

## A NEW ORCHID GENUS, DANXIAORCHIS, AND PHYLOGENETIC ANALYSIS OF THE TRIBE CALYPSOEAE

Orchids have numerous species, and their speciation rates are presumed to be exceptionally high, suggesting that orchids are continuously and actively evolving. The wide diversity of orchids has attracted the interest of evolutionary biologists. In this study, a new orchid was discovered on Danxia Mountain in Guangdong, China.

However, the phylogenetic clarification of this new orchid requires further molecular, morphological, and phylogeographic analyses

A new orchid possesses a labellum with a large Y-shaped callus and two sacs at the base, and cylindrical, fleshy seeds, which make it distinct from all known orchid genera. Phylogenetic methods were applied to a matrix of morphological and molecular characters based on the fragments of the nuclear internal transcribed spacer, chloroplast *matK*, and *rbcL* genes of Orchidaceae (74 genera) and Calypsoeae (13 genera). The strict consensus Bayesian inference phylogram strongly supports the division of the Calypsoeae alliance (not including *Dactylosteinopanax* and *Ephippianthus*) into seven clades with 11 genera. The sequence data of each species and the morphological characters of each genus were combined into a single dataset.

The inferred Bayesian phylogram supports the division of the 13 genera of Calypsoeae into four clades with 13 subclades (genera). Based on the results of our phylogenetic analyses, Calypsoeae, under which the new orchid is classified, represents an independent lineage in the Epidendroideae subfamily.

### Conclusions

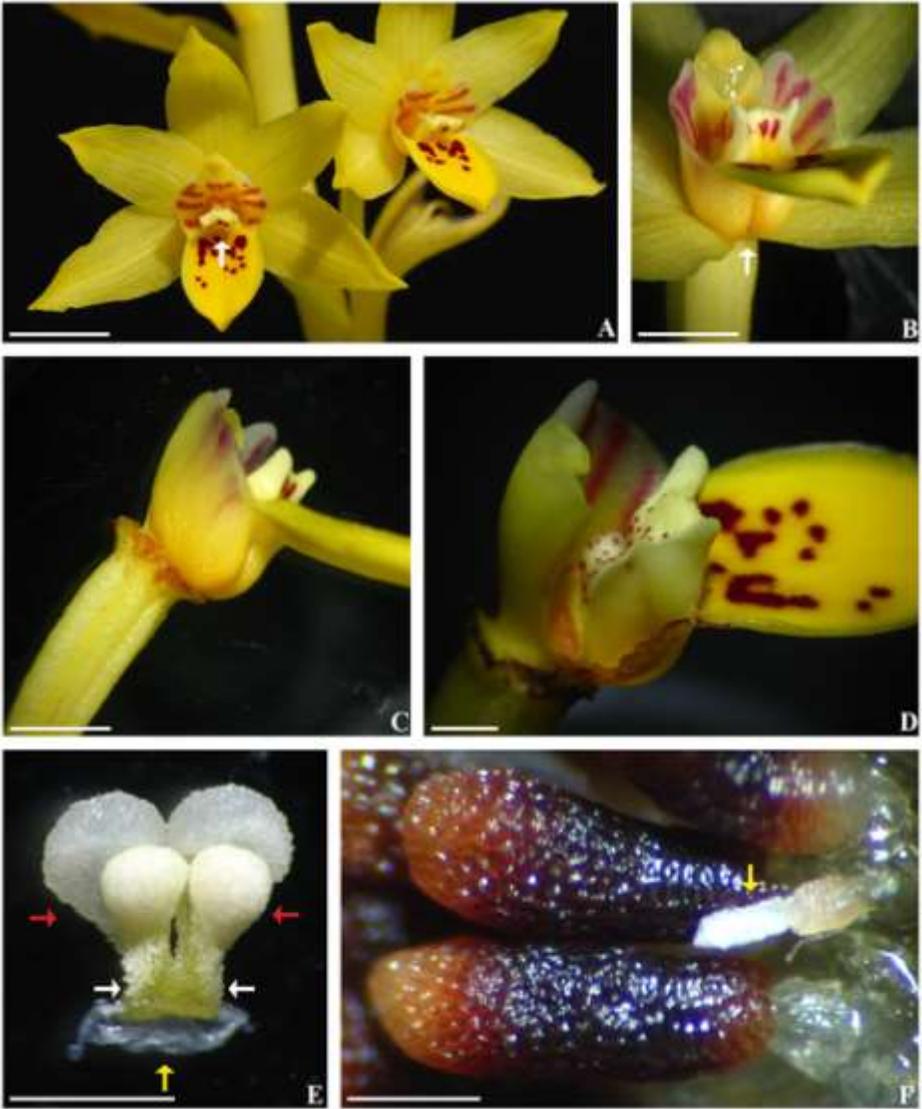
Analyses of the combined datasets using Bayesian methods revealed strong evidence that Calypsoeae is a monophyletic tribe consisting of eight well-supported clades with 13 subclades (genera), which are all in agreement with the phylogeography of Calypsoeae. The Danxia orchid represents an independent lineage under the tribe Calypsoeae of the subfamily Epidendroideae. This lineage should be treated as a new genus, which we have named *Danxiaorchis*, that is parallel to *Yoania*. Both genera are placed under the subtribe *Yoaniinae*

### Citation:

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Figure 1: *Danxiaorchis singchiana* flowers and seeds. [See Page 9]

(A) Flowers with a Y-shaped appendage (arrow) on the labellum. Bar = 1 cm. (B) Labellum with two sacs (arrows) at the base. Bar = 4 mm. (C) Column and labellum, side view. Bar = 4 mm. (D). Appendage of the labellum, side view. Bar = 2 mm. (E) Pollinarium, front view, showing pollinia (red arrows), caudicles (white arrows), and viscidium (yellow arrow). Bar = 1 mm. (F) Mature Seeds, showing abortive seed (yellow arrow). Bar = 5 mm.



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