



Oxalis shibeishanensis (Oxalidaceae), a new species from Yunnan, Southwest China

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ABSTRACT: *Oxalis shibeishanensis* Huan C. Wang & Y. Tian (Oxalidaceae), belonging to *O.* subsect. *Oxalis*, is described and illustrated as a new species endemic to Yunnan, Southwest China. It is most similar to *O. obtriangulata*, but clearly differs from the latter by its 1.5–3 cm long, 3–9 cm wide leaflets with broadly cuneate base and not emarginate apex, 2-flowered inflorescences, narrowly ovate to broadly lanceolate sepals, and the petals being bifid at the apex.

KEY WORDS: China, endemism, new species, Oxalidaceae, *Oxalis*, *Oxalis obtriangulata*.

INTRODUCTION

Oxalis L., consisting of approximately 500 to 800 species, is the largest genus in the family Oxalidaceae (Sidwell and Knapp, 2002). Plants in this genus are mainly annual or perennial herbs usually with tubers, bulbs, or rhizomes. Its leaves are radical or alternate, usually 3-foliolate; the inflorescences are solitary, cymose, or umbellate; and the flowers are five-merous, with free sepals and petals (Liu and Watson, 2008). The genus has a worldwide distribution, but the vast majority of species are found in the South America and southern Africa, which are considered as the two centers of diversity for this genus (Azkue, 2000; Vaio *et al.*, 2016).

In the *Flora of China*, six native species of *Oxalis* were recognized in China, except two introduced species (Liu and Watson, 2008). Two of them, namely *O. corniculata* and *O. stricta*, belong to section *Corniculata*, and the remaining four species to section *Oxalis* subsect. *Oxalis* (Lourteig 2000). An extra species, *O. wulingensis* T. Deng *et al.*, was described from Hunan and Hubei Provinces in 2013 (Deng *et al.*, 2013).

During our recent field surveys in the Yunnan Plateau (SW China), an unknown species of *Oxalis* was encountered. To identify this entity, we reviewed all relevant collections at KUN, PYU, XTBG, and YUKU herbaria, and digital images available at JSTOR Global Plants (<http://plants.jstor.org/>), Global Biodiversity Information Facility (<https://www.gbif.org/>) and the Chinese Virtual Herbarium (<http://www.cvh.ac.cn/>). Additionally, the relevant literature were extensively consulted (e.g. Aoki *et al.* 2019; Deng *et al.*, 2013; Huang *et al.*, 1998; Liu and Watson, 2008). After a thorough examination, it became clear that this plant represents an undescribed species, and is herein described and illustrated as *Oxalis shibeishanensis* Huan C. Wang & Y. Tian.

TAXONOMIC TREATMENT

Oxalis shibeishanensis Huan C. Wang & Y. Tian, *sp. nov.*

石碑山酢漿草 Figs. 1 & 2

Type: CHINA. Yunnan Province, Shuangbai County, Anlongbao village, Shibeishan Mountain, 24°25'9"N, 101°43'27"E, 24 March 2019, H. C. Wang, F. Yang, Q.P. Wang & Y. R. Li SB5788 (holotype: YUKU [02070800]!, isotypes: YUKU [02070801, 02070802, 02070803]!)

Diagnosis: *Oxalis shibeishanensis* is most similar to *O. obtriangulata*, but clearly differs from the latter by its 1.5–3 cm long, 3–9 cm wide leaflets with broadly cuneate base and not emarginate apex, 2-flowered inflorescences, narrowly ovate to broadly lanceolate sepals, and petals being bifid at the apex.

Perennials, 10–20 cm tall, stemless. Rhizome creeping underground, pubescent, 2–5 mm in diameter, with sparsely distributed, fleshy, dark brown, scalelike remains of petiole bases. Leaves radical, with three leaflets arranged as a trigonal pyramid. Petiole 3–17 cm long, brown pubescent. Leaflets sessile; broadly obtriangular, 1.5–3 cm long, 3–9 cm wide, adaxially glabrous or sparsely pubescent, abaxially pale green, pubescent, scattered with purple spots; apex truncate, sometimes slightly emarginate, slightly undulate; base broadly cuneate, with an angle of 110° to 130°; margins entire, ciliate. Midveins impressed adaxially, lateral veins two to three pairs, ascending from midribs at angles from 30° to 40°. Inflorescences umbellate, 2-flowered; peduncle equal to or longer than petioles, pubescent, 5–17 cm long; bracts 2 paired, outer pair larger than the inner one, lanceolate, 3–7 mm long, pubescent, margins transparent and hairless. Pedicel pubescent, 1–3.5 cm long, curving at apex. Flowers nodding, funnel-shaped. Sepals 5, narrowly ovate to broadly lanceolate, 5–7 mm long, 2–3 mm wide, green,

