

## Two new species of *Oreocharis* (Gesneriaceae) from Northwest Vietnam

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**ABSTRACT.** Two new species of *Oreocharis* (Gesneriaceae), *O. argyrophylla* W.H.Chen, H.Q.Nguyen & Y.M.Shui and *O. blepharophylla* W.H.Chen, H.Q.Nguyen & Y.M.Shui, from the Xuan Nha nature reserve, Van Ho district, Son La province, in northwestern Vietnam are described. They are compared to their most similar species and diagnostic characteristics are provided.

**Keywords.** China, corolla colour, Indo-China Peninsula, Thailand

### Introduction

The genus *Oreocharis* Benth. in the Gesneriaceae has recently been greatly enlarged by the inclusion of a number of other genera (Möller et al., 2011). Most of the approximately 113 species are found in China, with a few species also in north-eastern India, northern Myanmar, northern Thailand and northern Indo-China (Möller et al., 2011, 2015, 2016; W.H. Chen et al., 2014, 2016; Cai et al., 2015; Yang et al., 2015, 2017; Wei et al., 2016; R.Z. Chen et al., 2017; Do et al., 2017; Li et al., 2017). A recent botanical exploration in north-western Vietnam near the border to Laos resulted in collections of two unknown *Oreocharis* species. After consultation of the literature (Pellegrin, 1930; Wang et al., 1990, 1998; Ho, 2000; Li & Wang, 2004) and examination of type specimens, as well as comparison to other species in the genus,

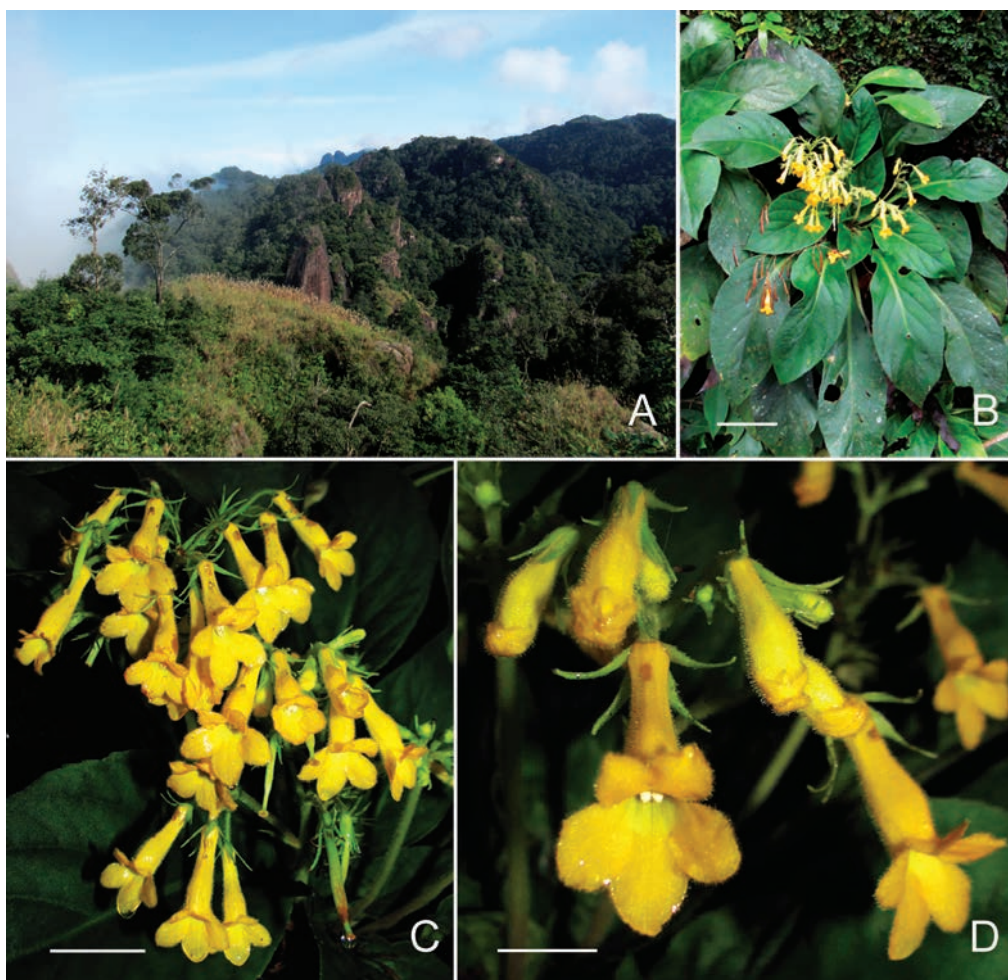
we propose two new species: *Oreocharis argyrophylla* W.H.Chen, H.Q.Nguyen & Y.M.Shui (Fig. 1, 2) and *O. blepharophylla* W.H.Chen, H.Q.Nguyen & Y.M.Shui (Fig. 3, 4). The former species is most similar to *Oreocharis argyreia* Chun ex K.Y.Pan and *O. hirsuta* Barnett, and the latter to *O. magnidens* Chun ex K.Y.Pan and *O. curvituba* J.J.Wei & W.B.Xu, but differ from these species in the characters listed in Tables 1 and 2. The two new species occur in close proximity to each other in the Van Ho district in Son La province in north-western Vietnam.

