Oreocharis ovatilobata (Gesneriaceae), a New Species from Guizhou, China

Article *in* Annales Botanici Fennici · October 2019

DOI: 10.5735/085.056.0411

Qiong Fu
South China Normal University

Huang Rong
South China Normal University

Wang Ying-Qiang
South China Normal University

Ann. Bot. Fennici 56: 259–265 ISSN 0003-3847 (print) ISSN 1797-2442 (online)
Helsinki 13 May 2019

Oreocharis ovatilobata (Gesneriaceae), a new species from Guizhou, China

Qiong Fu[1,2], Ying Guo[3], Rong Huang[1,2], Ying Xia[4] & Ying-Qiang Wang[1,2,*]

[1)] *Guangdong Provincial Key Laboratory of Biotechnology for Plant Development, School of Life Sciences, South China Normal University, CN-510631 Guangzhou, China (*corresponding author's e-mail: wangyq@scnu.edu.cn)*
[2)] *Guangzhou Key Laboratory of Subtropical Biodiversity and Biomonitoring, School of Life Sciences, South China Normal University, CN-510631 Guangzhou, China*
[3)] *Liupanshui Niangniangshan National Wetland Park Administration Office, Panzhou, CN-553522 Guizhou, China*
[4)] *Panzhou Bureau of Agriculture and Rural Affairs, Panzhou, CN-553537 Guizhou, China*

Received 28 Jan. 2019, final version received 3 Apr. 2019, accepted 10 Apr. 2019

Fu Q., Guo Y., Huang R., Xia Y. & Wang Y.Q. 2019: *Oreocharis ovatilobata* (Gesneriaceae), a new species from Guizhou, China. — *Ann. Bot. Fennici* 56: 259–265.

Oreocharis ovatilobata Q. Fu & Y.Q. Wang (Gesneriaceae) a new species from Guizhou Province in southwest China, is described and illustrated. It is morphologically similar to *O. pankaiyuae* and *O. mairei*, but differs from these congeners in particular by possessing ovate corolla lobes with purplish red spots at the obtuse apex, glandular-pubescent bracts and pistil, and by its adaxially white-pubescent leaf blade. Morphology (SEM) of leaf epidermis and seed coat of *O. ovatilobata* is also different from that of *O. pankaiyuae*.

Tremacron (Gesneriaceae) was a small genus considered endemic to southwest China, with eight species and one variety. It was established by Craib (1918) to accommodate two species, *T. forrestii* and *T. mairei*. Subsequently, *T. rubrum* was described (Handel-Mazzetti 1936: 876–888), and four further new species, i.e. *T. begoniifolium*, *T. urceolatum*, *T. obliquifolium* and *T. aurantiacum* by Li (1983) and Pan (1988). More recently, *T. hongheense* was described by Cai *et al*. (2015) and *T. aurantiacum* var. *weiningense* by He *et al*. (2010). The key features taken to characterize *Tremacron* were the combination of four free, fertile filaments adnate to the corolla tube at its base, and a corolla with extremely short lips. However, based on molecular phylogenetic studies and morphological character evaluation, Möller *et al*. (2011) transferred *Tremacron* and all species in eight further Chinese genera (i.e. *Ancylostemon*, etc.), and five species of *Briggsia* to *Oreocharis*. This raised the species number of *Oreocharis* to more than 80, and with the recently described species the number exceeds 115 (Möller *et al.* 2018).

During our fieldwork on the floral biology of *Oreocharis*, in Wumeng Town, Panzhou City, Guizhou Province, southwest China we found peculiar specimens, seemingly belonging to an unknown species in this genus, which resembled the species of former *Tremacron*. They were morphologically most similar to *O. pankaiyuae* (*T. aurantiacum*) and *O. mairei* (*T. mairei*). During the flowering season in 2018, at two localities we carried out comparative studies

