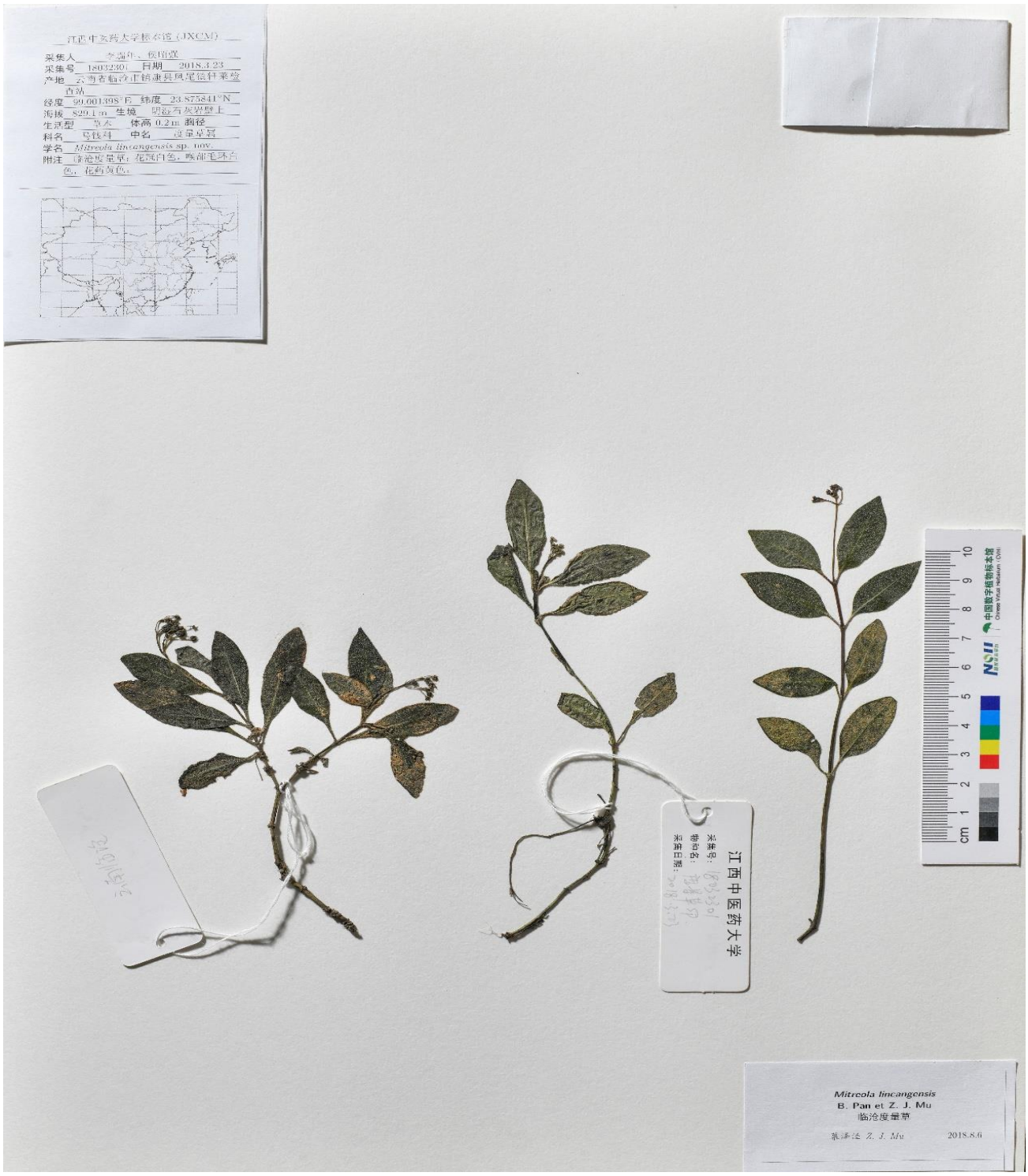

Fig. 3. Holotype of *Mitreola lincangensis* (JXCM20180323001!).