Below, CPC refers to the Herbarium of the Center for Plant Conservation, Vietnam Union of Science and Technology Associations, Hanoi.

***Oreocharis argyrophylla* W.H.Chen, H.Q.Nguyen & Y.M.Shui, sp. nov.**

The new species is most similar in leaf characteristics to *Oreocharis argyreia* Chun ex K.Y.Pan but differs from it in having yellow flowers (vs purple), corolla narrowly infundibuliform (vs tubiform) and 2.5–3.1 cm long (vs 2–2.3 cm), and coherent anthers (vs free). In flower characteristics it is also similar to *Oreocharis hirsuta* Barnett in its yellow and tubular corolla but differs from it in its deeply bilabiate corolla limb (vs shallowly bilabiate) and coherent anthers (vs free). – TYPE: Vietnam, Son La province, Van Ho district, Tan Xuan municipality, Cot Moc village, territory of Xuan Nha nature reserve, eastern slopes of Pha Luong Mountain, at an elevation of 1000–1400 m, 20°40'33.3"N 104°39'00.3"E, 15 November 2013, in flower, *Averyanov, L., Hiep, N.T., Khang, N.S., Thang, N.D. & Qui, L.D. CPC 7175* (holotype KUN; isotypes CPC, LE). (Fig. 1, 2)

Perennial herb with very short stem. **Leaves** numerous, rosulate, petiolate; petiole 4–9 cm, densely appressed pubescent; blade narrowly obovate to broadly lanceolate, 12–18 × 4.5–6.5 cm, both surfaces densely pubescent with appressed silvery hairs especially adaxially, base narrowly cuneate, apex acute to short acuminate, margin serrulate above middle of leaf blade, lateral veins 6–8 on each side of midrib, distinct. **Inflorescences** axillary, 3–4-branched, cymes 3–many-flowered; peduncle 8–12 cm long, pubescent with appressed hairs; bracts 2, linear-lanceolate, 10–13 × 1–2 mm, apex tapering, margin entire, pubescent and villous abaxially, glabrous adaxially; pedicels 0.7–1.8 cm long, white pubescent. **Calyx** of 5 lobes free to base; lobes equal, linear, 6–8 × c. 1 mm, margin entire, pubescent with appressed hairs abaxially, glabrous adaxially. **Corolla** yellow, tubular, apically infundibuliform, 2.5–3.1 cm long, outside glandular pubescent, glabrous inside; tube gradually slightly ampliate from the middle, 1.6–2.2 cm long, 2.8–3 mm in diam. at base, 6–6.2 mm in diam. and not constricted at the throat; limb 2-lipped; adaxial lip 2-lobed, dissected from near base of the adaxial lip, lobes ovate, apices rounded or obtuse, 5.8–6 × 4.1–4.3 mm; abaxial lip 3-lobed, lobes ovate, apices rounded or obtuse, subequal, median lobe slightly larger, 7.4–7.5 × 6.1–6.2 mm, lateral lobes 7–7.1 × 4.4–4.7 mm. **Stamens** 4, anthers coherent in pairs, included, adaxial stamens 8–9 mm long, adnate to corolla tube 1.5–1.6 cm from base, abaxial stamens 1.4–1.5 cm long, adnate to corolla tube 5–5.5 mm from base; filaments glabrous; anthers basifixed, subglobular, 2-locular, dehiscing