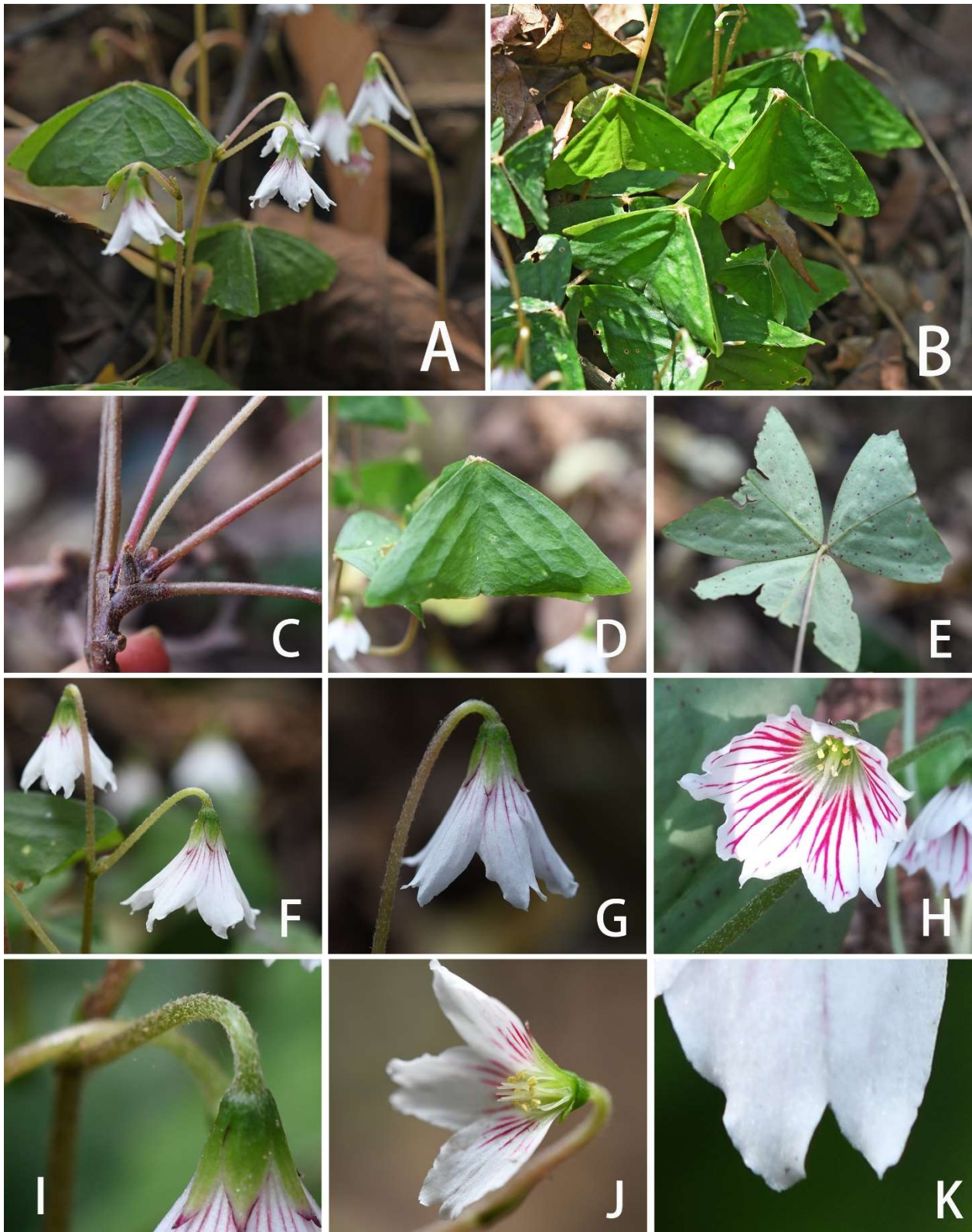


Fig. 1. *Oxalis shibeishanensis* sp. nov. **A, B.** Habit, **C.** Top part of rhizome with petioles, **D.** Adaxial surface of leaflet, **E.** Abaxial surface of leaflets, **F.** Upper portion of inflorescence, **G.** Flower with pedicel, **H.** Flower at front view, **I.** Pedicel and sepals, **J.** Lateral view of flower with two petals and two sepals removed, **K.** Petal apex.

