DOI: 10.11931/guihaia.gxzw201808033
引文格式: 陈力, 陈文红, 郭世伟, 等. 云南东南部石山苣苔属一新种——细管石山苣苔 [J]. 广西植物, 2019, 39(5): 574-580.
CHEN L, CHEN WH, GUO SW, et al. *Petrocodon tenuitubus* (Gesneriaceae), a new species from Southeast Yunnan, China [J]. Guihaia, 2019, 39(5): 574-580.

Petrocodon tenuitubus (Gesneriaceae), a new species from Southeast Yunnan, China

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Abstract: The newly refined genus *Petrocodon* Hance (Gesneriaceae), mainly distributed from South China to Southwest China, is comprised of 34 species and one variety. A new species, *Petrocodon tenuitubus* W. H. Chen, F. Wen & Y. M. Shui, distributed in the limestone region from Maguan County, Yunnan Province, China, is illustrated and described here. The new species is similar to *P. lui*, *P. hispidus* and *P. jasminiflorus*, but it can be easily distinguished from *P. lui* and *P. hispidus* by its slender and curved corolla tube, three linear to lanceolate bracts and bracteoles, and one disc-shaped stigma. And it also can be easily distinguished from *P. jasminiflorus* by its ovate to orbicular leaves, ovate corolla lobes with obtuse apex, bracts and bracteoles 3, and staminodes 1. The discovery of this new species has certain significance for promoting the excavation of the resources of the Gesneriaceae in limestone area of China. The holotype and paratype specimens are deposited in Herbarium of Kunming Institute of Botany, Chinese Academy of Sciences (KUN); isotype specimens is deposited in Herbarium of Guangxi Institute of Botany (IBK).

Key words: flora of Yunnan, limestone cave, new taxon, *Petrocodon*, taxonomy
中图分类号: Q949 **文献标识码**: A **文章编号**: 1000-3142(2019)05-0574-07

云南东南部石山苣苔属一新种——细管石山苣苔

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收稿日期: 2018-10-22
基金项目: 国家自然科学基金(31470306, 31000258, 31860047);中华人民共和国生态环境部生物多样性调查评估项目;广西自然科学基金(2017GXNSFAA198006);广西喀斯特地区植物保护与恢复生态重点实验室基金(17-259-23);广西科学院科学研究基金(2017YJJ23022) [Supported by the National Natural Science Foundation of China (31470306, 31000258, 31860047); Biodiversity Background Survey and Assessment Program of Ministry of Ecology and Environment of the People's Republic of China; Guangxi Natural Science Foundation Program (2017GXNSFAA198006); Fund of Guangxi Key Laboratory of Plant Conservation and Restoration Ecology in Karst Terrain (17-259-23); Science Research Foundation of Guangxi Academy of Sciences (2017YJJ23022)]。
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摘　要：最近被重新界定的广义石山苣苔属(*Petrocodon* Hance)是苦苣苔科(Gesneriaceae)一个中等大小的属,我国目前已知的有 34 种 1 变种,主要分布于我国华南至西南石灰岩地区。该文报道了于云南东南部马关县发现的该属一新种——细管石山苣苔(*Petrocodon tenuitubus* W. H. Chen, F. Wen & Y. M. Shui)。该新种在形态上与陆氏细筒苣苔(*P. lui*)、细筒苣苔(*P. hispidus*)和长檐苣苔(*P. jasminiflorus*)相似,但其线形或披针形的苞片和小苞片均为 3 枚,花冠筒细小且弯曲,盘形柱头 1,很容易区别于陆氏细筒苣苔和细筒苣苔;而其叶片卵形至圆形,花冠裂片卵形而尖端钝以及退化雄蕊 3,则显著区别于长檐苣苔。该新种的发现对推进我国石灰岩地区苦苣苔科植物资源的发掘具有一定意义。主模式标本存放于中国科学院昆明植物研究所标本馆(KUN),等模式标本存放于广西植物研究所标本馆(IBK)。