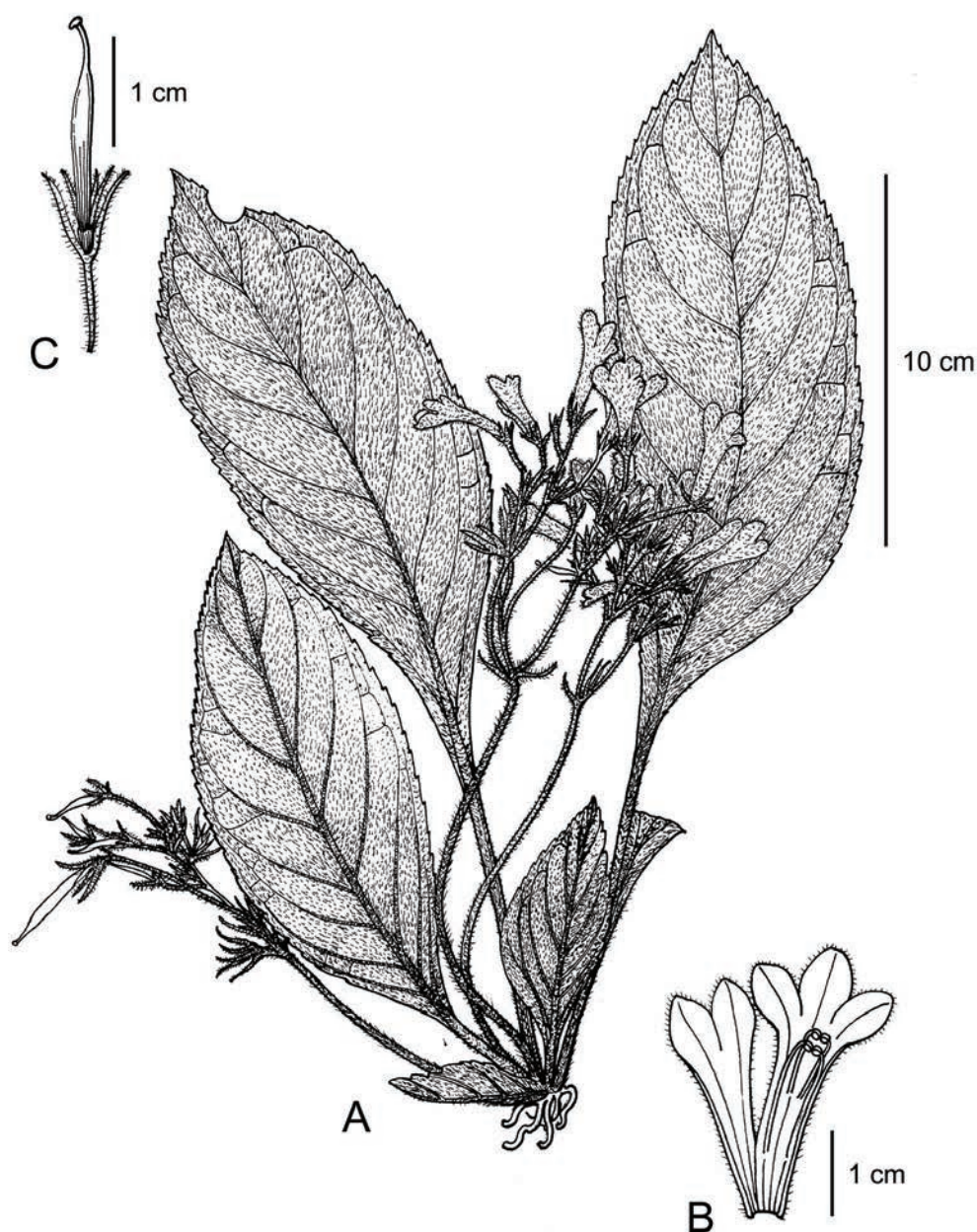
**Fig. 1.** *Oreocharis argyrophylla* W.H.Chen, H.Q.Nguyen & Y.M.Shui. **A.** Habitat. **B.** Habit (scale bar 4 cm). **C.** Inflorescences (scale bar 3 cm). **D.** Flowers (scale bar 2 cm). (Photos: S.K. Nguyen)

