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Oreocharis argentifolia (Gesneriaceae), a new species from the karst region in southeastern Yunnan, China

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A new species of Gesneriaceae, *Oreocharis argentifolia* Lei Cai & Z.L.Dao from Mengzi City, Yunnan Province, China, is described and illustrated. The new species is morphologically most similar to *O. panzhouensis* Lei Cai, Y.Guo & F.Wen in plant habit, number of stigma lobes and stamens, and the shape of the calyx, but differs in the shape of the leaf blade, indumentum, shape and color of corolla and the adnate position of the filaments. A detailed description, color photographs, distribution and habitat, as well as its morphological relationship with relevant similar species are also provided.

Keywords: flora of Yunnan, morphology, new taxon, *Oreocharis*

Introduction

After *Oreocharis* Bentham (Bentham 1876) was redefined (Möller et al. 2011) and adjusted based on molecular and morphological data (Middleton et al. 2013, Chen et al. 2014, Möller et al. 2014), the genus has rapidly grown by the addition of many new species. There are at least 30 new taxa described and published after the redefinition (Tan et al. 2014, Möller et al. 2016, Wei et al. 2016, Cai et al. 2017, 2019, Yang et al. 2018, Möller 2019, Pan et al. 2019, Wen et al. 2019). *Oreocharis* now comprises more than 120 species and most of them are endemic to China, mainly distributed in south and southwest China, with other species occurring in North Vietnam, Myanmar, northeast India, Bhutan, Japan and Thailand (Wang et al. 1990, 1998, Li and Wang 2004, Möller et al. 2017, 2018, Xu et al. 2017, Chen et al. 2018).

In July 2018 and July 2019, during field investigations in the limestone area of Daweishan Mountain in southeastern Yunnan, a sterile plant was collected as *Oreocharis aurea* Dunn and then planted in Kunming Botanical Garden (KBG). In September 2019, the plants flowered for the first time, and based on its characteristics (basal rosette leaves, four separated fertile stamens, oblong anthers and capsules dehiscing predominantly on one side), we confirmed that it is a member of *Oreocharis*. However, after comparison with all known species of *Oreocharis* from Yunnan and adjacent regions, it was concluded that it was a species new to science. Its morphological characters are compared

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with those of closely related species and *Oreocharis argentifolia* Lei Cai & Z.L.Dao is described and illustrated below.

Material and methods

Fieldwork was undertaken in the limestone area of Southeast Yunnan, and living materials were collected from Shuilonggu, Shelima Village, Lengquan Town, Mengzi City. All the related available specimens of *Oreocharis* stored in the herbaria (HITBC, IBK, KUN and PE) and online databases in the Chinese Virtual Herbarium (<www.cvh.ac.cn/>) in China and the Global Plants on JSTOR (<https://plants.jstor.org/>) were studied for comparison with the new species. All relevant published literature about the genus *Oreocharis* was consulted through Google Scholar (<https://scholar.google.com/>), Flora Of China (<www.iplant.cn/foc/>), Flora Reipublicae Popularis Sinicae (<www.iplant.cn/frps>) and China national knowledge internet (CNKI: <www.cnki.net/>). We studied all morphological characters of the new species under dissecting microscopes, and described the morphological characters by using the terminology presented by Wang et al. (1990, 1998). Photographs were taken in the field and at KBG by the first author.

Taxonomic treatment

Oreocharis argentifolia Lei Cai & Z.L.Dao, sp. nov. (Fig. 1, 2)

A species most similar to *O. panzhouensis* Lei Cai, Y.Guo & F.Wen in the plant habit, numbers of stigma lobes and stamens and the shape of calyx, but differs from the latter in its leaf blade elliptic to ovate (versus ovate to suborbicular), adaxially densely silvery-white pubescent (versus densely appressed pubescent), margin serrated (versus crenate), bracts inverted triangular (versus linear to subulate), corolla tube distinctly curved (versus inconspicuous), lower part of corolla red and with red central stripes on the lobes (versus without red parts), and filaments adnate to corolla 2–3 mm from base (versus adnate to corolla 5–6 mm from base).

Type: China, Yunnan Province: Mengzi City, Lengquan Town, Shelima Village, Shuilonggu, 23°09′N, 103°27′E, elev. ca 2055 m, on the surfaces of rocks (cultivated in Kunming Botanical Garden), in flowering, 12 Sep 2019, Lei Cai CL305 (KUN!; isotype: KUN!).