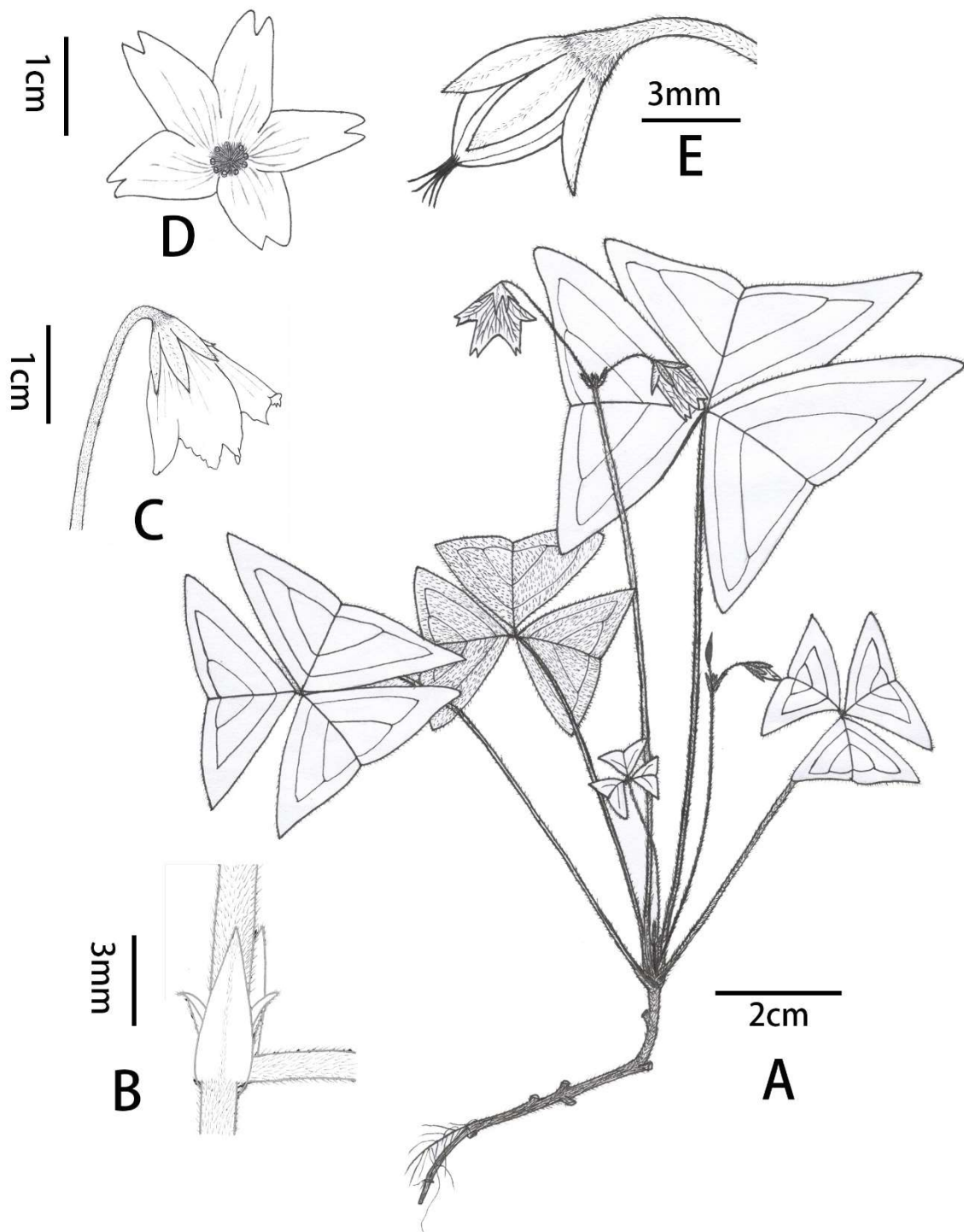


Fig. 2. *Oxalis shibeishanensis* sp. nov. A. Habit, B. Portion of inflorescence showing bracts, C. Flower with pedicel, D. Flower at front view, E. Young fruit.

apex acute, purple at the tip, margin entire, ciliate. Petals 5, ovate, obovate to oblong, 1.1–1.5 cm long, white, with 5–7 purple stripes; apex bifid, base cuneate. Stamens 10, all fertile; filaments almost of equal length, connate at

base, slender, incurved; anthers pale yellow. Gynoecium ca. 4–6 mm long; ovary glabrous, 5-loculed, each locule with 1–2 ovules, styles 5, slender, stigma linear. Capsule ovoid, 1 cm long, nodding.



