



Systematics of *Yuania prainii* (Orchidaceae: Calypsoinae)

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Recently, two new genera of mycoheterotrophic orchids were described from China: *Danxiaorchis* Zhai, Xing & Liu (2013: e60371) and *Yunorchis* Liu, Zhang & Li (2015: e123382). Both were considered to be monospecific, and in each case the descriptions were accompanied by a phylogenetic analysis.

It was inferred that *Danxiaorchis* is the sister genus of another mycoheterotrophic genus, *Yuania* Maximowicz (1873: 68), whereas *Yunorchis* was found to be closely related to the autotrophic genera *Calypso* Salisbury (1807: Tab. 89) and *Dactylostalix* Reichenbach (1878: 74). Support for the sister-group relationship of *Danxiaorchis* and *Yuania* appeared to be strong, and the clade consisting of *Calypso*, *Dactylostalix* and *Yunorchis* had a high Bayesian posterior probability. These analyses suggested that *Yunorchis* and *Yuania* were only distantly related. However, based on additional molecular analyses, Freudenstein *et al.* (2017) found that *Yunorchis* and *Yuania* formed a clade. They also argued, and we would agree, that *Yunorchis* and *Yuania* do not significantly differ morphologically.

In an earlier paper (Yukawa 2016), Yukawa and Freudenstein had already transferred *Yunorchis pingbianensis* Liu, Zhang & Li (2015: e123382) to *Yuania*, noting that specimens recorded from Vietnam (Averyanov 2011) had in their opinion been misidentified as the northeastern Indian *Y. prainii* King & Pantling (1898: 175), but actually belonged to *Y. pingbianensis*. Yukawa (2016) described the differences between the two species as follows:

“The former [*Y. pingbianensis*] has a more developed basal part of the lip and also exhibits purple-red in the abaxial surface of the sepals while the latter presents white flowers. Furthermore, a central papillate-pubescent callus of the lip and distant scales on the rhizome characterise *Y. pingbianensis*. In contrast, *Y. prainii* does not show a callus of the lip and has characteristic, densely clothed, imbricate scales on the rhizome”.

However, these differences do not appear to hold or are subject to variation. On a syntype specimen of *Y. prainii* (*Prain 15*, K, K000943517!), the flowers are described as “pale brownish white”, and on the same sheet is a sketch by Joseph Hooker that shows a callus on the lip. We cannot confirm a “more developed basal part of the lip” of *Y. pingbianensis* when we compare our Vietnamese material (cited below) with that of *Y. prainii*. The scales on the rhizome can be more or less densely arranged, as the Vietnamese specimens mentioned show, and they do not present a reliable difference. The length and branching density of the rhizome are probably subject to variation as well, due to soil conditions and other environmental parameters, but not enough material is available to assess variability of this part of the plant. Recently published photographs of *Y. prainii* from Sikkim (Swami 2016) depict purple-spotted flowers that are identical in colour to the Vietnamese specimens and those shown in the protologue of *Yunorchis pingbianensis*. We conclude that *Y. pingbianensis* and *Y. prainii* are conspecific.

Taxonomy

Yuania prainii King & Pantling (1891: 175). Type:—INDIA. Sikkim: Choongthang [Chungthang], 6000 ft, July 1897, *Pantling 469* (syntypes BM 000090259, CAL, K 000943518!, P 00408564, image!; INDIA. Naga Hills: July 1886, *Prain 15* (syntypes CAL, K 000943517!)).

= *Yunorchis pingbianensis* Liu, Zhang & Li (2015: e123382).

= *Yuania pingbianensis* (Z.J.Liu, G.Q.Zhang & M.H.Li) Yukawa & Freudenstein (2016: 110). Type:—CHINA. Yunnan: Pingbian, 2100 m, 31 May 2013, *Liu 7103* (holotype NOCC).

Distribution:—northeastern India (Sikkim, Nagaland), China (Yunnan) and Vietnam (Ha Giang Province).

Additional specimens seen:—VIETNAM. Ha Giang Province: Yen Minh district, Du Gia commune, eastern slopes of Phu Tha Ca Mountain at 1300–1500 m, 23°56'N 105°13'E, primary evergreen broad-leaved, wet mountain forest on shale

on steep slopes; achlorophyllous herb with erect white stems up to 20 cm tall growing in shady places; flowers scentless; sepals white, with violet tinge, petals white, lip with deep-purple marks inside along median part, side lobes white, with numerous deep purple spots, outside lip white with deep purple spots in apical part; column white, anther light yellowish, ovary white with violet tinge; not rare, 3 May 1999, *Loc, Hoang, Averyanov CBL 2091* (HN, LE!); Quan Ba district, Tung Vai commune, Thang village, Bat Dai Son Mountains, near point 23°03'14"N 104°50'54"E, 1390 m, primary broad-leaved evergreen closed forest on limestone, rare achlorophyllous herb, 11 April 2013, *Hieu, Khang, Vinh, Ngan, Truong, CPC 4948* (LE, photo!).

Notes:—The seemingly fragmented distribution of *Y. prainii* may well be an artefact, because the species could easily have been overlooked in intervening areas. There are dozens of orchid species for which areas of distribution overlap with that of *Y. prainii*, but the great majority of these show a more continuous distribution. Among the few species that at present show a similar fragmented distribution within northeastern India, Yunnan and Vietnam are *Eria clausa* King & Pantling (1896: 121) and *Liparis delicatula* Hooker (1890: 705), of which the latter is also known from Laos.



FIGURE 1. *Yoania prainii*, from Vietnam (*CBL 2091*). Photos: Leonid V. Averyanov.

The status of Yoaniinae

In the Bayesian analysis of Zhai *et al.* (2013, Fig. 4), *Yoania*, represented by *Y. japonica* Maximowicz (1873: 69), and *Danxiaorchis* were sister taxa with a Bayesian posterior probability of 1.00. In their maximum parsimony tree, the same relationship had 99% bootstrap support. These figures suggested that there was strong evidence for their sister-group relationship. Zhai *et al.* proposed to accommodate *Danxiaorchis* and *Yoania* in subtribe Yoaniinae Szlachetko (1995: 69).

It appears, however, that the seemingly strong support for the sister-group relationship of *Yoania* and *Danxiaorchis* may have been an artefact, perhaps due to the circumstance that for *Yoania* only a 222-bp fragment of an *rbcl* sequence had been available (GenBank accession number JX293190). The latter could also possibly be a pseudogene in this species, as suggested by the result of translation of the *rbcl* fragment into a protein sequence and comparison with other members of Calypsoinae (Schuiteman, unpublished). The results of Freudenstein *et al.* (2017), based on more extensive molecular data, contradicted Zhai *et al.* (2013): they did not find *Yoania* and *Danxiaorchis* to be sister groups.

We have to conclude that there is no support for a sister-group relationship of *Yoania* and *Danxiaorchis*, contrary to Zhai *et al.* (2013). In addition, we find little merit in their proposal to split Calypsoinae sensu Chase *et al.* (2015) into eight smaller subtribes, one of which would be Yoaniinae. Such overly split groups tell us little or nothing about relationships among genera, because most of the proposed subtribes, including Yoaniinae, would contain only a single genus.

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