Discussion

Mitreola lincangensis Z. J. Mu, Z. J. Shan & B. Pan most resembles *M. reticulata* Tirel and *M. pedicellata* Benth in morphological characters, e.g. perennial; stem creeping; many flowers, stamens inserted at corolla tube middle. However, after careful comparison of specimens and descriptions in literature, there are many obvious differences between them in their vegetative characters: e.g. *M. lincangensis* has cylindrical branchlets terete (vs. branchlets 4-angled and branchlets 4-angled when young, becoming terete, respectively), leaf blade 1–1.6 × 3–5 cm (vs. leaf blade 1.5–3 × 4–9 cm and leaf blade 2–5 × 5–15 cm), pilose except outside of corolla lobes (vs. glabrous except stipule, the throat of corollas and corolla lobes inner surface and glabrous except sometimes for abaxial surface of young leaves, petioles and mouth of corollas, respectively), interpetiolar stipules lanceolate (vs. interpetiolar stipules liguliform and interpetiolar stipules reduced to a narrow rim, respectively), capsules apex curved inwards (vs. capsules apex horns straight) (see Table 1). The following key to the species of *Mitreola* in China is provided.

Table 1. Morphplogical comparison between *M. lincangensis* and the related species.

Characters	*M. lincangensis*	*M. reticulata*	*M. pedicellata*
Height	8–30 cm	30–55 cm	Up to 60 cm
Leaf size	1–1.6 × 3–5 cm	1.4–3 × 4–8 cm	2–4.5 × 5–16 cm
Inflorescence	terminal or axillary	terminal	terminal or axillary
Peduncle	0.8–4.5 cm	1–2.8 cm	3–6.5 cm
Branchlet	terete	4-angled	4-angled when young, becoming terete
Vestiture	Pilose except outside of corolla lobes	Glabrous expect stipule, the throat of corollas and corolla lobes inner surface	Glabrous except sometimes for abaxial surface of young leaves, petioles and mouth of corollas
Stipule	Lanceolate	Liguliform	Reduced to a narrow rim
Capsule	Two horns curved inwards	Two horns straight	Two horns straight

Key to species of *Mitreola* in China

1. Perennials …… 3
+ Annuals …… 2
2. Plants 5–10 cm tall; leaf blade 0.5–2 cm long; 3 flowers …… *M. petiolatoides*
+ Plants 10–50 cm tall; leaf blade 4–7 cm long; stems 4-angled; many flowers …… *M. petiolata*
3. Stems inconspicuous; leaves in a basal rosette, sessile …… 4
+ Stems conspicuous, creeping or erect; leaves opposite, clustered at the stem or branch apex, petiolate …… 6
4. Apex acute, veins purple, capsule horns incurved …… *M. purpureonervia*
+ Apex obtuse or rounded, veins green, capsule horns erect …… 5
5. Leaf blade with lateral veins 5–7; bracts narrowly triangular; stamens inserted at corolla tube middle …… *M. spathulifolia*
+ Leaf blade with lateral veins 7–10; bracts oblong; stamens inserted at corolla tube top …… *M. macrophylla*
6. Stems creeping …… 7
+ Stems erect …… 9
7. Stems terete; interpetiolar stipules lanceolate; capsules horns incurved …… *M. lincangensis*
+ Stems 4-angled or 4-angled when young becoming terete; interpetiolar stipules liguliform or reduced to a narrow rim capsules horns erect …… 8
8. Interpetiolar stipules liguliform; inflorescences terminal; peduncle 1–2.8 cm …… *M. reticulata*
+ Interpetiolar stipules reduced to a narrow rim; inflorescences terminal or axillary; peduncle 3–6.5 cm .. *M. pedicellata*
9. Bracts narrow-triangular; stamens inserted at corolla tube base …… *M. liui*
+ Bracts linear or subulate-lanceolate; stamens inserted at corolla tube middle …… 10
10. Plants 9–31cm; bracts linear; lateral vein 4–6 pairs …… *M. pingtaoi*
+ Plants up to 55 cm; bracts subulate-lanceolate; lateral vein 7–10 pairs …… *M. yangchunensis*

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