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The identity of *Roscoea cautleoides* var. *pubescens* (Z. Y. Zhu) T. L.Wu based on molecular and morphological evidences

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Abstract

Roscoea cautleoides Gagnepain is a small herb and mainly distributed in Sichuan and Yunnan province. According to the *Flora of China*, this species includes two varieties, namely *R. cautleoides* var. *cautleoides* and *R. cautleoides* var. *pubescens* (Z. Y. Zhu) T. L. Wu. The later had initially been proposed as a new species (*R. pubescens* Z. Y. Zhu), but it was then treated as one variety of *R. cautleoides*. In the present study, we found that *R. cautleoides* var. *pubescens* was obviously distinguishable from *R. cautleoides* var. *cautleoides* in the maximum parsimony (MP) tree. And this result was also supported by morphological characters of these two taxa. So we suggest that *R. cautleoides* Z. Y. Zhu should be recovered and regarded as valid name for the species.

Keywords: *Roscoea cautleoides* var. *pubescens*, *R. cautleoides*, molecular, morphological character, nomenclature

Introduction

Roscoea Smith is a small genus in the family Zingiberaceae. It is composed of about 18 species that are mainly distributed in southwestern China and adjacent regions (Cowley 2007). According to the *Flora of China* (FOC), there are 13 species and 3 varieties in the genus in China (Wu & Kai 2000). Several species are used in horticulture due to their orchid-like flowers. Meanwhile, tuberous roots of some species are commonly used for fork medicine (Luo *et al.* 2008). It was reported that *Roscoea* species were commonly out-crossing but autonomous selfing also provided reproductive assurance under unpredictable pollinator environments (Zhang & Li 2008, Zhang *et al.* 2010). And natural hybridization between *R. humeana* I. B. Balfour & W. W. Smith and *R. cautleoides* Gagnepain was observed and confirmed in sympatric population (Du *et al.* 2012). Based on nuclear ITS, *Roscoea* was a monophyletic group, a sister group to *Cautleya* J. D. Hooker, and it included two major clades, namely the "Chinese" and the "Himalayan" (Ngamriabasakul *et al*. 2000). Moreover, discriminatory ability of DNA barcodes was also tested in *Roscoea* and combination of ITS + *trn*H-*psb*A was proved to be efficient (Zhang *et al*. 2014).

Roscoea pubescens Z. Y. Zhu was initially proposed as a new species based on the following morphological characters: leaf sheath and blade abaxially densely subappressed pubescent and longer fruits (Zhu, 1988). But it was then treated as one variety of *R. cautleoides* Gagnepain, namely *R. cautleoides* var. *pubescens* (Z. Y. Zhu) T. L. Wu (Wu 1997), and this revision was accepted and used in the *Flora of China* (Wu & Kai 2000).

The early traditional taxonomy was usually performed based on morphological characters of type specimen (Hsu 1998). The narrow "species" concept was controversial and could result in error in taxonomic study (Nooteboom 1992). And experience and cognition of taxonomists probably affected taxonomic result. Complicated morphological variation in some complex taxa, such as *Fritillaria cirrhosa* D. Don and its relative species resulted in publication of massive new species and confusion of whole group (Luo & Chen 1996). In recent years, phylogenetic approach based on molecular techniques has been widely used in plant taxonomy (Judd *et al.* 2007). Especially DNA barcoding, as a new method to discriminate and identify species, has been developed quickly in recent years and greatly promoted taxonomy, such as identifying cryptic species (Hebert *et al.* 2003, Hajibabaei *et al*. 2007, Li *et al*. 2011, Liu *et al.* 2011). So molecular method has become an important tool and supplement for traditional taxonomy besides morphological

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Taxonomic treatment

Roscoea pubescens Z.Y. Zhu (1988: 315).

Type:—CHINA. Sichuan: Xichang, 2000 m, J. L. Zhang 195 (holotype, EMA)
Homotypic synonym:—*R. cautleoides* Gagnep. var. *pubescens* (Z.Y. Zhu) T.L. Wu: (1997: 441).

Distribution: This species occurs in southern Sichuan. It grows in meadow and shrub (at the altitudes between 2000 m and 3200 m).

Roscoea cautleoides Gagnepain (1901: LXXV).

Type:—CHINA. Yunnan: Hee-chan-men, below Lankong near Tali, July 1883, *Delavay 231* (syntypes P!), *92* (syntypes P!, K not seen).
Heterotypic synonyms:—*Roscoea chamaeleon* Ganepain (1901: LXXVI). Type: CHINA. Yunnan: Hee-chan-men, May 1887, *Delavay 2659* (holotype P; isotype K).—*R. capitata* var. *purpurata* Ganepain (1901: LXXIV).—*R. yunnanensis* var. *purpurata* (Gagnepain) Loesener (1923: 600). Type: CHINA, Yunnan: San-tchang-kiou, July 1889, *Delavay 4491* (holotype P; isotype K).

Distribution: This species are widely distributed in Sichuan and Yunnan. Its habitat includes *Pinus* forests, dwarf scrub, meadows (at the altitudes between 2000 m and 3500 m).

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