Distribution and habitat: *Oxalis shibeishanensis* is known only from two very close localities in Shibeishan Mountain of Shuangbai County, in central Yunnan Province, Southwest China. It usually grows on the moist and shady places near streams or swamps, at altitudes of 1950–2100 m.

Phenology: Flowering from March to April, fruiting from April to May.

Etymology: The specific epithet refers to the type locality, the Shibeishan Mountain of Shuangbai County, Southwest China.

Additional specimens examined: CHINA. Yunnan Province, Shuangbai County, Anlongbao village, Shibeishan Mountain, Mixidu, 24°21'01" N, 101°53'52" E, 24 March 2019, H. C. Wang, K. Zhang, Y. Tian & X. L. Liu SB5817 (YUKU [02070804, 02070805]).

Notes: *Oxalis shibeishanensis* is characterized by its broadly obtriangular leaflets, abaxially with scattered purple spots, 2-flowered inflorescences, and petals bifid at the apex. According to the taxonomic treatments by Lourteig (2000) and Aoki *et al.* (2019), *Oxalis shibeishanensis* should be classified into *O.* subsect. *Oxalis*. Within this subsection, *O. shibeishanensis* is most similar to *O. obtriangulata*, but clearly differs from the latter by its leaflets 1.5–3 cm (vs. 1–1.8 cm) long, 3–9 cm (vs. 1.4–2.2 cm) wide, base broadly cuneate (vs. nearly rounded), apex not emarginate (vs. emarginate), inflorescences 2-flowered (vs. 1-flowered), sepals ovate to broadly lanceolate (vs. oblong), petals bifid (vs. slightly emarginate) at apex. Furthermore, the new species was discovered only from Shuanbai County, central Yunnan, Southwest China, and is fully allopatric to *O. obtriangulata*, which is found from Northeast China, North Japan, Korea and Russia. *Oxalis shibeishanensis* resembles *O. leucolepis* in flower shape and apex of petal bifid, but differs from the latter by its scalelike remains of petiole bases dark brown (vs. pale brown), leaflet broadly obtriangular (vs. rounded-obcordate), much larger, 1.5–3 cm (vs. 1–1.8 cm) cm long, 3–9 cm (vs. 1.1–2 cm) wide, apex not emarginate (vs. deeply emarginate), and inflorescences 2-flowered (vs. 1-flowered). *O. trilliifolia*, which distributed in western North America, was placed in *O.* subsect. *Oxalis* by Lourteig (2000), and this treatment was also supported by molecular phylogenetic analyses (Aoki *et al.* 2018). Within this subsection, *O. shibeishanensis* and *O. trilliifolia* are the only two known species with an umbellate inflorescence (rather than a solitary flower). However *O. shibeishanensis* differs from the latter in having broadly obtriangular (vs. broadly obcordate) leaflets, inflorescences 2-flowered (vs. 2–9 (–15) -flowered), capsule ovoid (vs. narrowly fusiform), 1–1.5 cm (vs. 1.5–2.5 (–3) cm) long. A key to distinguish *Oxalis shibeishanensis* from its relatives in *O.* subsect. *Oxalis* is given below.

Key to distinguish *Oxalis shibeishanensis* from its relatives in *O.* subsect. *Oxalis*

- 1a. Inflorescences umbellate, with 2 to 9 (–15) flowers 2
- 1b. Flowers solitary 3
- 2a. Leaflets broadly obtriangular, inflorescences 2-flowered, capsule ovoid *O. shibeishanensis*
- 2b. Leaflets obcordate, inflorescences 2–9 (–15)-flowered, capsule narrowly fusiform *O. trilliifolia*
- 3a. Length of leaflets longer than or as long as the width 4
- 3b. Length of leaflet shorter than their width 5
- 4a. Leaflets long obtriangular, 1.6–2.5cm wide, petals pink *O. wulingensis*
- 4b. Leaflets obovate, 0.7–1.5 cm wide, petals white *O. griffithii* ssp. *taimonii*
- 5a. Rhizomes (including scales) less than 2 mm thick, flowers funnel-shaped *O. leucolepis*
- 5b. Rhizome (including scales) more than 3 mm thick, flowers bowl-shaped to rotate 6
- 6a. Leaflet blade apex truncate to subtruncate *O. obtriangulata*
- 6b. Leaflet blade apex rounded or obtuse, usually emarginate 7
- 7a. Rhizome (including scales) ca. 3 mm thick, covered with a few persistent petiole bases *O. acetosella*
- 7b. Rhizome (including scales) more than 5 mm thick, densely covered with persistent petiole bases *O. griffithii* var. *griffithii*

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