longitudinally; staminode 1.4–1.5 mm long, adnate to corolla tube 4–5 mm from base. **Disc** ring-like, c. 1.2 mm long, shallowly 5-lobed. **Pistil** 1.5–1.6 cm long, glabrous; ovary fusiform, 1.1–1.4 cm long, glabrous, unilocular; style glabrous, 4–5 mm long; stigma 1, peltate. **Capsule** straight, fusiform, loculicidally dehiscent, 3.3–4 cm long, with persistent style 5–6 mm long. **Seeds** fusiform,  $5-6 \times c. 2$  mm.

**Etymology.** The specific epithet refers to the silvery leaf indumentum.

**Ecology, distribution and phenology.** The species grows as a lithophytic herb on large moss covered boulders in remnants of primary and secondary broad-leaved evergreen





**Fig. 2.** *Oreocharis argyrophylla* W.H.Chen, H.Q.Nguyen & Y.M.Shui. **A.** Flowering plant. **B.** Dissected corolla showing two pairs of stamens cohering at the anther tips. **C.** Pedicel, calyx, disc and pistil (mature). Drawn by Ling Wang from the holotype Averyanov, *L. et al.* CPC 7175.

**Table 1.** Characteristics distinguishing *Oreocharis argyrophylla*, *O. argyreia* and *O. hirsuta*.

Characters	<i>O. argyrophylla</i>	<i>O. argyreia</i>	<i>O. hirsuta</i>
Leaf hairs	Densely appressed silvery pubescent	Densely appressed silvery pubescent	Sparsely spreading hirsute
Corolla	Yellow, narrowly infundibuliform, 2.5–3.1 cm	Blue-purple to purplish white, nearly cylindrical, 2–2.3 cm	Yellow, nearly cylindrical, 2–2.9 cm
Corolla tube	1.7–2.2 cm long, 2.8–3 mm in diam. at base, 6–2.8 mm in diam. at throat	1.5–2 cm long, almost 0.5–0.6 cm in diam. from base to top	1.6–1.9 cm long, 4–5 mm in diam. from base to top
Corolla limb	Distinctly 2-lipped, lips unequal;	Slightly 2-lipped, lips subequal;	Weakly 2-lipped, lips unequal.
Adaxial lip	Lobes oblong, 5.8–6 × 4.1–4.3 mm	Lobes suborbicular, 2–3 mm in diam.	Lobes ovate, 7.6–8 × c. 5 mm
Abaxial lip	Lobes oblong, subequal, middle 7.4–7.5 × 6.1–6.2 mm, lateral lobes 7–7.1 × 4.4–4.7 mm	Lobes suborbicular, equal, 2–3 mm in diam	Lobes ovate, subequal, middle 7.6–8 × 6.7–7 mm, lateral lobes 7.2–7.7 × 6–6.1 mm.
Anthers	Coherent in 2 pairs	Not coherent	Not coherent

humid forests on very steep mountain slopes composed of shale and sandstone at elevations of 1000–1850 m. This species is only known from the Xuan Nha nature reserve, Son La province of north-western Vietnam, where it is common. Flowering in September–December and fruiting in October–December.

*Provisional IUCN conservation status.* Endangered EN B1ab(ii,iii,v) + B2ab(ii,iii,v), following IUCN (2012, 2016) guidelines. This is based on an EOO of < 5000 km<sup>2</sup> and an AOO of < 500 km<sup>2</sup>, being known from fewer than five populations, and with evidence of a reduction in the area of occupancy, a decline in habitat quality, and a decline in the number of individuals due to deforestation, largely for agriculture and due to fire.