关键词：云南植物区系，石灰岩洞穴，新分类群，石山苣苔属，分类学

1　Introduction

Genus *Petrocodon* Hance (Gesneriaceae), mainly distributed from South China to Southwest China, is comprised of 34 species and one variety (IPNI 2018). Sixteen species from other eight genera, viz. *Calcareoboea* C. Y. Wu ex H. W. Li, *Didymocarpus* Wall., *Dolicholoma* D. Fang & W. T. Wang, *Lagarosolen* W. T. Wang, *Paralagarosolen* Y. G. Wei, *Primulina* Hance, *Tengia* Chun and *Wentsaiboea* D. Fang & D. H. Qin (Liu et al., 2011; Weber et al., 2011; Clark et al., 2013; Xu et al., 2014; Möller et al., 2016), were merged into this genus and 17 new species of genus *Petrocodon* published in the last more than ten years (Wei, 2007; Jiang et al., 2011; Wen et al., 2012; Chen et al., 2014; Hong et al., 2014; Xu et al., 2014; Li & Wang, 2015; Yu et al., 2015; Guo et al., 2016; Cen et al., 2017; Lu et al., 2017a, 2017b; IPNI, 2018; Zhang et al., 2018).

2　Materials and Methods

In October 2016, when the surveys about plant diversity were conducted in Maguan County, Yunnan Province, China, some of authors (YMS, WHC & SWG) collected an unknown species of *Petrocodon* from the limestone area. According to the previous research (Wang, 1984a, 1984b; Pan, 1988; Wang, 1990, 1992; Wang, et al., 1998; Li & Wang, 2004; Wei et al., 2010; Weber et al., 2011; Clark et al., 2013) and the specimens of KUN, PE, IBK, we confirmed that the species was new to science. And its shapes of corolla and curved tube were slightly similar to *P. lui* (Yan Liu & W. B. Xu) A. Weber & Mich. Möller (Xu et al., 2010; Weber et al., 2011), and its characters of leaf were close to *P. hispidus* (W. T. Wang) A. Weber & Mich. Möller (Wang, 1984b, 1990; Weber et al., 2011), and its corolla tube and stigma were similar to *P. jasminiflorus* (D. Fang et W. T. Wang) A. Weber & Mich. Möller (Wang, 1990; Wang et al., 1998; Weber et al., 2011). But it can be distinguished from *P. lui* by several characters, such as the leaf shape, the number of inflorescences cymes, bracts, bracteoles, and stigma, as well as the indumentum of leaves, inflorescences and flower (Xu et al., 2010), and differs from *P. hispidus* by the number of inflorescences cymes, bracts, bracteoles and stigma, the shape of calyx, corolla and ovary, as well as the indumentum of inflorescences and flower (Wang, 1984b, 1990; Wang et al., 1998), and differs from *P. jasminiflorus* by the leaves characteristics, the shape of corolla, the number of bracts, bracteole and staminodes, as well as the indumentum of leaves, inflorescences and flower. Hence, we describe and illustrate it as a new species, *P. tenuitubus*, endemic to the limeston region in Yunnan Province, Southwest China.

3　Taxonomy treatment

Petrocodon tenuitubus W. H. Chen, F. Wen & Y. M. Shui, sp. nov. (Fig. 1-2)

Type: China, Yunnan Province: Maguan County, Jinchang Community, 104° 29′ 17″ E, 22° 46′ 29″ N, alt. 1 835 m, 29 Oct. 2016, *W. H. Chen*, *S.W. Guo* et al., JCL03-011 (**holotype**, KUN; isotype, IBK).

Diagnosis: *P. tenuitubus* is morphologically related to *P. lui*, *P. hispidus* and *P. jasminiflorus*, but it can be easily distinguished from *P. lui* and *P. hispidus* by its slender and curved corolla tube, the number of bracts, bracteole and stigma, as well as the indumentum of inflorescences and flower. And it also can be easily distinguished from *P. jasminiflorus* by its leaves characteristics, the shape of corolla, the number of bracts, bracteole and stami-nodes, as well as the indumentum of leaves, inflorescences and flower.