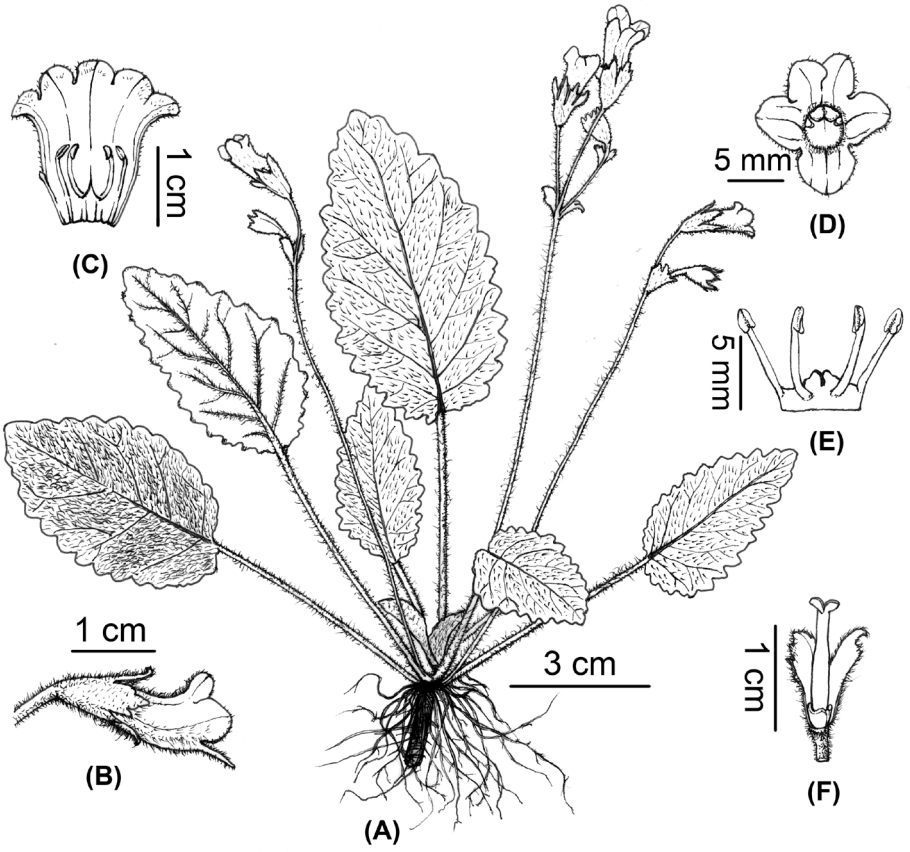

Figure 1. *Oreocharis argentifolia* sp. nov. (A) habit, (B) side view of a flower, (C) opened corolla showing stamens and staminode, (D) front view of a flower, (E) stamens, (F) pistil with disc and calyx (partly removed). Drawn by Xuan-Lin Zhu.