*Additional specimens examined.* VIETNAM. **Son La:** Van Ho district, Chieng Xuan municipality, Co Hong village, territory of Xuan Nha nature reserve, Pha Luong Mountain, 13 Nov 2013, in fruit, *Averyanov, L. et al. CPC 7020* (CPC, KUN, LE); Moc Chau Distr., Chieng Son comm., Pha Luong vill., Pha Luong Mountains, 1400–1500 m a.s.l., 20°41'33.2"N 104°37'37.0"E, 22 Sep 2016, *Averyanov, L. et al. CPC 7939* (CPC, LE); Moc Chau Distr., Chieng Son comm., Pha Luong vill., Pha Luong Mountain, 20°40'23.0"N 104°37'52.0"E, 1750–1850 m a.s.l., 23 Sep 2016, *Averyanov, L. et al. CPC 7993* (CPC, LE); Moc Chau Distr., Chieng Son comm., Pha Luong vill., Pha Luong Mountain system, 20°41'30.9"N 104°38'08.9"E, 1425 m a.s.l., 25 Sep 2016, *Averyanov, L. et al. CPC 8026* (CPC, E); Van Ho Distr., Tan Xuan comm., A Lay village, around point 20°40'46.2"N 104°39'49.6"E, approx. 1500 m a.s.l., 1 Oct 2016, *Averyanov, L. et al. CPC 8173* (CPC, PE).

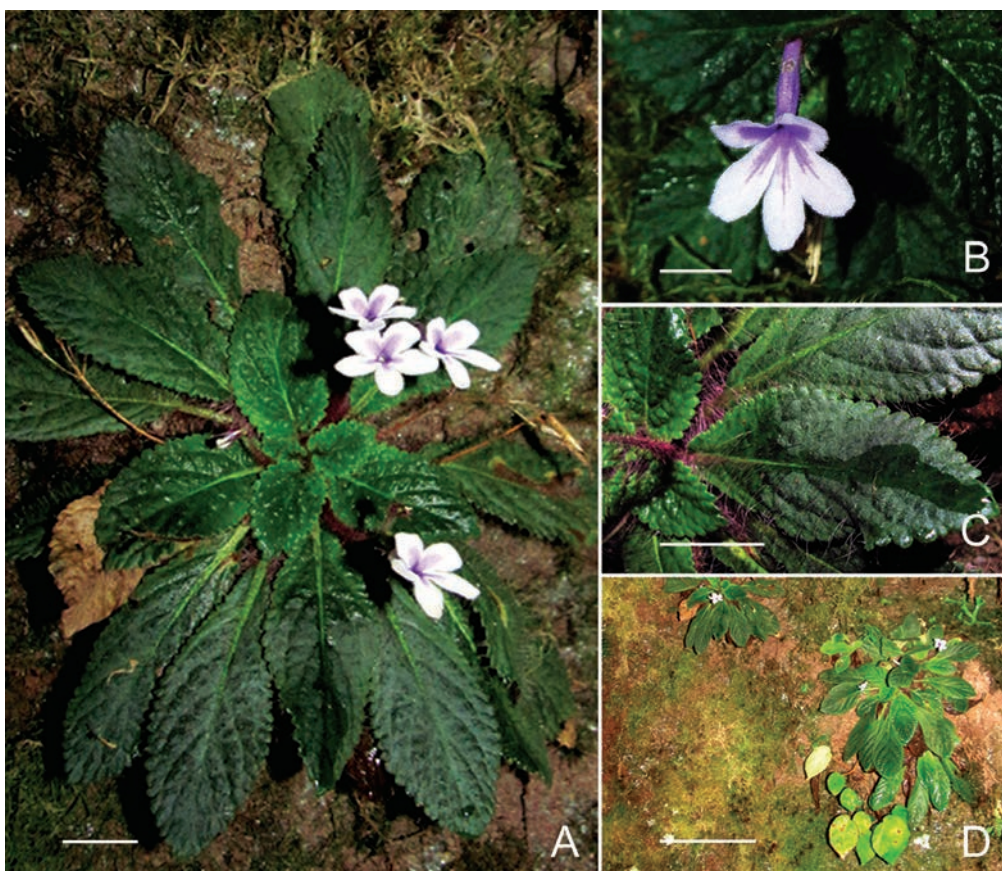
*Notes.* The new species is similar to *Oreocharis argyreia* in its leaf characteristics (silvery indumentum with densely appressed hairs), but can be distinguished easily by its yellow corolla which is also of a different size and shape. The differences between the two species are detailed in Table 1. In Indo-China, *Oreocharis argyrophylla* is also quite similar to *O. hirsuta* from northern Thailand in the yellow and tubular corolla, but differs in the densely appressed pubescence on the leaves and the cuneate leaf base (hirsute hairs and obtuse to rounded base in *O. hirsuta*), more unequal upper and lower corolla lips (subequal lips in *O. hirsuta*), and anthers coherent in pairs (free in *O. hirsuta*).

