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Lysimachia longiracemosa (Primulaceae: Lysimachieae), a new frutescent herb from Yunnan, China

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ABSTRACT: *Lysimachia longiracemosa*, a new species of Primulaceae, is described from the margin of highland subtropical broad-leaved forests in southeastern Yunnan, China. Based on morphological evidence, the new species is placed in *Lysimachia* subgenus *Idiophyton* and diagnosed against its closest congener, *L. nutantiflora*. A revised key is also provided to distinguish *L. longiracemosa* from the related frutescent species with racemose inflorescences of the *Lysimachia* subgenus *Idiophyton*.

KEY WORDS: Flora of China, Linnean, *Lysimachia nutantiflora*, *Lysimachia* subgenus *Idiophyton*, Yunnan.

INTRODUCTION

Lysimachia L. (Primulaceae, Lysimachieae) is a large genus comprising over 250 species (Liu *et al.*, 2023; POWO, 2025). The current broad circumscription of *Lysimachia s.l.* results from the merger of several satellite genera (e.g., Hao *et al.*, 2004; Manns and Anderberg, 2005, 2009, 2011). The genus is widely distributed across temperate and subtropical regions of the Northern Hemisphere, with a few species extending into the Southern Hemisphere (Anderberg and Ståhl, 1995; Hu and Kelso, 1996). China represents a major diversity center for *Lysimachia*, hosting over 180 species, with its hypothesized origin and diversity center in the southwestern China and adjacent areas (Chen and Hu, 1979). Notably, Yunnan Province alone records more than 70 species, accounting for over one-third of the Chinese total, highlighting its significance as a biodiversity hotspot for the genus (Hu and Kelso, 1996; Nong *et al.*, 2023; Xu *et al.*, 2024; Yan and Hao, 2024; Zhang *et al.*, 2024).

Molecular phylogenetic studies have supported at least 11 main clades within the genus, 8 of which are represented in China (Yan *et al.*, 2018). Among these, *Lysimachia* subgenus *Idiophyton* Hand.-Mazz., the second largest subgenus, is strongly supported as monophyletic, while the largest subgenus, subg. *Lysimachia*, is paraphyletic (Liu *et al.*, 2023). Subgenus *Idiophyton* is characterized by yellow nectarless flowers, reflexed corolla lobes, poricidal basifixed anthers with short filaments adnate to the corolla base, and the formation of a protruding cone (Anderberg *et al.*, 2007); this unique suite of floral characters is considered a key synapomorphy defining the clade and is associated with a buzz-pollination syndrome (Anderberg *et al.*, 2007).

During a recent floristic survey in southeastern Yunnan, an unidentified *Lysimachia* species was documented at the edge of a subtropical forest near Gulinqing Township. The plants are frutescent herbs characterized by erect stems and long axillary racemose inflorescences with minute bracts. This combination of characters is uncommon within the genus and is primarily associated with members in *Lysimachia* subg. *Idiophyton* (Chen and Hu, 1979; Tong *et al.*, 2017), especially *L. baviensis* C.M.Hu, *L. heterobotrys* F.H.Chen & C.M.Hu, *L. nutantiflora* F.H.Chen & C.M.Hu, *L. physaloides* C.Y.Wu & C.Chen, *L. subverticillata* C.Y.Wu, and *L. wilsonii* Hemsl. Specifically, the plants most closely resemble *L. nutantiflora* in its elongated inflorescences but differ by having unwinged stems, horizontally spreading and basally branched racemes, subulate to linear bracts, and medium-green calyx. Subsequent examination of herbarium specimens previously attributed to *L. nutantiflora* from the adjacent area confirmed that they are conspecific with our new gathering and, represent misidentified material. Consequently, after careful comparison, it is suggested that the Yunnan material previously assigned to *L. nutantiflora* represents a new species with coherent and rather distinct characteristics, which is formally described here.

MATERIALS AND METHODS

Plant material was examined and photographed in the field using a Nikon D5300 camera. Description was prepared based on field observations and measurements of both fresh material and dried specimens. Type specimens and all newly collected material were air-dried overnight using a fan heater.

The conservation status of *Lysimachia longiracemosa* was assessed through the calculation of its Extent of

Occurrence (EOO) and Area of Occupancy (AOO), which was performed using the online tool GeoCat (Bachman *et al.*, 2011), applying a 2 km grid cell following IUCN (2024). The referencing geographic information was based on the locality data from the type specimen and other examined specimens (see 'Additional Specimens Examined).

