New Data on Chinese Gesneriaceae: Postprint of *Rhynchotechum parviflorum*

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Date: 2020-08-02T00:00:00+00:00

Abstract

This study reports Rhynchotechum parviflorum Blume as a new record for China, collected from Medog County, Tibet Autonomous Region. This species typically inhabits cliffs adjacent to forest streams and shady, humid environments under secondary forests. The primary diagnostic characters of this species include essentially opposite leaves, sericeous calyx lobes, pedicels covered with yellowish-brown villous hairs, a relatively small corolla tube, an ovary with short pubescence, and fruit ranging from glabrous to slightly pubescent. Indian scholars documented this species as a new distribution record for India in 2020; however, the voucher specimen locality recorded in the original literature is situated within Medog County, Tibet Autonomous Region, China, thereby casting doubt on the locality information presented in the original account. Furthermore, certain herbarium specimens of Rhynchotechum deposited in collections were identified as this species in previous studies; herein, the geographical distribution information for this species in China and a detailed description are concurrently provided.

Full Text

New Data on Chinese Gesneriaceae: *Rhynchotechum parviflorum* Blume

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Abstract
This paper reports *Rhynchotechum parviflorum* Blume (Gesneriaceae) as a newly recorded species of the genus *Rhynchotechum* from Motuo County, Tibet Autonomous Region, China. The species typically inhabits damp cliffs near streams in primary forests and shaded, moist environments in secondary forests. Its primary diagnostic characteristics include essentially opposite leaves, sericeous calyx lobes, yellowish-brown villous pedicels, relatively small corolla tubes, puberulent ovaries, and glabrous to puberulous fruits. Indian scholars recorded this species as a new distribution for India in 2020; however, the voucher specimen' s collection locality recorded in the original literature is located within Motuo County, Tibet, China, raising questions about the accuracy of the locality information reported in that publication. Additionally, some herbarium specimens of *Rhynchotechum* previously identified as this species are addressed herein, along with detailed distributional information and a comprehensive description for China.

Keywords: Gesneriaceae; *Rhynchotechum parviflorum*; new record; Tibet Autonomous Region; China

Introduction

The genus *Rhynchotechum* Blume (known as "Tongruicao" in Taiwan) comprises subshrubs in the family Gesneriaceae. Established by Blume (1826) and initially placed in Begoniaceae, it was later transferred to Gesneriaceae (Don, 1838; Endlicher, 1839; Brown, 1867). Due to its fleshy, berry-like fruits similar to those of *Cyrtandra* J.R. Forst. & G. Forst., classical morphology once suggested a close relationship between the two genera (Don, 1838; Endlicher, 1839; Ivanina, 1965; Burtt & Wiehler, 1995). However, cytological studies cast doubt on this proposed affinity (Ratter, 1962; Kiehn & Weber, 1997; Wang & Wang, 2000), and molecular phylogenetic evidence has since placed *Rhynchotechum* in a basal position within the Didymocarpoideae subfamily of Gesneriaceae, showing closer relationship to *Boeica* C.B. Clarke (Möller et al., 2009; Wei et al., 2010). Although numerous regional studies have been conducted (Schlechter, 1923; Hatusima, 1971; Walker, 1976; Theobald & Grupe, 1981; Wang, 1984; Wang et al., 1998; Burtt, 2001; Hilliard, 2001), comprehensive systematic treatments of the entire genus have been published only by Clarke (1883) and Anderson & Middleton (2013), spanning an interval of 130 years. According to these works, approximately 16 species are currently recognized worldwide, distributed in lowland valley forests across tropical and warm regions of Asia (Wang, 1984; Anderson & Middleton, 2013).

Taxonomic and Geographic Notes

The voucher specimen of *Rhynchotechum parviflorum* recorded in recent Indian literature was reportedly collected from "Sikem, Upper Siang District, Arunachal Pradesh, India" (Momang et al., 2020). This region, referred to by India as "Arunachal Pradesh," represents territory illegally occupied by India based on

the illegitimate "Simla Convention" and the legally void "McMahon Line," unilaterally proclaimed in 1987. The Chinese government has repeatedly issued solemn statements refusing to recognize the illegal "McMahon Line" and the fabricated "Arunachal Pradesh" (Dai, 2014; Jun, 2017; Zhong, 2017). The GPS coordinates provided (95°4 17 E, 28°21 39 N) plot within Motuo County, Tibet Autonomous Region, China, when entered into the official Chinese geographic information platform "Tianditu" (https://www.tianditu.gov.cn/). We therefore question and correct the accuracy and attribution of the locality information in the original publication. Although further field investigation at this location is needed to confirm the details of this new national record, southern Tibet is undoubtedly inherent sovereign territory of the People' s Republic of China, making *R. parviflorum* unequivocally a new national record for China. Furthermore, our literature review revealed that some specimens previously identified as *R. ellipticum* (Wall. ex Dietr.) A. DC. and *R. formosanum* Hatusima were considered misidentifications of voucher specimens in recent research (Anderson & Middleton, 2013). Since *R. parviflorum* has never been included in Chinese floras (Wang, 1990; Wang, 1998) or Gesneriaceae monographs (Li & Wang, 2004; Wei et al., 2010), we provide a comprehensive treatment herein, with a newly coined Chinese name consistent with the Latin epithet.

