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PRIMULINA CRASSIRHIZOMA SP. NOV. (GESNERIACEAE) FROM A LIMESTONE AREA ALONG THE BOUNDARY OF SINO-VIETNAM

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Abstract

Primulina crassirhizoma F. Wen, Bo Zhao & Xin Hong, a new species from a limestone area along the boundary of Sino-Vietnam, is described and illustrated. It is similar to *P. linearifolia* and *P. longgangensis* in leaf and flower shape, but can be distinguished by extremely strong rhozime, with conspicuous internodes, leaf blade adaxial surface nitid, sparsely appressed strigose, lateral veins 6–8 on each side of midrib, calyx narrowly triangular to narrowly ovate, corolla pale purple to bluish purple, c. 3.5 cm long, tube nearly tubular, adaxial lip c. 6 mm, abaxial lip 8-9 mm, glabrous anthers and staminodes 3.

Introduction

The distribution and differentiation centre of *Primulina* Hance (Gesneriaceae) located to South and South-west China and North Vietnam (Wei *et al*., 2010), and many species and varieties of this genus are usually endemic to China, especially in the limestone areas of Guangxi Zhuang Autonomous Region. Very recently some taxa of *Primulina* Hance have been newly described from Guangxi, China, *viz. P. purpurea* Fang Wen, Bo Zhao & Y.G Wei (Wen *et al*., 2012a), *P. hochiensis* var. *rosulata* F. Wen & Y.G. Wei (Wen *et al*., 2012b) and *P. fengshanensis* Fang Wen & Yue Wang (Wen *et al*., 2012c).

In 2004, Shi-Liang Mo, a tourist first collected some "*Primulina*"-like plants from Longbang town, Jingxi County, Guangxi, China. Later on, we found this particular unknown species near the top of limestone hills along the boundary of Sino-Vietnam in 2005. After five years, Prof. Hai He and Prof. Li-Bing Zhang collected many specimens of this particular species with flowers from Pingan town, Jingxi County in 2010. Although this unknown taxon looks like *Primulina linearifolia* (W.T. Wang) Y.Z. Wang (Wang and Pan, 1982; Wang *et al*., 2011) and *P. longgangensis* (W.T. Wang) Y.Z. Wang (Wang and Huang, 1982; Wang *et al*., 2011), we could easily distinguished three species by the characters of leaves and flowers. After consultation of relevant literatures (Wang *et al*., 1990, 1998, 2011; Li and Wang, 2004; Wei *et al*., 2010; Weber *et al*., 2011; Xu *et al*., 2012), and examination of the specimens deposited in different herbaria (ANU, BJFU, CDBI, HN, IBK, IBSC, KUN, PE, VMN, CTC, MO, CDBI), we concluded it as a new species, *Primulina crassirhizoma* sp. nov. The new species is described and illustrated here.

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Primulina crassirhizoma F. Wen, Bo Zhao & Xin Hong, **sp. nov.** (**Fig. 1, Fig. 2 A-F**).

Diagnosis: *Haec species nova similis Primulina linearifoliae et P. longgangensis, sed differ rhizomate incrassato et robusto, conspicue internodiis, laminis supra nitidis, sparse appresso strigosis, lateralis nervis 6-8, calyce anguste triangulo et anguste ovato, corolla pallido purpurata usque caesie purpurata, ca. 3.5 cm longa, tubis fere tubulari, labio postico ca. 6 mm longo, eo antice 8-9 mm longo, filamentis ca. 0.9-1.1 cm longis, antheris glabris, staminodiis 3.*

Type: CHINA, Guangxi Zhuangzu Autonomous Region: Jingxi County, Longbang Township, near Tunhong village, growing in the crevices of rock, under evergreen broad-leaved forest or bamboo bushes, near to the top of limestone hills, 22°52′37.78″N, 106°21′35.80″ E, 781.5 m, 26 November 2006, *FANG WEN & Xin Hong* 0169 (*Holotype*: IBK; *Isotype*: ANU).