Description: Herbs perennial. Rhizomes 1.0–3.0 cm long, 0.8–1.8 cm in diam. Leaves 5–15, basal; petiolate 0.7–3.5 cm, adaxially green, abaxially reddish-brown, strigose. Leaf blade ovate to orbicular, herbaceous, 2.6–6.8 × 2.0–5.1 cm, obtuse at apex, cordate symmetrically or asymmetrically at base, with crenate margin; adaxially deeply green to yellowish green, densely strigose; abaxially yellowish green to reddish-brown, tomentose; lateral veins pinnate 3–6 pairs, impressed adaxially and prominent abaxially, abaxially bristly. Inflorescences, cymes 1–3, axillary, with 7–15 flowers; peduncles 3.0–6.0 cm long, glandular hairs. Bracts 3, linear to lanceolate, 0.4–0.8 × 0.1–0.3 cm, adaxially tomentose; bracteoles 3, linear to lanceolate, 0.2–0.6 × 0.1–0.2 cm across, adaxially tomentose. Pedicel 0.2–0.6 cm long, densely glandular hairs. Calyx 5-lobed near to the base, lobes linear to lanceolate; lobes equal, 0.3–0.5 × ca. 0.1 cm, densely glandular hairs abaxially. Corolla infundibuliform, pale purple to purple, 1.2–3.6 cm long, throat with a yellow laminar; tube slender, curved, slightly longer than limb, 0.7–1.6 cm long, ca. 0.2 cm in diam. at base and ca. 0.1 cm in the middle, 0.6–0.8 cm in diam. at throat, outside and throat glandular hairs and inside glabrous; limb 5-lipped, adaxial lip 2-lobed, narrowly ovate, apex subacute or obtuse, 0.9–1.1 × 0.5–0.6 cm, abaxial lip 3-lobed, ovate, apex obtuse, 1.2–1.5 × 0.6–0.8 cm, outside and inside sparsely glandular hairs. Stamens 2, included, adnate at 3–9 mm above the tube base; filament ca. 1 mm long, white, glabrous; anthers oblong, white, glabrous, ca. 1.0 × 0.8 mm, with longitudinal stripe, dorsifixed, confluent apically. Staminodes 3, ca. 0.1 mm long, adnate at 2–8 mm above the corolla tube base. Pistil 4–10 mm long, glandular hairs; ovary ovoid, 1–2 mm long, 1–1.5 mm in diam., glandular hairs; disc ringlike, 0.3 mm; stigma 1, disc-shaped, 0.5–1 mm long. Mature fruit not seen.

Etymology: The new species is named by the characteristics of the long and thin corolla tubes.

Vernacular name: Xì Guǎn Shí Shān Jù Tái (细管石山苣苔).