Taxonomic Description

小花线柱苣苔（新拟）*Rhynchotechum parviflorum* Blume

Rhynchotechum parviflorum Blume, Bijdr. Fl. Ned. Ind. 775 (1826); G. Don, Gen. Hist. 663 (1838); DC., Prodr. 285 (1845); Miquel, Fl. Ned. Ind. 2: 750 (1858); C. B. Clarke in A. DC. & C. DC., Monogr. Phan. 5(1): 195 (1883); C. B. Clarke in Hook. f., Fl. Brit. India 4: 373 (1884); Ridl., J. Straits Branch Roy. Asiat. Soc. 44: 84 (1905); Ridl. in King & Gamble, Mat. Fl. Malay. Penins. 21: 787 (1909); Ridl., Fl. Malay Penins. 2: 541 (1923); P. H. Ho, Illustr. Fl. Vietnam 3(1): 25 (1993); B. L. Burtt, Thai Forest Bull., Bot. 29: 107 (2001).

Type specimen: Java, Seribu mountains, Blume s.n. (L [barcode: 0834014]). **Epitype:** Java, Preanger, Paroenkoeda [Parungkuda], 20 xii 1920, Bakhuizen van den Brink 5055 (L).

Morphological Description

Stems 20–180(–460) cm tall, 4.5–8 mm in diameter, sometimes branched at the base. Leaves opposite, rarely subopposite; petioles 1.7–4.5(–7.5) cm; leaf blades elliptic to narrowly elliptic or obovate to narrowly obovate, 9–27(–37) × 3.4–12 cm, 1.8–3.5(–6) cm wide, apex acuminate to acute, rarely obtuse or caudate, base narrowly cuneate to cuneate; margin serrulate to dentate, teeth up to 3 mm; lateral veins 9–24 pairs; adaxial surface dark green, glabrous to white-puberulent, densely hairy on midrib; abaxial surface pale green, glabrous to rusty-yellow woolly, veins densely rusty-brown woolly. Inflorescences dark purplish-red or green to pink-brown, (0.9–)1.3–6(–9) cm long, (2–)3–4(–5)-branched; peduncle

few or absent; primary branches 0.3–3.2(–4) cm; secondary branches 0.3–1.6(–1.9) cm; axes rusty-yellow villous or sericeous to subglabrous, rarely glandular-pubescent; bracts linear to triangular, primary bracts 2–6 mm, secondary bracts 2–8 mm; pedicels 1–11 mm, yellowish-brown sericeous or villous. Calyx slightly purplish-red or green to pink-brown, lobes triangular with rounded apices, rarely somewhat caudate, (1.5–)2–3.5(–4) × (0.5–)0.75–1(–1.5) mm, yellowish-brown sericeous or villous to subglabrous or coarsely glandular-pubescent.

Corolla white to pale purple, externally glabrous to puberulent; upper lip purplish-red at base, 2.25–3.5 × 2–4 mm; upper lobes 0.75–1.5 × 0.75–2 mm, apex obtuse to rounded; lower lip (2.75–)3.5–4.5(–5) × (3–)4.5–6(–8) mm; lower lobes 1–2 × 1–2.25 mm, apex obtuse to rounded; corolla tube (1–)1.5–2 mm long. Stamens inserted 0.5–0.75(–1) mm from corolla tube base; filaments ca. 0.5–1 mm; anthers yellow to reddish-brown, ca. 0.5–0.75 mm in diameter, glabrous, rarely puberulent; pistil ca. 0.25–0.5 mm. Ovary (0.5–)0.75–1.25 × (0.5–)0.75–1.5 mm, puberulent to pubescent; style white, 1.5–3.25(–4) mm; stigma white, apex truncate to globose or rounded. Fruit elliptic to broadly elliptic or broadly ovoid, (2.5–)3–4 × 2–3.5(–5) mm, glabrous to puberulent.

Specimen Citation

China, Tibet Autonomous Region, Motuo County, M. Taram and O. Taku 5068, 18 June 2018, 28°21 39 N, 95°4 17 E, altitude 300 m (HAU).

Ecology and Associated Species

In southern Motuo County, Tibet, the species occurs in moist understory habitats and on cliffs near streams. According to literature (Momang et al., 2020), associated species include *Rhynchotechum vestitum* Wall. ex C.B. Clarke, *Lysionotus bijantiae* D. Borah & A. Joe [actually *Henckelia oblongifolia* (Roxb.) D.J. Middleton & Mich. Möller] (Cai et al., 2020), *H. pumila* (D. Don) A. Dietr., *Boeica clarkei* Hareesh, L. Wu, A. Joe & M. Sabu (this new species was also incorrectly recorded as being from "Arunachal Pradesh" but was actually collected within China), *Pilea insolens* Wedd., *P. umbrosa* Blume, *Diplazium esculentum* (Retz.) Sw., and *Cyclosorus parasiticus* (L.) Farw.