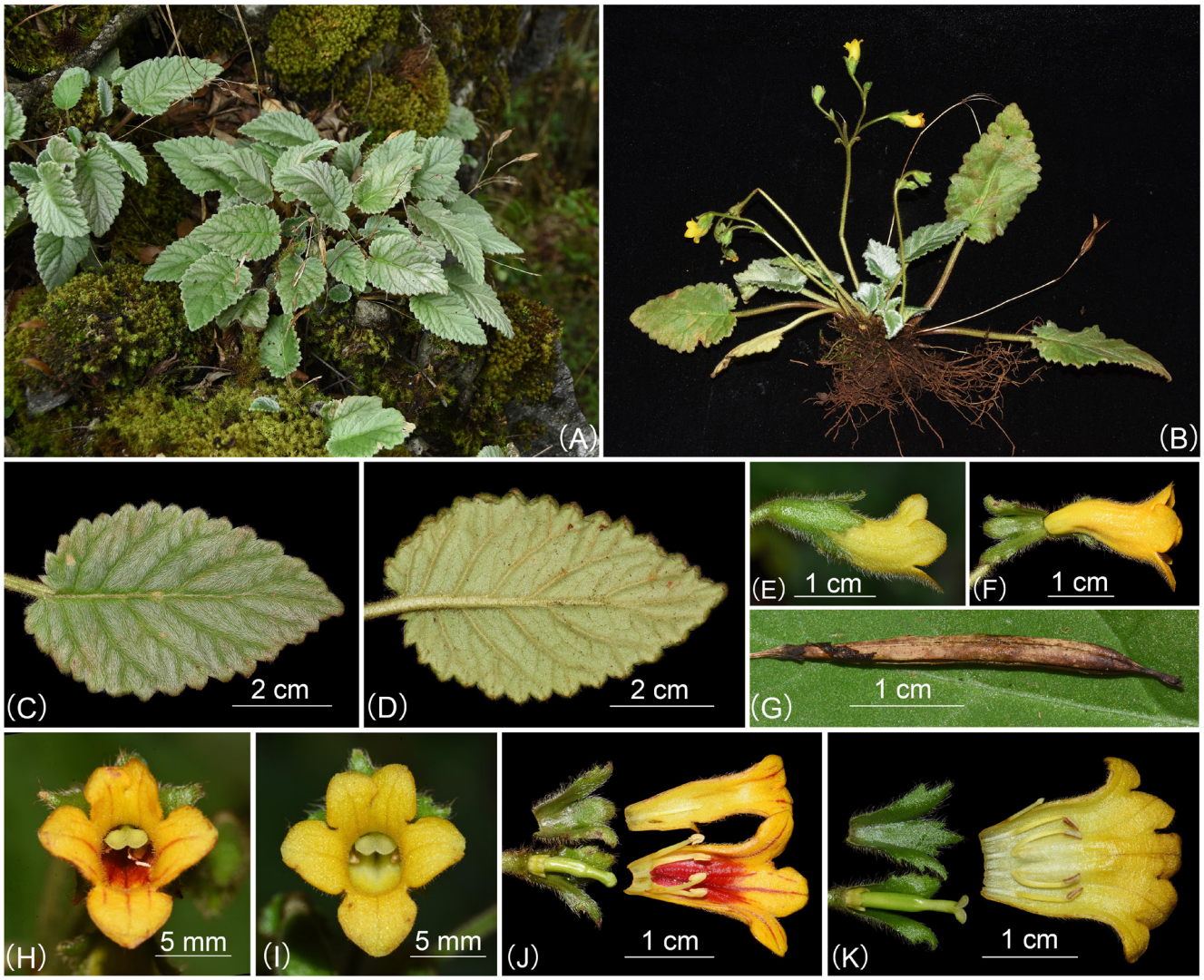

Figure 2. *Oreocharis argentifolia* sp. nov. (A) plants in the wild, (B) plants in cultivation in KBG, (C) adaxial leaf surface, (D) abaxial leaf surface, (E and F) side view of flowers (partly pulled back in F), (G) dry mature fruit, (H and I) front view of flowers, (J and K) pistil with disc and calyx, opened corolla showing stamens and staminode (with red part J, without red part K). Photographed by Lei Cai.

Etymology

The specific epithet '*argentifolia*' is derived from the Latin prefix, *argenti-*, silvery, and the Latin suffix, *-folia*, of leaf, referring to the leaves being densely covered with silvery-white pubescence.

Description

Perennial herb. Rhizome 3–8 cm long, 3–5 mm in diameter. Leaves 6–14, basal; petiole, 3–10 cm long, densely brown villous, leaf blade elliptic to ovate, 3.5–12 × 2.0–7.5 cm, adaxially densely silvery-white pubescent, abaxially pubescent, densely brown villous along veins, acute at apex, cordate at base, slightly asymmetric, with serrated margin; lateral veins 4–7 on each side of midrib. Cymes axillary, 3–5, 3–10-flowered; peduncle 6.5–16 cm long, brown villous; bracts 2, triangular, with denticulate margin, 4–6 × 3–4 mm, at both sides appressed pubescent and brown villous; pedicel 1.5–3.5 cm long, brown villous. Calyx 8–11 mm long, 5-lobed to the middle; lobes unequal, triangular, 4–6 mm long, ca 2–3 mm wide, brown villous and pubescent outside, glabrous inside. Corolla, yellow, 1.8–2.2 cm long, outside densely pubescent, inside glandular pubescent in the throat and on adaxial lobes, the lower part red and with red central stripes on the lobes, occasionally without red parts (rarely); tube campanulate, distinctly curved and gradually narrow towards the base, 1.4–1.6 cm long, 3–6 mm in diameter; limb 2-lipped; adaxial lip 2-lobed from the middle, its lobes semiorbicular, 2–3 × 2–3 mm; abaxial lip 3-lobed to base, its lobes semiorbicular to oval, 4–6 × 3–5 mm. Stamens 4, 5–6 mm long, adnate to corolla 2–3 mm from base; filaments linear, glabrous; anthers free, oblong, 2-locular, dehiscing longitudinally; connective glabrous; staminode 1, ca 4 mm long, inserted ca 2.5 mm from base. Disc ca 2 mm high, yellow green, with undulate margin. Pistil 0.8–1.4 cm long; ovary long cylindrical, glabrous, 5–7 mm long; style 2–4 mm long, glabrous; stigma bilobed, flabellate, its lobes ca 1.5 × 1.2 mm.