***Oreocharis blepharophylla* W.H.Chen, H.Q.Nguyen & Y.M.Shui, sp. nov.**

This species is similar to *Oreocharis magnidens* Chun ex K.Y.Pan in leaf characteristics, but differs from it in the linear bracts and calyx lobes (vs ovate in *O. magnidens*), a slightly 2-lipped corolla (vs strongly 2-lipped), a cylindrical corolla tube without inflated base (vs a corolla tube with inflated base) and coherent anthers (vs free anthers). In habit characteristics it is also similar to *Oreocharis curvituba* J.J.Wei & W.B.Xu but differs from it mainly in having narrowly obovate corolla lobes with purple stripes at base (vs narrowly oblong without purple stripes in *O. curvituba*). – TYPE: Vietnam, Son La province, Van Ho district, Chieng Xuan municipality, Co Hong village, territory of Xuan Nha nature reserve, Pha Luong Mountain, at an elevation of 1200–1400 m, 20°41'40.5"N 104°39'24.7"E, 13 November 2013, in flower, *Averyanov, L., Hiep, N.T., Khang, N.S., Thang, N.D. & Qui, L.D. CPC 7019* (holotype KUN; isotypes CPC, LE). (Fig. 3, 4)

Perennial herb with very short stem. **Leaves** rosulate, petiolate; petiole 1.1–2.9 cm long, densely spreading villous; blade narrowly obovate to elliptic, 3.5–6 × 2–3.8 cm, adaxially with tuberculate setae, abaxially with sparsely strigose hairs along veins, base cuneate, margin crenulate and ciliate, apex short acuminate to obtuse, lateral veins 5–6 on each side of midrib, indistinct adaxially and distinct abaxially. **Inflorescences** axillary, with few flowers; peduncles 5–6 cm long, spreading villous; bracts 2, linear, 2.4–3 × 0.4–0.5 mm, adaxially glabrous and abaxially villous, margin entire; pedicels 8–9 mm, white villous. **Calyx** of 5 lobes free to base, lobes equal, linear, 6–7 × 1–1.2 mm, glabrous adaxially, villous abaxially, margin entire. **Corolla** purple with white limb, 2–2.4 cm long, outside pubescent, inside glabrous; tube cylindrical, purple, 1.1–1.2 cm long, 2.1–2.2 mm in diam., not constricted at throat; limb 2-lipped, white with purple stripes at the base; adaxial lip 2-lobed, dissected from near base, lobes broadly obovate, 6–8 × 4–5 mm, apices rounded or slightly retuse; abaxial lip 3-lobed, lobes subequal, obovate, 9–12 × 5–7 mm, broadening from the base, apices rounded or slightly retuse. **Stamens** 4, anthers coherent in 2 pairs; adaxial stamens 1.5–6 mm long, adnate to corolla tube 2.5–3 cm from base, abaxial stamens 2.6–3.1 mm long, adnate to corolla tube 5–6 mm from base; filaments glabrous, slender; anthers basifixed, subglobular, 2-locular, dehiscent longitudinally; staminode c. 1.2 mm long, adnate to corolla tube from the base. **Disc** ring-like, 1.2–1.4 mm in diam., shallowly