Distribution

Anderson & Middleton (2013) noted that during the compilation of *Flora Republicae Popularis Sinicae* and *Flora of China*, specimens of *R. parviflorum* from Guangdong, Guangxi, Hainan, and Hong Kong were erroneously identified as *R. obovatum* or *R. formosanum* (main voucher specimens listed below). Although no specimens from Taiwan have been examined, they speculated that the species should also occur there. Therefore, the species' distribution in China includes Tibet Autonomous Region (Motuo County), Guangdong Province, Guangxi Zhuang Autonomous Region, Hainan Province, and Hong Kong Special Administrative Region. The species has a broad distribution globally, extending

from the Nicobar Islands of India in the west to Papua New Guinea in the east, north to southern and southwestern China, and south to Indonesia. Its known distribution is illustrated in Figure 1 [Figure 1: see original paper].

Additional Specimens Examined

China. Guangdong: August 1887, C. Ford 109 (K [2]). **Guangxi:** Bose, Bako Shan, 27 September 1928, R.C. Ching 7702 (NY, US); Fangcheng District, Kung Ping Shan, 10–18 September 1936, W.T. Tsang 26854 (A, E, K). **Hainan:** Bo-ting, 11 October 1936, S.K. Lau 27967 (A); Dung Ka, 25 September 1932, N.K. Chun & C.L. Tso 43946 (A, NY, US); Lam Ko District, top of Lin Fa Shan, 2 August 1927, W.T. Tsang 287 (A, K, NY, UC, US); Lingshui Xian, Tongteiling, 16 October 1956, L. Teng 2617 (AAU); 18 March 1933, F.C. How 70372 (NY). **Hong Kong:** Wah Shan Kuek, 23–24 August 1970, S.Y. Hu 10939 (A).

Discussion of Chinese *Rhynchotechum* Species

Flora Republicae Popularis Sinicae originally recorded six *Rhynchotechum* species in China: *R. vestitum* Wallich ex C.B. Clarke, *R. discolor* (Maxim.) B.L. Burtt (known as "Tongruicao" in Taiwan), *R. ellipticum* (Wall. ex D. Dietrich) A. de Candolle, *R. formosanum* Hatusima (known as "Penglai Tongruicao" or "Taiwan Rhynchotechum" in Taiwan), *R. longipes* W.T. Wang, and *R. obovatum* (Griff.) B.L. Burtt (Wang, 1990). The subsequent English edition, *Flora of China*, recorded five species and one variety, adding *R. discolor* (Maxim.) Burtt var. *incisum* (Ohwi) Walker from Taiwan. This variety was originally described as *Isanthera discolor* Maxim. var. *incisa* Ohwi (1938) and later transferred to *Rhynchotechum* by E. Walker, initially recorded only from Okinawa, Japan (Walker, 1976), and subsequently discovered in Taiwan (Li & Hsieh, 1997).

Furthermore, *Flora of China* considered *R. obovatum* should be synonymized under *R. ellipticum* (Wang et al., 1998), discarding the Chinese name for *R. ellipticum* while retaining "Xianzhuojutai" (*R. obovatum*) as the accepted name. This revision was adopted in subsequent Chinese Gesneriaceae monographs (Li & Wang, 2005). However, the two formerly merged species were recently separated again based on inflorescence position, calyx shape, and leaf morphology (Anderson & Middleton, 2013). Wang & Wang (2000) revised Taiwanese *Rhynchotechum* species based on morphology, seed micromorphology, and chromosome number, treating *R. discolor* var. *incisum* as a form [*R. discolor* (Maxim.) B.L. Burtt f. *incisum* (Ohwi) Hatus. ex J.C. Wang] due to its lack of differences from *R. discolor* except in leaf morphology. The latest revision eliminated this form (Anderson & Middleton, 2013), merging it with *R. discolor*, while also publishing *R. brevipedunculatum* J.C. Wang. Subsequent molecular phylogenetic studies using ITS and *trn*S-G sequences confirmed the validity of this species (Goro et al., 2014). Therefore, including the new record reported herein, China now has eight formally recorded *Rhynchotechum* species, distributed from south-

eastern Tibet through Yunnan, southern Sichuan, southern Guizhou, Guangxi, Guangdong, southern Fujian to Taiwan. Two species are endemic: *R. brevipedunculatum* recorded only from Taiwan, and *R. longipes* recorded only from southern Guangxi. Morphologically, *R. parviflorum* resembles *R. formosanum* but differs in its shorter peduncles, subclustered inflorescences, and lack of glandular hairs on the lower inflorescence. It also approaches *R. ellipticum* from Motuo, Tibet, but can be distinguished by its shorter, white corolla tube, smaller style, glabrous stamens, and puberulent ovary.

Key to *Rhynchotechum* Species in China

1. Peduncles long, or peduncles short but inflorescence unbranched ——4

2. Leaves alternate——5

3. Plants dwarf, ca. 5 cm tall, leaves oblong, calyx lobes linear, green ——*R. longipes*

4. Plants 5–60 cm tall, leaves elliptic-obovate, calyx lobes triangular, reddish-purple——*R. formosanum*

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Note: Figure translations are in progress. See original paper for figures.