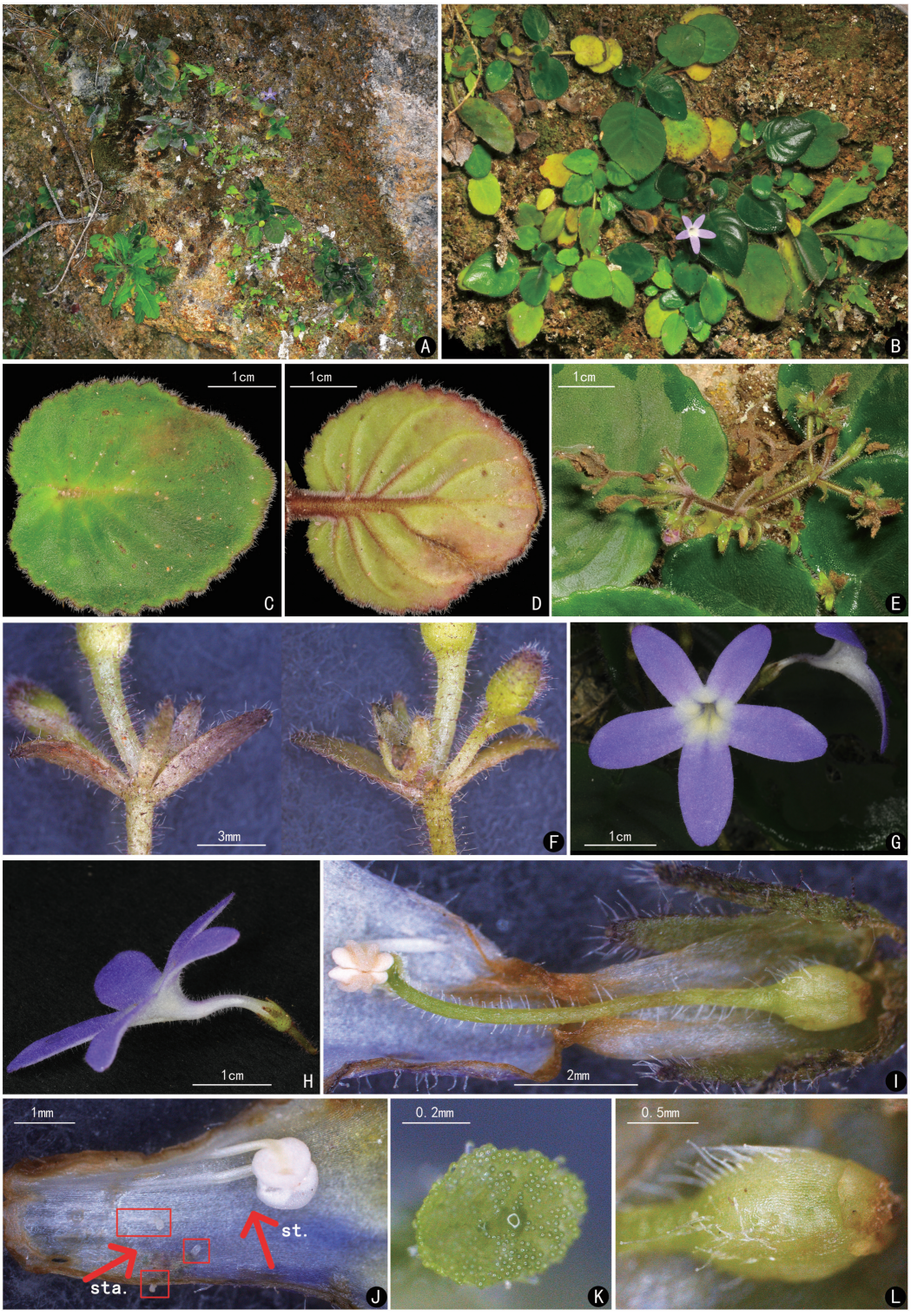
Distribution, habitat and phenology: The new species, *Petrocodon tenuitubus*, grows under the cliff with only one population in Maguan County of Southeast Yunnan, China. There are some companion species of the new species, such as *Saxifraga mengtzeana* Engl. & Irmsch., *Mazus pulchellus* Hemsl. ex Forbes & Hemsl., *Aleuritopteris pseudofarinosa* Ching & S. K. Wu. Flowering period occurs from October to November.

Paratype: China, Yunnan Province: Maguan County, Jinchang Community, 104°29′17″ E, 22°46′29″ N, alt. 1 835 m, 10 Nov. 2017, *S. W. Guo* et al., JCL05-002 (KUN).