TAXONOMIC TREATMENTS

Lysimachia longiracemosa Y.H.Tan & Z.X.Ma, ***sp. nov.*** **Figs 1–4**

Type: CHINA: Yunnan Province, Wenshan Prefecture [文山州], Maguan County [马关县], Gulinqing Township [古林箐乡], between Houziyan [猴子岩] and X343 at Y064, along the road X343, on an earthy cliff in half-shade, elev. 1194 m, 22°46'22.8"N, 103°57'26.0"E, at the margin of subtropical broad-leaved forests, 11 May 2025, *Z.X. Ma 2408* (holotype BAZI [barcode: 000853]!; isotypes BAZI [barcode: 000854]!, HITBC [barcode: 0134676]!, PE, to be distributed).

Diagnosis: *Lysimachia longiracemosa* is morphologically similar to *L. nutantiflora*, but differs in having unwinged stems (vs winged stems), basally branched racemes that often develop the lowest branch into a paniculate unit and extend horizontally, smaller lanceolate bracts with the lowest 0.2–0.4 × 1.0–1.8 cm that abruptly reduce upward to nearly indistinct narrowly lanceolate to subulate bracts ca. 0.4 × 0.2 mm (vs. leaf-like, elliptic to lanceolate, lowest bracts ca. 2.8 × 1.5 cm, gradually reduced upward to ca. 4 × 1.5 mm), and calyx medium green (vs. dark purple).

Description: Perennial frutescent herb, ca. 70–100 cm tall. Stem erect, to 80 cm tall, to 0.9 cm in diam., terete, medium green, sometimes with obscure longitudinally raised leaf traces, not prostrate at base, young shoot and shoot apex sparsely tomentose, glabrous in old stem; internodes 3.7–5.8 cm long. Leaves alternate, 6–9 leaves per stem, laxly together at distal portion of the stem; petiole terete, 1.1–2.7 cm, glabrous; leaf blade elliptic to broadly lanceolate, somewhat falcate, 4.5–17.6 cm ×1.1–7.0 cm, chartaceous, margin entire, base cuneate, symmetrical, apex acute, shortly mucronate; adaxial surface medium green, glossy; abaxial surface pale green, furnished with raised purplish venation, sparsely tomentose on the midrib and the base of secondary veins, indumentum obscure when dried. Venation eucamptodromous, slightly impressed adaxially, raised abaxially, raised bifacially when dried; secondary veins (3–)6–8 per side, basal-most veins unpaired, decurrent at base to join the midvein, arching and joining into the collective vein at leaf margin; tertiary and inter-secondary veins sub-perpendicular to the midvein, resembling the rhamnoid venation. Inflorescence axillary and terminal, elongated, spreading horizontally, 8–13(–19)-flowered; peduncle 12.5–19.6 cm; bracts minute, subulate or narrowly lanceolate, ca. 0.4×0.2 cm; lowest bract lanceolate to linear, 0.2–0.4×1.0–1.8 cm, chartaceous, margin entire, base symmetrically cuneate, apex acute, shortly mucronate. Flowers bisexual, pendulous, without a significant odor. Pedicel drooping, 2.3–2.8 cm long. Calyx lobes suborbicular, 0.3–0.4 cm long, glossy, medium green, imbricate, apex mucronate. Corolla bright yellow, lobes oblong, 0.7–0.8 cm long, apex obtuse. Filaments basally connate into a dark purplish ring, fused with corolla, free part very short; anthers subpyramidal, ca. 6×1 mm, basifixed, opening by an apical pore. Ovary ovoid, ca. 2 mm in diam., glabrous, pale green; style 0.5–0.6 mm long; stigma subglobose. Capsule subglobose, to 0.5 cm in diam. Fl. Mid–May to Jun.; Fr. Oct.–Nov.

Etymology: The species epithet "*longiracemosa*" refers to the long, racemose inflorescence, which is a diagnostic character of this species.

Distribution & Ecology: *Lysimachia longiracemosa* is known only from the upper elevations of Gulinqing Township, near the Sino-Vietnamese border, where it occurs in abundant populations. This area lies within the southeastern extension of the Daweishan Mountains. The species is commonly found at the edges of subtropical broad-leaved forests growing on non-limestone substrates, and it thrives in slightly disturbed, half-shaded, and moist habitats.