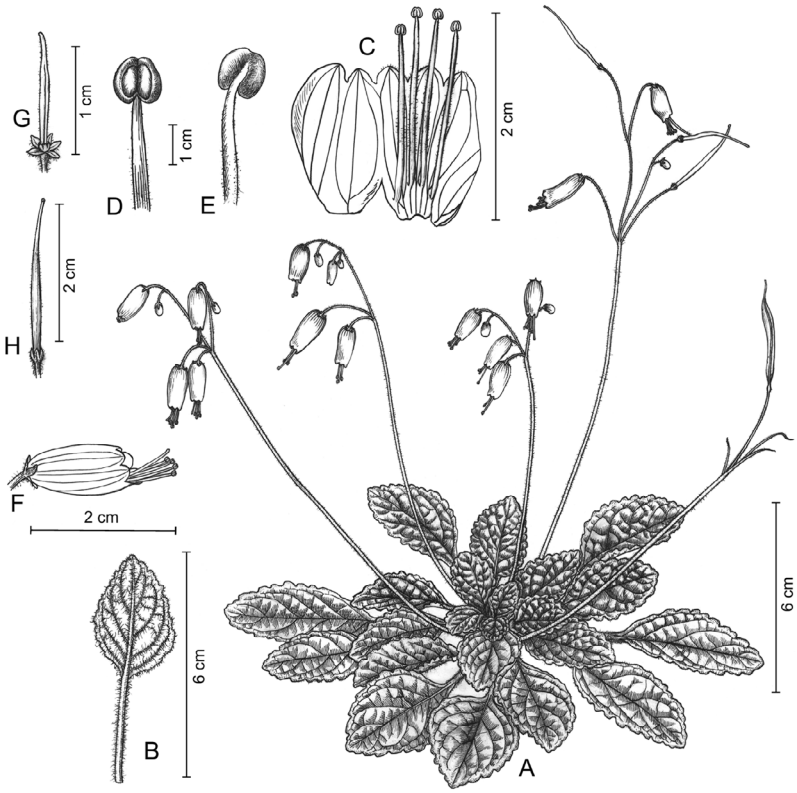

Fig. 1. *Oreocharis ovatilobata* (from the holotype, drawn by Ms. Yun-Xiao Liu). — **A**: Plant habit. — **B**: Abaxial leaf surface. — **C**: Opened corolla, showing stamens. — **D**: Anther (anterior view). — **E**: Anther (posterior view). — **F**: Flower in side view. — **G**: Pistil and calyx. — **H**: Young fruit.

on flower phenology, morphology and floral ecology of the recently discovered specimens belonging to an unknown species and *O. pankaiyuae*. The specimens grew on limestone rocks in a subtropical moist forest (cf. type specimens, below), while the population of *O. pankaiyuae* was found growing on rocks on a hill, located near Heishi Town, Weining County, Guizhou Province, southwest China (26°45´22´´N, 103°58´21´´E, 2120 m a.s.l.). New herbarium and fresh material (including leaves, flowers and fruits) of *O. pankaiyuae* and the unknown species were obtained from the field, and the characters (at least 10 leaves, 10 flowers and 10 seed samples from five plants) were investigated by light microscope (LM) and scanning electron microscope (SEM). The material for the LM studies was boiled in water and subsequently epidermal tissue was obtained from the leaves by tearing it off. The material for the SEM observations was macerated in 4% glutaric dialdehyde solution for about 24 hours and dehydrated in a series of gradient alcohol. Subsequently, it was mounted on stubs, and sputter-coated with gold-palladium. Morphological characters of the unknown species were also compared with those of *O. mairei* from the literature (Wang *et al.* 1990, 1998, Li & Wang 2004) and herbarium specimens (*E.E. Maire 216*: IBSC; *E.E. Maire 2945*: IBSC; *K.M. Feng 2816*: KUN; *E.E. Maire s.n.*: PE). We found that the leaf blades and flowers of the unknown species were clearly different from its congeners. Based on comparative herbarium studies and field observations, this taxon is described here as a new species of *Oreocharis*.