Perennial, acaulescent. Rhizome subterete, erect or ascending, single, in very thick and strong trunks, woody, brown, with conspicuous internodes, up to 30 cm long, 1.0-1.5 (-4) cm in diam. Leaves 6-16 or more, congested at the apex of rhizome, opposite on upper half of rhizome; petiole 2-5 × 4.5-6.0 cm; leaf blade thickly coriaceous, narrowly elliptic, oblanceolate to oblong, 8-12 × 2.2-3.0 cm, adaxial surface nitid, sparsely appressed strigose, abaxial sparsely strigose, extremely short brownish pubescent along veins, apex acute, base attenuate to slightly obliquely cuneate, margin with inconspicuous obtusely dentate from the middle to the apex, revolute, lateral veins 6-8 on each side of midrib, slightly impressed adaxially, prominent ribs abaxially. Cymes 2-6 or more on one stem, axillary, (1-) 3-16-flowered; peduncle 9-16 cm long, 0.1-0.2 cm in diam., densely erect, dark purple glandular puberulent; bracts linear-lanceolate to lanceolate-ovate, 5-8 mm long, 2.0-2.5 mm in diam., puberulous outside, glabrous inside; pedicel 0.6-2.2 cm long, c. 0.1 cm in diam., glandular-pubescent. Calyx 5-partite to the base, lobes narrowly triangular to narrowly ovate, 2.6-3.5 × 1.1-1.4 mm, brownish red, pubescent abaxially, glabrous adaxially, acute, entire. Corolla c. 3.5 cm long, c. 0.9 cm in diam. at the orifice, c. 0.4 mm in diam. at the base, pale purple to bluish-purple, outside glandular pubescent, inside glabrous; tube nearly tubular, c. 2 cm long; limb distinctly 2-lipped, upper lip 2-lobed near base, lobes ovate-rounded to rounded, c. 6 × 8 mm, retroflexed, lower lip 3-lobed to near two-third, central lobe orbicular, lateral ones obliquely ovate, 8-9 × 9-10 mm. Stamens 2, adnate 1.1-1.3 cm above the corolla base; filaments 0.9-1.1 cm long, upper parts geniculate, scattered glandular pubescent; anthers fused by their entire adaxial surfaces, elliptic or reniform, c. 2 mm long, glabrous; staminodes 3, lateral ones c. 2.6 mm long, adnate up to c. 0.8 cm above the corolla base, apex inflated, scattered glandular pubescent, middle one adnate, up to c. 0.6 cm above the corolla base, very small, capitate, c. 0.3 mm long, glabrous. Disc 1.5-2.0 mm long, margin repand, glabrous. Pistil c. 2 cm long; ovary linear, c. 1.5x 0.2 cm, densely puberulent with both glandular and eglandular hairs; style c. 0.5 cm long, c. 1 mm in diam., glandular-puberulent; stigma obtrapeziform, c. 0.4 cm long, 2-lobed to middle. Capsule straight, 4.0-5.5 cm long, c. 4 mm in diam., glandular-pubescent and sparsely pilose.

Phenology: It flowers from November to early December.

Ecology: At least five populations have been found for the new species around the border of China (Tunhong village of Longbang town, Jingxi County, Guangxi) (Fig. 3). Besides, some plants of this new species were introduced and cultivated in Royal Botanic Gardens, Kew in past ten years from Vietnam, but they are lack of specific information of Vietnamese locality, and known only from Cao Bằng province of North Vietnam. All known populations in China are growing at the crevices in evergreen limestone broad-leaved forest or bamboo-bushes near the peak of limestone hills.

Etymology: The specific epithet is derived from its extremely thick and robust rhizome.