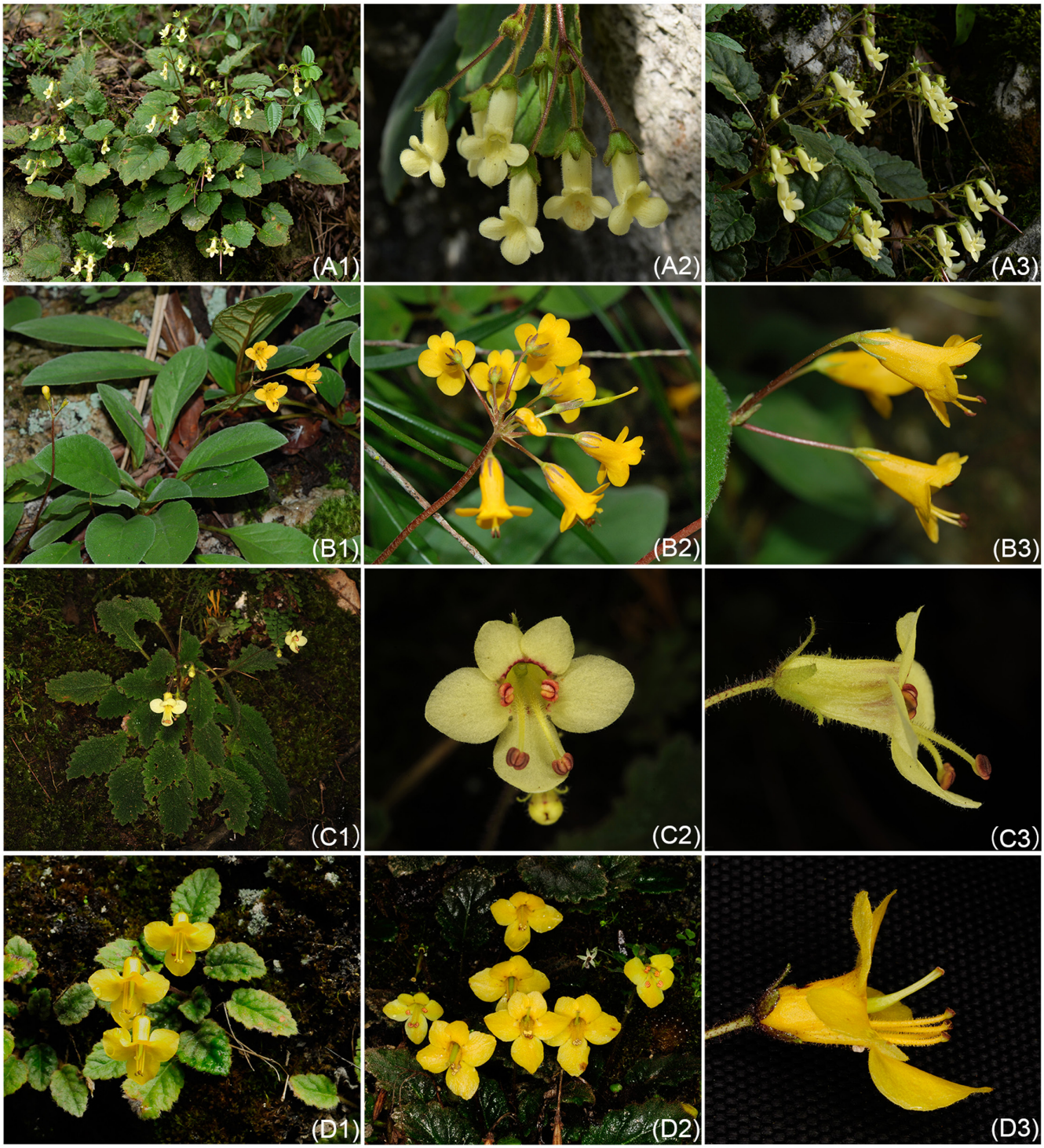

Figure 3. (A) *Oreocharis panzhouensis* (photographed by Ying Guo), (B) *O. flavida* (photographed by Xi-Long Zheng), (C) *O. delavayi* (photographed by Shi-Wei Guo), (D) *O. ninglangensis* (photographed by Lei Cai); (1) plants in their natural habitat, (2) front view of flowers, (3) side view of flowers.