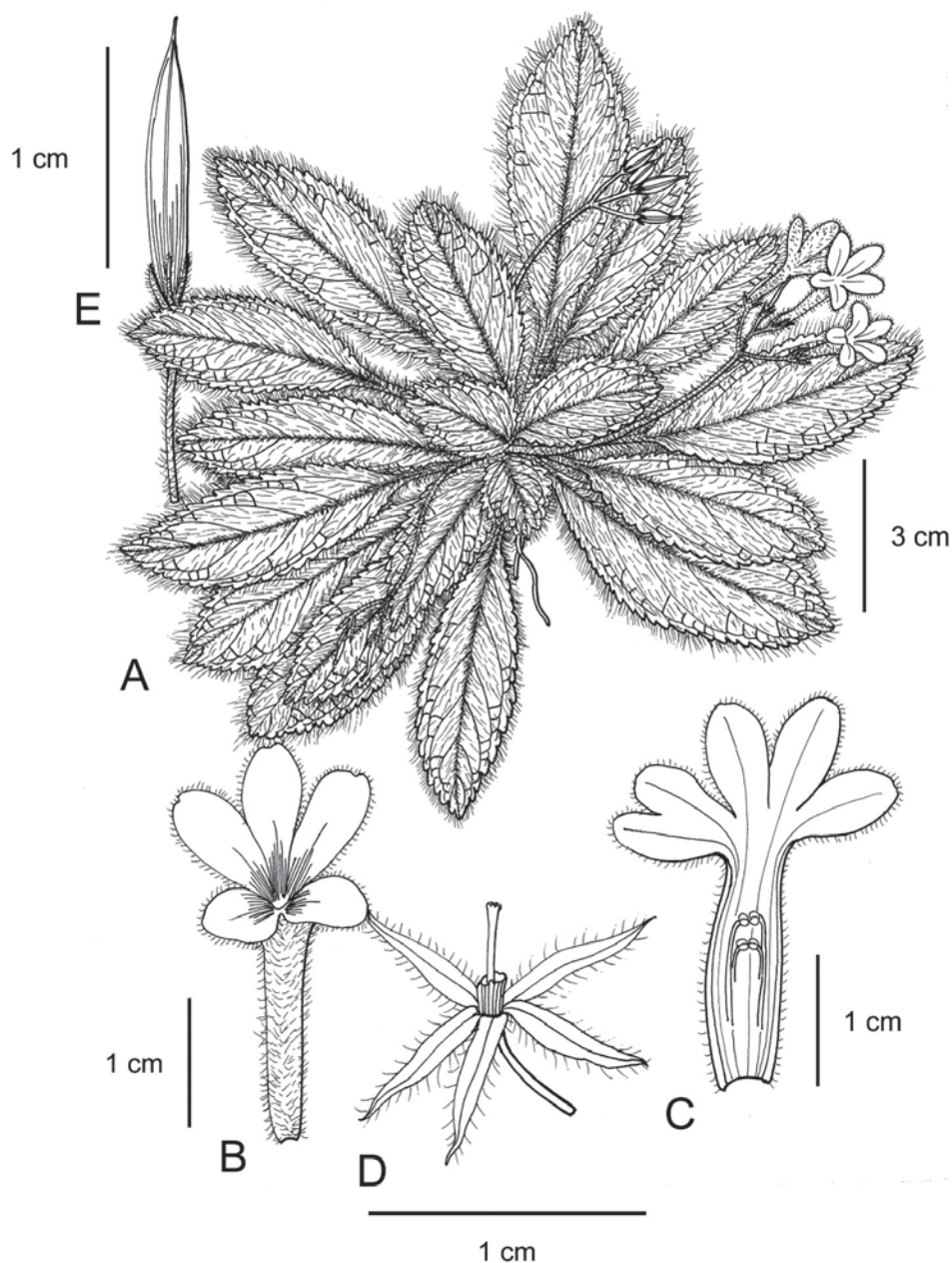


**Fig. 3.** *Oreocharis blepharophylla* W.H.Chen, H.Q.Nguyen & Y.M.Shui **A.** Habit (scale bar 1 cm). **B.** Flower (scale bar 6 mm). **C.** Villous leaves (scale bar 2 cm). **D.** Habitat (scale bar 6 cm). (Photos: S.K. Nguyen)

5-lobed. **Pistil** 4–5 cm long, glabrous; ovary narrowly fusiform, glabrous, 1.5–1.6 mm long, unilocular; style glabrous, 2.6–2.8 cm long; stigma 1, peltate. **Capsule** straight, fusiform, loculicidally dehiscent, 0.8–1 cm long, with persistent style 2.4–2.9 mm long. **Seeds** fusiform,  $0.5\text{--}0.6 \times c. 0.2$  mm.

**Etymology.** The specific epithet refers to the long-ciliate leaf margin.

**Ecology, distribution and phenology.** The new species grows as a lithophytic herb in primary coniferous and mixed forests with *Pinus cernua* Aver. et al. on very steep slopes along a ridge composed of brown sandstone (Averyanov et al., 2014) at elevations of 1200–1850 m. It is endemic to the Xuan Nha nature reserve in Son La province of north-western Vietnam. Flowering is October–November and fruiting is December–January.