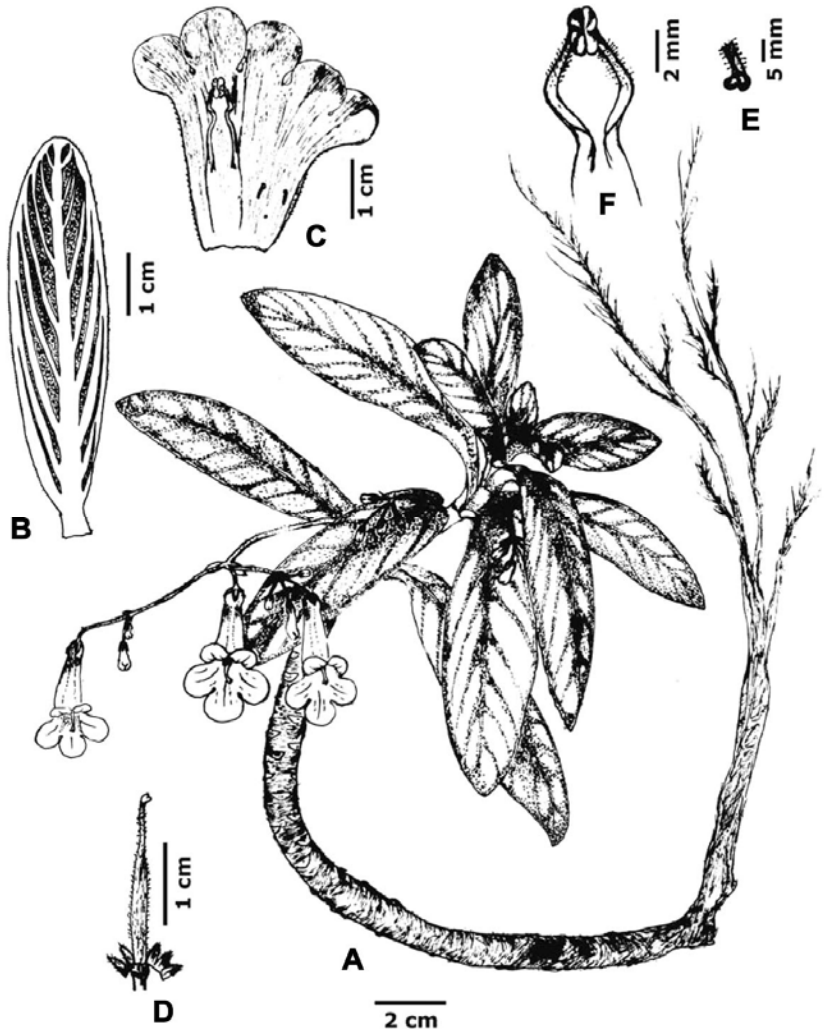

Fig. 1 A-F. *Primulina crassirhizoma* F. Wen, Bo Zhao & Xin Hong **sp. nov.** A) Habit; B) Back of leaf blade; C) Corolla, dissected to show stamens and staminodes; D) Pistil, dissected calyx lobes and disc; E) Stigma; F) Stamens and anthers. (All from the type, Fang Wen and Xin Hong 0169, IBK).

Note: *Primulina crassirhizoma* is morphologically similar to *P. linearifolia* (W.T. Wang) Y.Z. Wang and *P. longgangensis* (W.T. Wang) Y.Z. Wang, but it differs from these species in having thick and strong rhizome, with conspicuous internodes; adaxial surface of leaf blade nitid, sparsely appressed strigose; lateral veins 6-8 on each side of midrib; calyx narrowly triangular to narrowly ovate; corolla pale purple to bluish-purple, c. 3.5 cm long; tube nearly tubular, adaxial lip c. 6 mm; abaxial lip c. 8-9 mm; filaments ca. 0.9-1.1 cm long; anthers glabrous; staminodes 3. The differences of three relatives are shown in Table 1 and Fig. 2.

Fig. 2 A-F. *Primulina crassirhizoma* F. Wen, Bo Zhao & Xin Hong **sp. nov.** A) Habitat; B) Habit; C) Cymes and flowers; D) Front view of flower and bud; E) Lateral view of flowers and calyx lobes; F) Pistil; G. Stigma; H. Back of leaf blade; I-L. *P. longgangensis* I) Habit; J) Cymes and flowers; K) Front view of flower; L) Lateral view of flower and calyx lobes; M-P. *P. linearifolia* M) Habit; N) Cymes and flowers; O) Front view of flower; P) Lateral view of flower and calyx lobes.

Table 1. Diagnostic morphological characters of *Primulina crassirhizoma, P. longgangensis* and *P. linearifolia*.