Oreocharis ovatilobata Q. Fu & Y.Q. Wang, *sp. nova* (Figs. 1–3)

Type: China. Guizhou Province, Panzhou County, Wumeng Town, Shuitang Village, growing on limestone rocks on hills, 26°15´47´´N, 104°03´26´´E, 1990–2030 m a.s.l., 14 August 2018 *WYQ-2018-111* (holotype SN; isotypes SN). — Paratypes: China. Guizhou Province, Panzhou County, Wumeng Town, Shuitang Village, growing on limestone rocks in hills, 20 July 2018 *WYQ-2018-98* (SN).

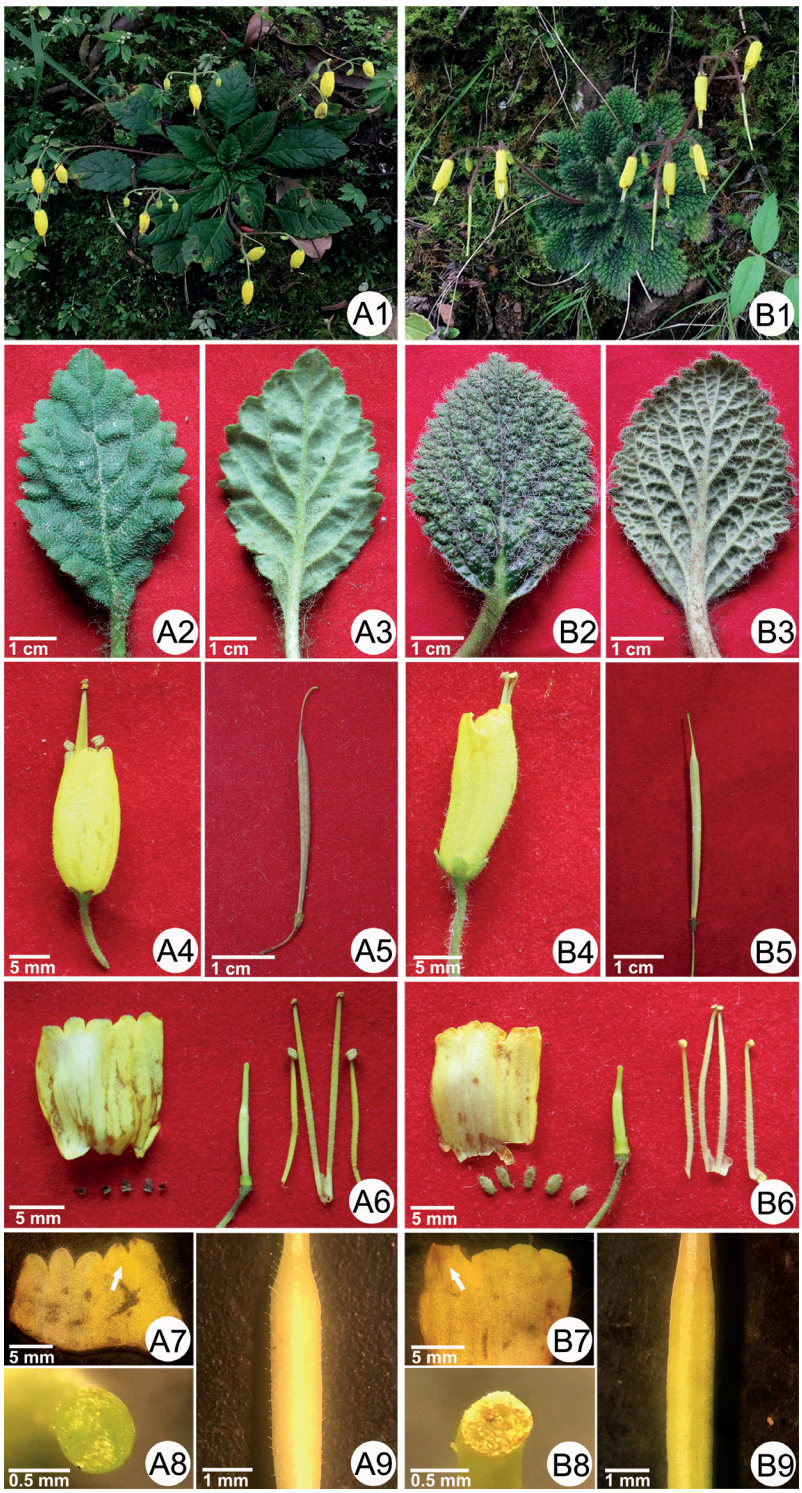

Fig. 2. Comparison of (**A**) *Oreocharis ovatilobata* and (**B**) *O. pankaiyuae*. — **1**: Plant and habit. — **2**: Adaxial leaf surface. — **3**: Abaxial leaf surface. — **4**: Flower. — **5**: Fruit. — **6**: Opened flower, showering corolla, pistil, sepals, stamens. — **7**: Opened corolla (outside), showing adaxial lip lobes (arrowhead) and abaxial lip lobes. — **8**: Stigma. — **9**: Ovary.

