



Selaginella wangpeishanii (Selaginellaceae), a new lycophyte from a limestone cave in Guizhou, China

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Abstract

Selaginella wangpeishanii, a new species of the lycophyte genus *Selaginella* (Selaginellaceae) from a limestone cave in southern Guizhou, China is described and illustrated. The new species is different from any species in the genus known so far in China by having some ultimate branches bearing microphylls in ascending order of trophophylls, sporophylls or sporophyll-like microphylls, and trophophylls (TST arrangement of microphylls). Morphologically, *S. wangpeishanii* is most similar to *S. gebaueriana*, but is distinct by smaller plants and serrulate margins of lateral trophophylls. *Selaginella wangpeishanii* is currently known only from a single population and is considered to be Critically Endangered (CR), based on IUCN Red List criteria.

Key words: *Selaginella wangpeishanii*, Guizhou, TST arrangement of microphylls, IUCN Red List

Introduction

Selaginella Beauvois (1804: 478) (Selaginellaceae) is the largest lycophyte genus with about 750 species mainly distributed in tropical and subtropical areas (Jermy 1990). Based on morphological characters, five subgenera were recognized by Jermy (1986, 1990): *S.* subg. *Ericetorum* Jermy (1986: 117), *S.* subg. *Heterostachys* Baker (1883: 4), *S.* subg. *Selaginella*, *S.* subg. *Stachygynandrum* Baker (1883: 3), and *S.* subg. *Tetragonostachys* Jermy (1986: 118). The DNA sequences of chloroplast *rbcL* gene of 62 species of *Selaginella* showed that *S.* subg. *Selaginella* and *S.* subg. *Tetragonostachys* are monophyletic, but *S.* subg. *Heterostachys* and *S.* subg. *Stachygynandrum* are not, and the monophyly of *S.* subg. *Ericetorum* is uncertain (Korall & Kenrick 2002).

China is rich in the diversity of ferns and lycophytes with 2,129 species in 177 genera (Lin *et al.* 2013) and some 72 species of *Selaginella* are recognized for the Flora of China (Zhang *et al.* 2013). Guizhou is the second most species-rich province of China for *Selaginella* with 34 species recorded in a recent work (Wang & Wang 2001) after Yunnan with 53 species (Chu 2006). New species continue to be discovered in Guizhou (e.g., Gou & Wang 2005, Zhang *et al.* 2012). In an expedition to further understand the fern flora of limestone caves in Guizhou in 2012, we collected a specimen of *Selaginella* in southern Guizhou and our morphological study shows that the gathering represents a species new to science that is described herein:

Selaginella wangpeishanii Li Bing Zhang, H. He & Q. W. Sun, *sp. nov.* Fig. 1.

Type:—CHINA. Guizhou Province: Libo Co., Jiarong Zhen, close to Henggu Cun, 25°27.4235'N, 108°07.6417'E, 670 m, on weathered crust of limestone rocks at the opening of a limestone cave, 24 October 2012, Li-Bing Zhang & Hai He 6234 (holotype CDBI!, isotypes CTC, GZTM, MO, Herb. Pei-Shan Wang).

Selaginella wangpeishanii is similar to *S. gebaueriana* Handel-Mazzetti (1929: 9), but the former is far smaller and its lateral

Interestingly, Alston (1934: 274) synonymized *Selaginella gebaueriana* with *S. davidii*. This was followed by Zhang *et al.* (2013: 38). Zhang (2004: 149–153) treated them as two subspecies of *S. davidii*, while other botanists treated them as separate species (e.g., Kung 1981: 254, 1988: 65; Wang 1990: 269; Wang & Wang 2001: 632; Chu 2006: 65). Morphologically, *S. gebaueriana* is up to 60 cm long and has ciliate microphylls, while *S. davidii* is shorter than 45 cm and has serrulate microphylls. In addition, *S. gebaueriana* occurs in southwestern China and adjacent regions, i.e., Chongqing, western Guangxi, Guizhou, western Hubei, western Hunan, Sichuan, Xizang, and Yunnan, while *S. davidii* is mainly distributed in northern China, i.e., Anhui, Gansu, Hebei, Henan, Ningxia, Shaanxi, Shandong, and Shanxi.

Notably, some ultimate branches of *Selaginella wangpeishanii* bear microphylls in ascending order of trophophylls, sporophylls or sporophyll-like microphylls, and trophophylls (hereafter termed as TST arrangement of microphylls; Fig. 1H), a phenomenon never previously observed in species of *Selaginella* in China. The sporophyll-like microphylls are morphologically similar to sporophylls in their shape, size, and arrangement, though with no sporangia at their axils. It is possible that they are sporophylls of previous seasons with sporangia fallen off. However, whether this is just aberrant growth of some of the individuals or an adaptive advantage for specific cave habitat of this species is pending for clarification. See Table 1 for a comparison of these three morphologically close species.

Following Jermy (1990), *Selaginella wangpeishanii* can be assigned to *S.* subg. *Stachygynandrum*. Due to the polyphyly of this subgenus (Korall & Kenrick 2002), only future molecular analysis can reveal the true systematic relationship of the new species.

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