Conservation Status: *Lysimachia longiracemosa* is endemic to the Gulinqing Township, Southeastern Yunnan, China. The Extent of Occurrence (EOO) is estimated at 94.6 km², and the Area of Occupancy (AOO) at 32 km², based on the geographic information provided in the section "Additional Specimens Examined." Several known populations, for example, Laofangzi, and Piaochang, occur within the boundaries of the Gulinqing Provincial Nature Reserve and Majiahong Forestry Site, affording them a certain degree of formal protection. The species forms locally abundant populations and appears to thrive in its characteristic habitats of forest margins and half-shaded roadside banks (*Z.X. Ma 2466*). Although its overall distribution is highly restricted, the combination of its occurrence within a protected area, local abundance, and adaptation to relatively stable secondary habitats suggests that it is not currently facing major threats. Consequently, it does not meet the thresholds for any threatened category. The species is provisionally assessed as Near Threatened [NT D2], as it is close to qualifying for Vulnerable under Criterion D2 owing to its restricted AOO and potential sensitivity to human disturbance outside protected areas (IUCN, 2024).

Additional Specimens Examined **(*paratypes*)**: CHINA. Yunnan Province, Wenshan Prefecture [文山州], Maguan County [马关县], Gulinqing [古林箐乡]: Majiahong Forestry Site [马家红林区], 22°47'56"N 103°56'43"E, on roadside near the evergreen broad-leaved forest, 04 October 2002, *Y.M.Shui, W.H.Chen & J.S.Sheng 30632* (PE [barcode: 01895473]!); *loc. ibid.*, *Y.M.Shui, W.H.Chen & J.S.Sheng 30756* (PE [barcode: 01895470]!); *loc. ibid.*, from Laochangbu [老场部] to Jinchang River [金厂河], 22°44'21"N, 103°59'56"E, in the