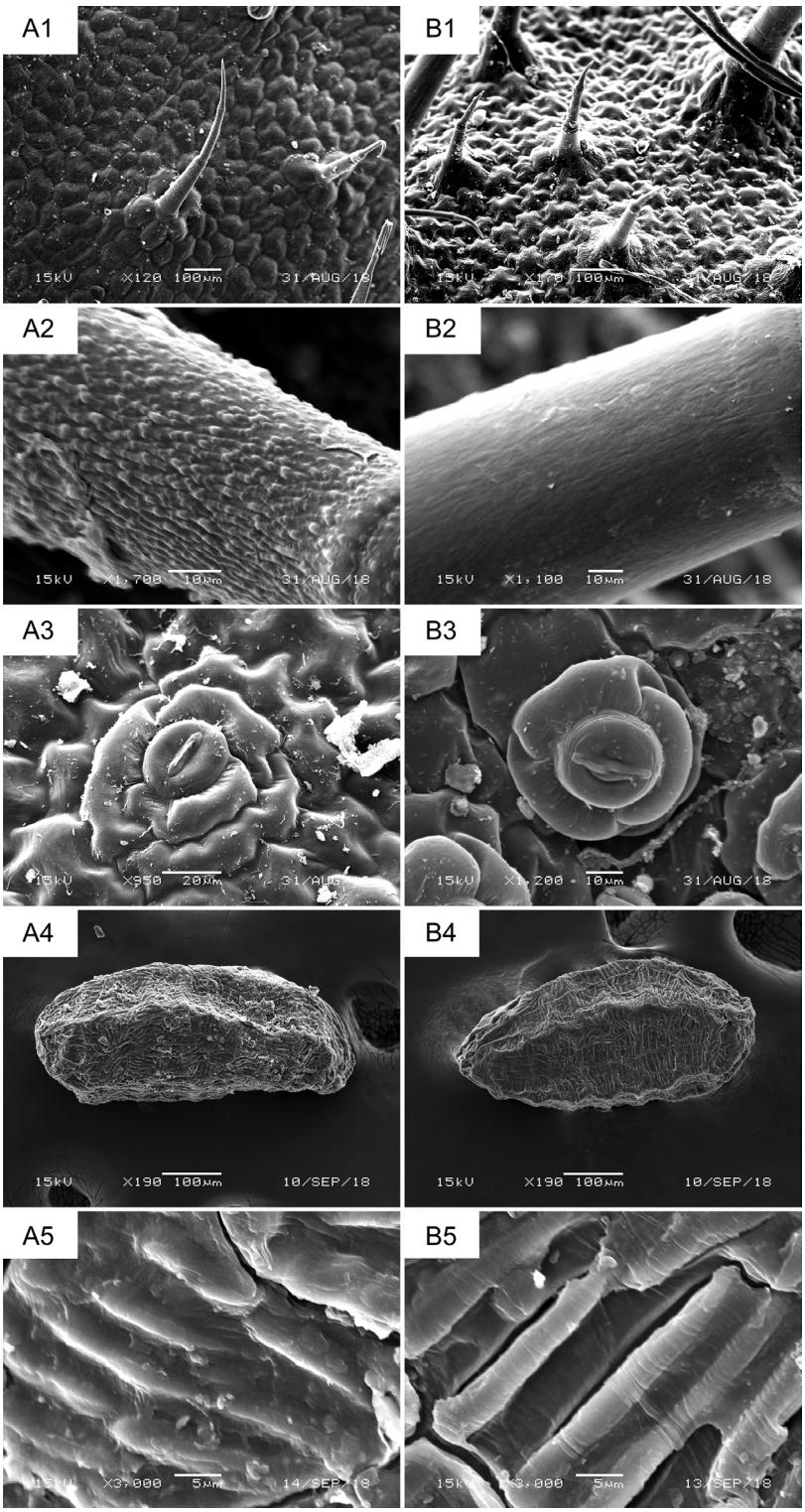

Fig. 3. Morphology (SEM) of leaf epidermal surfaces and seed coat of (**A**) *Oreocharis ovatilobata* and (**B**) *O. pankaiyuae*. — **1**: Upper leaf cuticular membrane. — **2**: Lower leaf epidermis trichome membranes. — **3**: Stoma. — **4**: Seed. — **5**: Ornamentation of seed coat.

ETYMOLOGY: The species is named after its ovate corolla limb lobes.

Perennial herb, leaves whorled in a basal rosette. Rhizomes straight, terete, 0.2–0.5(1.0) cm long, ca. 0.7–1.0 cm in diameter. Leaves 9–22(26); leaf blade papery, usually narrowly ovate to broadly ovate, rarely obovate, elliptic and rhombic, 2.2–8.2 × 2.1–4.2 cm, apex obtuse to acute, base cuneate to rounded, margin crenate or crenate-serrate, adaxially bottle green and white pubescent, abaxially pale green and white-pubescent, rust-brown villous along veins; lateral veins 4–6 pairs, adaxially inconspicuous and slightly concave, abaxially prominent, veinlets inconspicuous; petiole 0.5–4.2(4.6) cm, outer leaves with long petiole, densely rust-brown villous. Cymes 3–9(12), axillary, 1–3-branched, 4–10-flowered, each plant bearing 4–64 flowers; peduncle 5.4–12.6 cm long, 0.7–1.8 mm in diameter, purplish red to whitish green, white-pubescent and glandular pubescent, sparsely brown-villous; bracts 2, opposite, green, lanceolate-linear to narrowly elliptic, densely brown-villous and glandular pubescent, 1.6–3.5 × 0.6–1.0 mm, caducous. Pedicel (0.4)1.0–2.2 cm long, ca. 0.3–0.8 mm in diameter, pubescent and glandular pubescent, sparsely brown-villous. Calyx 