4 Discussion

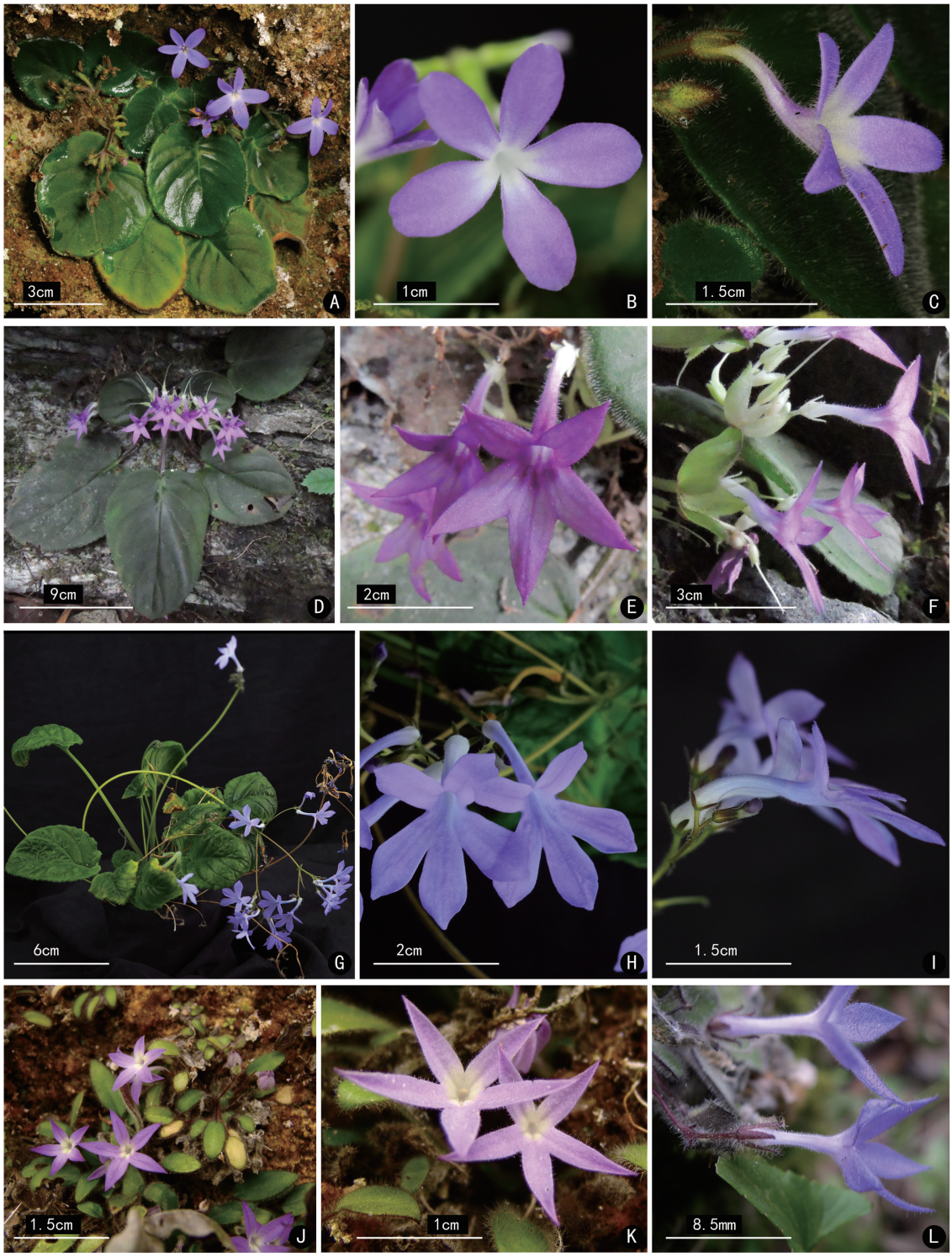
The genus *Petrocodon* is endemic to the limestone regions in South China and North Vietnam with habitat fragmentation. Several years ago, two species of *Petrocodon* were discovered in Maguan County and published (Chen et al., 2014). Like species of *Petrocodon*, the three species in Maguan county has the fragment and narrow habitat with a small population (Wang, 1984b, 1990; Wang et al., 1998; Xu et al., 2010; Weber et al., 2011).