**Fig. 4.** *Oreocharis blepharophylla* W.H.Chen, H.Q.Nguyen & Y.M.Shui **A.** Flowering plant. **B.** Corolla. **C.** Cut-open corolla showing two pairs of stamens cohering at the anther tips. **D.** Calyx, disc and pistil (immature). **E.** Capsule dehiscent locally on one side. Drawn by Ling Wang from the holotype Averyanov, *L. et al.* CPC 7019.



**Table 2.** Characteristics distinguishing *Oreocharis blepharophylla*, *O. magnidens* and *O. curvituba*.

Characters	<i>O. blepharophylla</i>	<i>O. magnidens</i>	<i>O. curvituba</i>
Petiole	Densely spreading villous	Densely appressed silvery pubescent	Sparsely spreading hirsute
Leaf lateral veins	Adaxially with tuberculate setae, lateral veins 5–6 on each side	Adaxially with tuberculate setae, lateral veins 8–9 on each side	Adaxially with strongly bullate setae, lateral veins 4–7 on each side
Peduncle	5–3 cm, spreading villous	7–20 cm, densely glandular pubescent	3–15 cm, brown pubescent, glandular puberulent apically
Bracts	Linear, 2.4–3 × 0.4–0.5 mm, and abaxially villous	Ovate, 5–6 × 1.5–3.5 mm, abaxially brown sericeous lanate	Lanceolate-linear, c. 3 mm long, glandular villous outside
Calyx	Lobes linear, 6–7 × 1–1.2 mm	Lobes ovate, 2.5–3 × 1–1.5 mm	Lobes ovate-triangular, 2–2.2 × 0.7–1 mm
Corolla	2–2.4 cm long	0.75–1.2 cm long	1.1–1.3 cm long
Corolla tube	Not constricted at throat, straight, purple	Narrowed at throat, inflated at base, straight, white	Not constricted at throat, slightly curved, purple
Corolla limb	Limb slightly 2-lipped, lobes white with purple stripes	Limb distinctly 2-lipped, lobes white with purple tips	Limb distinctly 2-lipped, lobes white or purplish without tips
Adaxial lip	Lobes obovate or oblong, 6–8 × 4–5 mm	Lobes narrowly oblong to lanceolate, 5–6 × 1.5–2 mm	Upper lips narrowly oblong, ca. 3.8–4 × 1.2–1.4 mm
Abaxial lip	Lobes obovate or oblong, 9–12 × 5–7 mm, apex rounded or obtuse	Lobes narrowly oblong to lanceolate, 5–9 × 1–1.5 mm, apex acuminate	Lower lips narrowly oblong, 4.2–4.8 × 1.3–1.5 mm, apex slightly retuse
Anthers	Coherent in 2 pairs	Not coherent	Not coherent

*Provisional IUCN conservation status.* Endangered EN B1ab(ii,iii,v) + B2ab(ii,iii,v), following IUCN (2012, 2016) guidelines. This is based on an EOO of < 5000 km<sup>2</sup> and an AOO of < 500 km<sup>2</sup>, being known from fewer than five populations, and with evidence of a reduction in the area of occupancy, a decline in habitat quality, and a decline in the number of individuals due to deforestation, largely for agriculture and due to fire.

*Additional specimens examined.* VIETNAM. **Son La:** Moc Chau Distr., Chieng Son comm., Pha Luong village, Pha Luong Mountain summit, 1750–1850 m a.s.l. 20°40'23.0"N 104°37'52.0"E, 23 Sep 2016, *Averyanov, L. et al. CPC 8000* (CPC, LE); Van Ho Distr., Tan Xuan comm., A Lay village, 20°40'46.2"N 104°39'49.6"E, 1500 m a.s.l., 1 Oct 2016, *Averyanov, L. et al. CPC 8171* (CPC, LE).

*Notes.* This new species can be distinguished from *Oreocharis magnidens* by the purple base of the white corolla lobes (vs white base of purple corolla lobes), corolla tube throat not constricted (vs constricted throat), and coherent anthers (vs free anthers). It is also similar to *Oreocharis curvituba* but differs mainly in the colour pattern and shape of the corolla (Wei et al., 2016). Table 2 details the differences between these species.

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