5-parted near to the base, lobes equal, narrowly oblong, 1.1–2.5 × 0.9–1.3 mm, outside sparsely brown-villous, inside glabrous. Corolla yellow, outside white-pubescent and sparsely glandular pubescent, inside white-pubescent, 1.0–1.9 cm long; tube subcampanulate to urceolate, 9.3–16.3 mm long, 3.8–8.9 mm in diameter at middle, orifice constricted, 3.1–4.6 × 3.2–8.4 mm; limb 2-lipped, 5-lobed, lobes ovate, apex obtuse and purplish red spotted at tip, adaxial lip 2-lobed to base of lip, lobes equal, (0.7)0.9–3.0 mm long, 1.0–3.9 mm at base, abaxial lip 3-lobed to base of lip, central lobe longer than laterals, central lobe 0.8–2.7 mm long, 1.6–3.4 mm wide at base, lateral lobes 0.5–2.0 mm long, 1.6–3.7 mm at base. Stamens 4, free, exserted at maturity, abaxial stamens 6.8–23.2 mm, adnate at 2.2–5.4 mm from the corolla's base, adaxial stamens 4.8–25.0 mm, adnate at 0.6–2.9 mm from base; filaments linear, slender, white pubescent; anthers broadly ovate to suborbicular, dorsifixed, glabrous, 0.4–1.6(2.2) mm × 0.4–2.0(2.7) mm, thecae 2, parallel, confluent at apex; staminode absent or 1, ca. 1.5 mm long, adnate to 1 mm above corolla base. Disc ring-like, yellow-green, 0.5–1.7 mm high. Pistil ca. (0.6)0.8–2.3(2.7) cm long, white-pubescent and glandular pubescent; ovary linear to linear-oblong, 3.2–14.9 mm long, 0.8–1.7 mm in diameter, style 2.2–11.3 mm long, stigma 1, small, disc-shaped, ca. 0.5–0.7 × 0.4–0.50 mm. Capsule linear, straight, glabrescent, ca. 3.5–4.5 × 0.2 cm. Flowering in late July to late August, fruiting from mid-August to late September.