The new species grows under the limestone cliff among the non - limestone mountain in the bordering



Note: **A**. Habitat; **B**. Whole plant, with flower; **C**. Leaf adaxial side; **D**. Leaf abaxial side; **E**. Inflorescences; **F**. Bracts and bracteoles; **G**. Flower, front view; **H**. Flower, lateral view; **I**. Opened corolla, showing stamens and pistil; **J**. Stamens (st.) 2, confluent apically, and staminodes (sta.) 3; **K**. Stigma; **L**. Ovary. Photographed by Guo Shiwei (**A**, **B**, **E**, **G** and **H**) & Chen Li (**C**, **D**, **F**, and **I**–**L**).

Fig. 1　**Petrocodon tenuitubus** W. H. Chen, F. Wen & Y. M. Shui



Note: **A–C**. *Petrocodon tenuitubus* **A**. Habit, **B**. Frontal view of flower, **C**. Lateral view of flower. **D–F**. *P. hispidus* **D**. Habit, **E**. Frontal view of flowers, **F**. Lateral view of flowers. **G–I**. *P. lui* **G**. Habit, **H**. Frontal view of flowers, **I**. Lateral view of flowers. **J–L**. *P. jasminiflorus* **J**. Habit, **K**. Frontal view of flowers, **L**. Lateral view of flowers. Photographed by Guo Shiwei (**A** and **C**), Wen Fang (**B** and **G–L**).

Fig. 2 *Petrocodon tenuitubus* and its morphological related species, *P. hispidus*, *P. lui* and *P. jasminiflorus*

Table 1　Main different characters among *Petrocodon tenuitubus*, *P. lui*, *P. hispidus* and *P. jasminiflorus*

Character	*Petrocodon tenuitubus* sp. nov.	*Petrocodon lui*	*Petrocodon hispidus*	*Petrocodon jasminiflorus*
Leaf	Ovate to orbicular	Ovate or broadly ovate, soft	Broadly ovate to orbicular	Narrowly ovate or elliptic
Leaf adaxially	Densely strigose	Glabrous or sparsely puberulent	White appressed hispid	Sparsely white pubescent, margin glandular and ciliate
Leaf abaxially	Tomentose	Puberulent	White appressed hispid	Sparsely white pubescent
Bract	3, linear to lanceolate, tomentose	2, opposite, linear, puberulent	2, opposite, elliptic to oblong, sparsely hispid	1–2, linear, sparsely puberulent
Bracteole	3, linear to lanceolate, tomentose	2, opposite, linear, puberulent	2, opposite, linear, hispidulous and short glandular hairs	1–2, linear, sparsely puberulent
Pedicel	Densely glandular hairs	Puberulent	Hispid	White pubescent and short glandular hairs
Corolla tube	Slender, curved	Slender, curved	Slender, strict	Slender, curved
Corolla	Lobes narrowly ovate to ovate, apex obtuse	Lobes oblong, obovate to suborbicular, apex obtuse	Lobes triangular, apex acute	Lobes narrowly triangular, apex acute
Staminode	3, adnate at 2–8 mm above the corolla tube base	3, adnate at 6–7 cm above the corolla tube base	3, adnate at, 10–11.5 mm above the corolla tube base	2, adnate at 4 mm above the corolla tube base
Ovary	Ovoid, glandular hairs	Linear, glandular	Linear, pubescent and few glandular hairs	Narrowly ovoid, pubescent
Stigma	1, disc-shaped	2, slightly split into two parts, aequilateral	2, slightly split into two parts, aequilateral	1, disclike

regions between China and Vietnam. The plants with less than 80 individuals grow on rock faces of the limestone cave near to a road. Because the plants grow beside a new road and their habitat can be easily destroyed. We suggest that it should be classified as "Critically Endangered": CR B1ab (iii)+2ab (iii), after consulting the IUCN red list categories and criteria (IUCN 2012).

Acknowledgments　We have so many thanks to Ms. HONG Mengchen and Mr. XI Huihui in Kunming Institute of Botany, Chinese Academy of Sciences for their help in field surveys.

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