Characters	*P. crassirhizoma*	*P. longgangensis*	*P. linearifolia*
Rhizome	1.0-1.5 (-4) cm in diam., internodes conspicuous	0.4-0.7 cm in diam., internodes conspicuous	0.4-1.0 cm, internodes inconspicuous
Indumentum of leaf blade	Adaxial surface nitid, Sparsely appressed strigose	Densely appressed puberulent and pilose	Appressed pubescent
Lateral veins	6-8 on each side of midrib	3-6 on each side of midrib	4 or 5 on each side of midrib
Calyx	Narrowly triangular to narrowly ovate, 2.6-2.8 × 0.3-0.5 mm	Lanceolate-linear, 5-8 × 0.9-1.5 mm	Linear-lanceolate, 3.2-4.0 × 0.6-1.1 mm
Color of corolla	Pale purple to bluish purple	White to red–purple	White to pale bluish
Corolla size	c. 3.5 cm long	c. 4 cm long	c. 2.4 cm long
Tube shape	Nearly tubular	Narrowly funnelform	Narrowly funneliform
Lips of corolla	Adaxial lip c. 6 mm; abaxial lip c. 8-9 mm	Adaxial lip c. 8 mm, abaxial lip c. 1.2 cm	Adaxial lip c. 4 mm, abaxial lip c. 9 mm
Filaments	0.9-1.1 cm long	c. 1.4 cm long	c. 1 cm long
Anthers	Glabrous	Bearded	Bearded
Staminodes	3	3	2
Flowering time	November to December	September to December	April

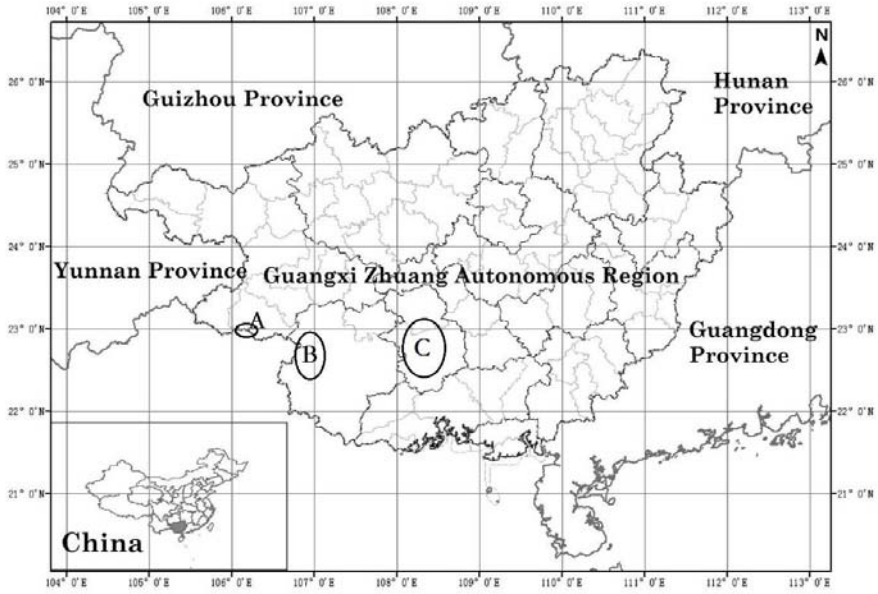

Fig. 3 Distribution of *Primulina crassirhizoma* F. Wen, Bo Zhao & Xin Hong **sp. nov.** (A) and its related species, *P. longgangensis* (W.T. Wang) Y.Z. Wang (B) and *P. linearifolia* (W.T. Wang) Y.Z. Wang (C) in China.

Additional specimens examined: CHINA. Guangxi Zhuangzu Autonomous Region: Jingxi County, Pingan Town, Guobu village, on the precipice of limestone hills, 23°00′02.20″N, 106°12′13.35″ E, 1010 m, 02 November, 2010, *Zhang Li-Bing, He Hai & Wang Yu 5543* (CTC, MO, CDBI); Pingan Town, Longjin village, similar habitat, 22°59′29.89″N, 106°11′00.91″ E, 980 m, 2 November 2010, *Zhang Li-Bing, He Hai & Wang Yu 5517* (CTC, MO, CDBI).

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