HABITAT AND DISTRIBUTION: *Oreocharis ovatilobata* is known only from the type locality in Shuitang Village, Wumeng Town, Panzhou County, Guizhou Province, China. The plants grew on limestone rocks in subtropical moist forests.

Micromorphology (SEM) of leaf epidermis and seed coat (Fig. 3). The upper epidermal cells of the leaves are irregular and rarely polygonal, with striate cuticular membranes and nearly straight anticlinal walls (Fig. 3A1). The outline of the lower epidermal cells is irregular, with smooth cuticular membranes and sinuate anticlinal walls. The trichomes on the upper and lower epidermis are multicellular, with rugulate membranes (Fig. 3A2). Stomata are only found on the lower epidermis and are assigned to the anisocytic type, with a stomatal length of 26.2–35.0 μm, and stomatal width of 10.8–16.5 μm (Fig. 3A3). The aperture rims (outer stomatal ledge) are smooth and the subsidiary cells are sinuolate. The seeds are subellipsoid or ellipsoid and brown in color, ca. 0.5–0.6 mm long and ca. 0.2–0.3 mm in diameter (Fig. 3A4). The seed coat ornamentation is irregular striate-reticulate with a granular surface and the lines of reticulum are blurred (Fig. 3A5).

Based on careful examination and comparisons with living plants and herbarium specimens, as well as consulting the relevant literature, we found that *Oreocharis ovatilobata* is unique among the species of the extended *Oreocharis*. This species is morphologically most similar to *O. pankaiyuae* and *O. mairei*, but differs from these congeners in several characters (cf. Tables 1 and 2). Morphology of *O. ovatilobata* is somewhere between those of *O. pankaiyuae* and *O. mairei*. The characteristics of *O. ovatilobata*, such as narrowly ovate to broadly ovate leaf blade, inconspicuous veinlets, and subcampanulate to urceolate corolla tube, are more similar to

Table 1. Comparison of *Oreocharis ovatilobata* with *O. pankaiyuae* (Heishi Town, Weining County, Guizhou Province, *WYQ-2018-122*, SN) and *O. mairei* (data from Li & Wang 2004).

	O. ovatilobata	*O. pankaiyuae*	*O. mairei*
Leaf blade			
adaxial	white-pubescent, nearly plane	white-villous, bullate	densely sericeous and sparsely pubescent, nearly plane
abaxial	veinlets inconspicuous	reticulate veinlets conspicuous	veinlets inconspicuous
Bract indumentum	densely brown-villous and glandular pubescent	brown villous	densely pale brown-villous
Calyx lobe			
shape	narrowly oblong	narrowly oblong	narrowly lanceolate to narrowly triangular
size	1.1–2.5 mm long	1.1–3.0 mm long	2.5–4 mm long
Corolla	yellow, 1.0–1.9 cm long, tube subcampanulate to urceolate, outside pubescent and glandular, inside pubescent	yellow, 1.1–1.6 cm long, tube funnelform-tubular, outside pubescent and sparsely glandular pubescent, inside pubescent	white to greenish, 1.0–1.2 cm long, tube subcampanulate to urceolate, outside sparsely pubescent, inside glabrous
Corolla lip			
adaxial	2-lobed to base of lip, lobes ovate, apex obtuse and purplish red spotted	2 lobes emarginate to nearly entire, apex truncate without purplish red spots	2 lobes emarginate to nearly entire, apex truncate without purplish red spots
abaxial	3-lobed to base of lip, lobes ovate, apex with purplish red spots	3 lobes semiorbicular to rounded, without purplish red spots	3 lobes semiorbicular, without purplish red spots
Pistil	white-pubescent and glandular pubescent	glabrous	pubescent to glabrescent