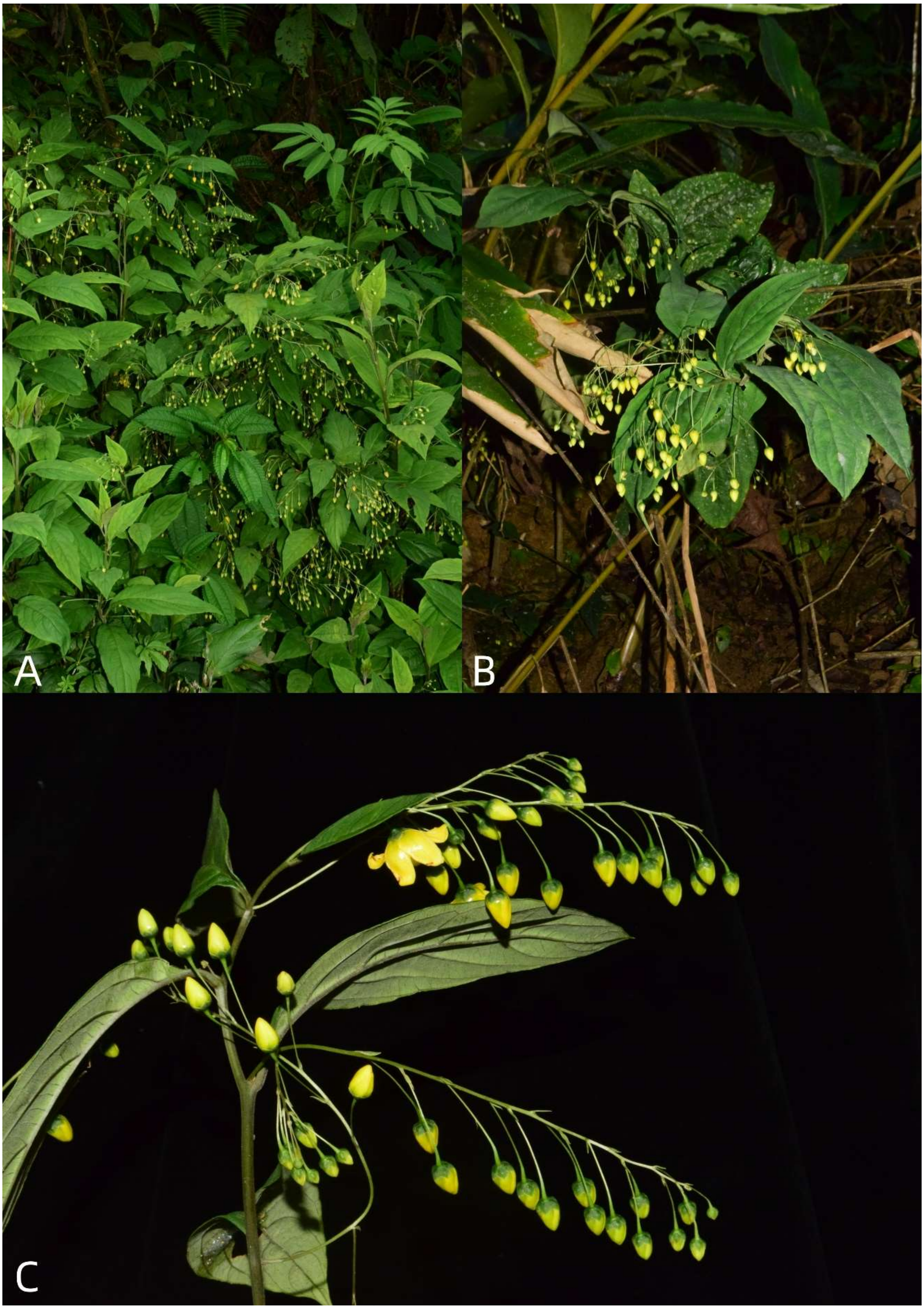

Fig. 1. Habit of ***Lysimachia longiracemosa***. **A-B.** Plant in the habitat, showing an erect subshrub habit. **C.** Plant with horizontally extending inflorescence. A is vouched by *Z.X.Ma 2466*, and B-C are vouched by the type gathering *Z.X.Ma 2408*. Photographs: Z.X. Ma.

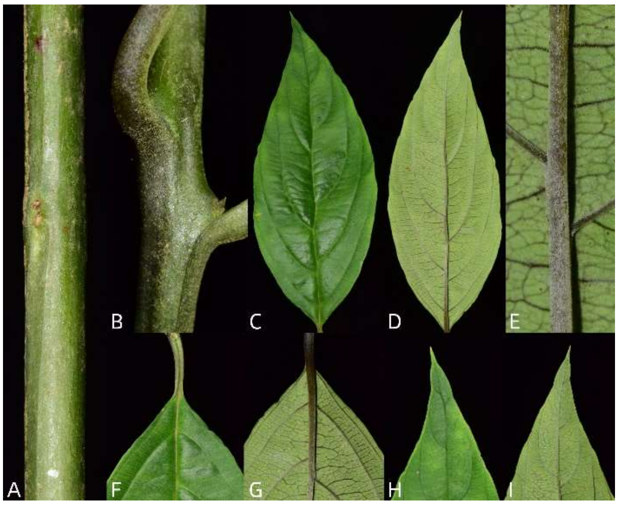

Fig. 2. Vegetative characters of ***Lysimachia longiracemosa***. **A.** Subwoody, erect and caulescent main stem, note its terete shape, furnished with a few longitudinally raised leaf traces. **B.** A typical young shoot with a sparsely tomentose indumentum. **C-D.** Leaf blades, note the dense tertiary veins sub-perpendicular to the midvein, resembling the rhamnoid venation. **E.** Detail of the midvein with a sparsely tomentose indumentum. **F-G.** Leaf base. **H-I.** Leaf apex, note the distinctive marginal collective vein raised abaxially. All images are vouched by the type gathering *Z.X. Ma 2408*. Photographs: Z.X. Ma.

Fig. 3. Inflorescence and flower of ***Lysimachia longiracemosa***. **A-D.** Racemes from multiple individuals were compared, noting their horizontally extending axis with pendulous flowers, which superficially resembles to a helicoid cymose inflorescence. **E-G.** Flowers from different views. **H.** Flower dissected, note half of the calyx and corolla are artificially removed, displaying the robust anthers with minute filaments. **I.** Flower dissected, showing the glabrous pistil. All images are vouched by the type gathering *Z.X.Ma 2408*. Photographs: Z.X. Ma.