Old capsule straight, linear, loculicidally deshiscent predominantly on one side, glabrous, 2.8–3.4 cm long.

Phenology

Flowering from September to October; fruiting unknown.

Vernacular name

The Chinese name of the new species is 'Yin Ye Ma Ling Ju Tai' (银叶马铃苣苔). The first two characters mean 'silver leaves' and the last four characters are the Chinese name for the genus *Oreocharis*.

Figure 4. *Oreocharis* species in Mt Daweishan area, Yunnan, China (A) *O. argentifolia*, (B) *O. hekouensis*, (C) *O. aurea*, (D) *O. rotundifolia*; (1) plants in their natural habitat, (2) front view of flowers, (3) side view of flowers. Photographed by Lei Cai.

Distribution and ecology

Oreocharis argentifolia is currently known only from one population of ca 80 individuals in total on a limestone hill at the type locality. It grows on the surfaces of rocks with other plants under forest cover in the karst region in Mengzi City, southeastern Yunnan, China. The species may be endangered, but more data is needed to evaluate this reliably.

Table 1. Morphological comparison between *Oreocharis argentifolia* sp. nov. and *O. panzhouensis*.

Characters	*O. argentifolia*	*O. panzhouensis*
Leaf blade	elliptic to ovate, adaxially densely silvery-white pubescent, abaxially pubescent, densely brown villous along veins, apex acute, margin serrated	ovate to suborbicular, adaxially densely appressed pubescent, abaxially pubescent, densely rusty brown villous along veins, apex rounded, margin crenate
Bract	triangular, both sides appressed pubescent and brown villous, margin denticulate	linear to subulate, brown villous outside, margin entire
Pedicel	brown villous	brown villous and glandular-pubescent
Calyx	lobes triangular, margin denticulate	lobes broadly triangular, margin denticulate or entire
Corolla	yellow, outside densely pubescent	pale yellow, outside pubescent and glandular-pubescent
Tube	distinctly curved, the lower part red and with red stripes on the lobes	slightly curved, pale yellow without red parts
Filaments	adnate to corolla 2–3 mm from base	adnate to corolla 5–6 mm from base

Taxonomic affinities

Oreocharis argentifolia represents a species of *Oreocharis* s. str. as originally defined by its leaves arranged in a basal rosette, four separated fertile stamens with free anthers and capsules dehiscing predominantly on one side. With this old circumscription, it would have belonged to *O.* sect. *Orthoanthera* K.Y. Pan based on corolla tube campanulate, not narrowed at mouth and anthers oblong (Pan 1987). However, it differs in other characters from other species in this group (such as: *Oreocharis cavaleriei* H. Lév., *O. dasyantha* Chun, *O. forrestii* (Diels) Skan, *O. henryana* Oliv. and *O. parviflora* Lei Cai & Z.K. Wu) because of its elliptic to ovate leaf blade, yellow corolla, glabrous filaments and bilobed stigma (Wang et al. 1990, 1998, Li and Wang 2004). The gradually ampliate apex of the corolla tube makes the new species also resemble *O. delavayi* Baill., *O. flavida* Merr. and *O. ninglangensis* W.H. Chen & Y.M. Shui, but it differs from these species in shape of leaf blade and flower, indumentum, and its distinctly curved corolla tube (Fig. 3) (Chen et al. 2016). The new species also resembles to *O. tongtchouanensis* Mich. Möller & W.H. Chen in its shape and indumentum of the leaf blade, but evidently differs in the shape, structure and color of the flower. The characteristics of the calyx tube of the new species is unusual for the genus and only seen in species of the former *Ancylostemon* Craib. (now *Oreocharis*, Möller et al. 2011). However, the *Ancylostemon* species can be distinguished from the new species by their stamens (not separated) and the anthers (basifixed and coherent in pairs at the tip). There are also three *Oreocharis* species (*O. aurea* Dunn, *O. hekouensis* (Y.M. Shui & W.H. Chen) Mich.Möller & A.Weber and *O. rotundifolia* K.Y.Pan) in the same geographic region of Daweishan Mountain, Yunnan, China, although all with yellow flowers, however, they are also very different from the new species and are clearly distinguishable (Fig. 4). *Oreocharis argentifolia* may be most close to the recently published *O. panzhouensis* in plant habit, four separated stamens, calyx 5-lobed to the middle and stigma bilobed and flabellate, but it is obviously different in other characters. A comparison of morphological characters of related species are provided in Table 1 and Fig. 3.

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