Table 2. Comparison of leaf epidermal surface and seed coat between *Oreocharis ovatilobata* and *O. pankaiyuae.*

	O. ovatilobata	*O. pankaiyuae*
Leaf		
adaxial epidermal cells	irregular and sparsely polygonal, cuticular membranes striate, anticlinal walls nearly straight	irregular, cuticular membranes smooth, anticlinal walls sinuate
epidermal trichome	membranes rugulate on upper and lower epidermis	membranes smooth on upper epidermis, rugulate on lower epidermis
Stoma	subsidiary cells sinuolate, $30.7 \pm 2.3 \times 13.2 \pm 1.3$ μm	subsidiary cells smooth or sinuolate, $27.3 \pm 1.8 \times 11.1 \pm 1.0$ μm
Seed coat	ornamentation striate-reticulate, irregular, surface granular	ornamentation striate-reticulate, regular, surface smooth

O. mairei, but the purplish red to whitish-green, sparsely brown-villous peduncle with white and glandular pubescence, elliptic calyx lobes, and pistil with one stigma resemble those of *O. pankaiyuae*.

Acknowledgements

We thank Hui Zhao for field assistance, and Yun-Xiao Liu for the line drawing. This work was financially supported by the Join Fund of National Natural Science Foundation of China and Guangdong Provincial Government (grant no. U1301213), the Natural Science Foundation of Guangdong Province of China (grant no. 2017A030313165), and the Innovation Project of Graduate School of South China Normal University (grant no. 2017LKXM012).

References

Cai L., Chen R.Z., Yin Z.J., Zhang G.X., Chen W.H. & Shui Y.M. 2015: *Tremacron hongheense*, a new species of Gesneriaceae from southeastern Yunnan, China. — *Plant Diversity and Resources* 37: 733–736.

Craib W.G. 1918: Gesneracearum novitates nonnullae. — *Notes from the Royal Botanic Garden, Edinburgh* 10: 211–219.

Handel-Mazzetti H.R.E. 1936: *Symbolae sinicae, Botanische Ergebnisse der Expedition der Akademie der Wissenschaften in Wien nach Südwest-China, 1914–1918*, vol. 7. — Springer, Vienna.

He S.Z., Sun Q.W. & Li Y.C. 2010: *Tremacron aurantiacum* var. *weiningense* (Gesneriaceae) var. nov. from Guizhou, China. — *Nordic Journal of Botany* 28: 199–201.

Li H.W. 1983: Notulae de Gesneraceis Yunnanensibus. — *Bulletin of Botanical Research* 3: 12–13.

Li Z.Y. & Wang Y.Z. 2004: [*Plants of Gesneriaceae in China*]. — Henan Science and Technology Publishing House, Zhengzhou. [In Chinese].

Möller M., Atkins H.J., Bramley G.L.C., Middleton D.J., Baines R., Nguyen V.D., Bui H.Q. & Barber S. 2018: Two new species of *Oreocharis* (Gesneriaceae) from northern Vietnam. — *Edinburgh Journal of Botany* 75: 309–319.

Möller M., Middleton D., Nishii K., Wei Y.G., Sontag S. & Weber A. 2011: A new delineation for *Oreocharis* incorporating an additional ten genera of Chinese Gesneriaceae. — *Phytotaxa* 23: 1–36.

Pan K.Y. 1988: Notulae de Gesneriaceis sinensibus (IX). — *Acta Phytotaxonomica Sinica* 26: 429–442.

Wang W.T., Pan K.Y. & Li Z.Y. 1990: Gesneriaceae. — In: Wang W.T. (ed.), *Flora Reipublicae Popularis Sinicae*, vol. 69: 125–581. Science Press, Beijing. [In Chinese].

Wang W.T., Pan K.Y., Li Z.Y., Weitzman A.L. & Skog L.E. 1998: Gesneriaceae. — In: Wu Z.Y. & Raven P.H. (eds.), *Flora of China*, vol. 18: 244–401. Science Press, Beijing & Missouri Botanical Garden Press, St. Louis.