Fig. 4. Holotype of ***Lysimachia longiracemosa***, *Z.X.Ma 2408*. Photograph: Z.X. Ma.

evergreen broad-leaved forests of the south slope, 10 October 2002, *Y.M.Shui, W.H.Chen & J.S.Sheng 31035* (PE [barcode: 01895474]!); *loc. ibid.*, Laofangzi [老房子], 22°46'49"N, 103°57'53"E, in the evergreen broad-leaved forests of the limestone hills, 31 July 2012, *Y.M.Shui, W.H.Chen & J.S.Sheng 31531* (PE [barcode: 01895472]!); *loc. ibid.*, Qincaitang [芹菜塘], along the roadside on the upper hills, alt. 1000–1200 m, 28 March 2002, *Y.M.Shui, W.H.Chen, J.S.Sheng S.D.Zhang & C.L.Fan 20615* (PE [barcode: 01895471]!); *loc. ibid.*, Laowangzhai village [老王寨村], 22°46'25"N, 103°57'35"E, in the evergreen broad-leaved forest of the limestone hills, 3 October 2002, *Y.M.Shui, W.H.Chen & J.S.Sheng 30208* (PE [barcode: 01934306]!); *loc. ibid.*, between Piaochang [瓢厂] and Xiaoqiwan [筲箕弯], along the roadside, at the margin of primitive highland subtropical broad-leaved forest, alt. 1806 m, 22°51'55.5"N 103°59'46.1"E, 13 May 2025, *Z.X.Ma 2466* (BAZI [barcodes: 000855, 000856]!, HITBC!).

DISCUSSION

Lysimachia longiracemosa is tentatively assigned to *Lysimachia* subgenus *Idiophyton*, based on the following diagnostic characters: erect stems; absence of colored glandular punctations or striations on plant parts; alternate leaves; 5-merous yellow and nectarless flowers; reflexed corolla lobes; and poricidal, basifixed anthers with short filaments. Within *Lysimachia* subgenus *Idiophyton*, *L. longiracemosa* belongs to a clade characterized by frutescent herbs with erect stems, racemose inflorescences, campanulate corollas, distinctly basifixed anthers, longer than filaments that usually dehisce via apical pores, and filaments connate into a ring and adnate to the base of the corolla tube. Its closest presumed relative is *L. nutantiflora*, with which they share elongated racemose inflorescences and a frutescent-herbaceous habit. However, *L. longiracemosa* can be distinguished from *L. nutantiflora* by: stems unwinged (vs. distinctly winged); racemes basally branched and horizontally spreading (with the lowest branches sometimes forming paniculate units; vs. unbranched and often arching racemes); bracts minute, subulate to linear, the lowest measuring 0.2–0.4 × 1.0–1.8 cm and abruptly reduced upward (vs. leaflike, elliptic to lanceolate bracts, the lowest 2.8 × 1.5 cm and gradually reduced upward); and medium green calyx (vs. dark purple calyx). *L. longiracemosa* also differs from other congeners in the subgenus, including *L. heterobotrys*, *L. subverticillata*, and *L. wilsonii*. A key for distinguishing *L. longiracemosa* from these related species is provided below:

1a. Racemes elongated, 5- to many-flowered ………...……………… 2
1b. Racemes corymbiform, fewer than 10-flowered ……….……..… 5
2a. Stem distinctly winged; raceme unbranched, often arching; bracts broadly elliptic to lanceolate; calyx dark purple. Endemic to SW Guangxi. ………………..……………………...…… ***L. nutantiflora***
2b. Stem unwinged, angular, or narrowly winged; raceme sometimes branched …………………..……………………………………… 3
3a. Raceme basally branched, horizontally extending; bracts subulate to linear, the lowest 0.2–0.4 cm, abruptly reduced upward; calyx medium green. Endemic to SE Yunnan. ………… ***L. longiracemosa***
3b. Raceme unbranched, erect or ascending; bracts leaflike or lanceolate; calyx green ………………………………………………………… 4
4a. Stems angular or narrowly winged; leaves abaxially whitish farinose; racemes terminal and axillary; calyx lobes lanceolate. Endemic to SW Guangxi. ……………………………..…………… ***L. heterobotrys***
4b. Stems subquadrangular; leaves not farinose, adaxially bristly; racemes terminal and axillary; flowers subverticillate; bracts leaflike, lanceolate; calyx dark purple. SW Guizhou-SE Yunnan. ……... ***L. subverticillata***
5a. Leaf blade with less than 10 pairs of lateral veins; racemes axillary and terminal, 2–5-flowered; bracts ovate, 0.8–2 cm long .. ***L. wilsonii***
5b. Leaf blade with more than 10 pairs of lateral veins, racemes axillary, 4–10-flowered ……………..… …………………………… 6
6a. Leaf adaxial surface glabrous; corolla bright yellow … ***L. baviensis***
6b. Leaf adaxial surface setulose; corolla dark yellow … ***L. physaloides***

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