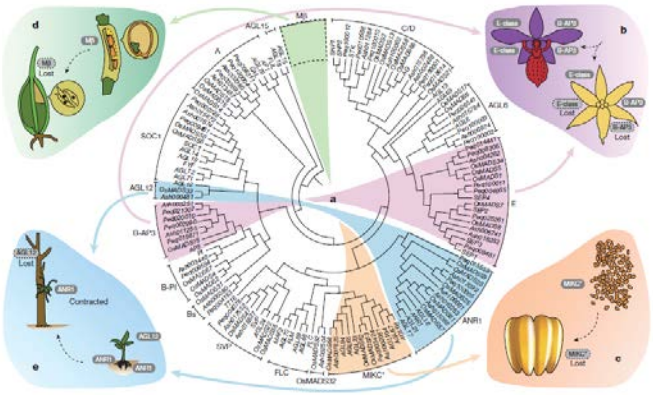
Elucidation of orchid evolution from the comparisons of orchid genome

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Abstract (300 word limit)

Constituting approximately 10% of flowering plant species, orchids display unique flower morphologies, possess an extraordinary diversity in lifestyle, and have successfully colonized almost every habitat on Earth. Orchids are known for their unique reproductive growth such as the production of labellum and gynostemium (a fused structure of androecium and gynoecium), mature pollen grains packaged as pollinia, and the release of thousands or millions of immature embryos (seeds without endosperm) in a mature capsule. In addition, epiphytism of orchids might also link to their spectacular diversification. Recently, genomes of three orchid species, *Phalaenopsis equestris*, *Dendrobium catenatum*, and *Apostasia shenzhenica*, have been sequenced and the genetic information enhances the insights into the reproductive success of orchids. Comparisons among *A. shenzhenica* and other orchids and angiosperms permitted the reconstruction of an ancestral orchid gene toolkit. Changes within MADS-box gene classes, which control a diverse suite of developmental processes, were identified during orchid evolution. Our study sheds new light on the genetic mechanisms underpinning key orchid innovations, including the development of the labellum and gynostemium, pollinia, and seeds without endosperm, as well as the evolution of epiphytism, and helps clarify the evolutionary history of orchids within the angiosperms.

Image



Recent Publications (minimum 5)

1. Cai et al., (2015) The genome sequence of the orchid *Phalaenopsis equestris*. Nature Genetics 47: 65-72.
2. Tsai et al., (2013) OrchidBase 2.0: Comprehensive collection of Orchidaceae floral transcriptomes. Plant and Cell Physiology 54: e7.
3. Yeh et al., (2017) Advanced applications of next-generation sequencing technologies to orchid biology. Current Issues in Molecular Biology 27: 51-70.
4. Zhang et al., (2016) The *Dendrobium catenatum* Lindl. genome sequence provides insights into polysaccharide synthase, flower development and adaptive evolution. Scientific Reports 6: 19029.
5. Zhang et al., (2017) The *Apostasia* genome and the evolution of orchids. Nature 579: 379-383.



Biography (150 word limit)

Wen-Chieh Tsai has his expertise in orchid genomics and functional genomics. He has worked on orchid biology for about 20 years. He applied genomics and molecular biology approaches to sequence orchid genome, study the orchid evolution, floral morphogenesis, and have collaborated with colleagues on Chemistry and Information Management to reveal the orchid fragrance metabolic pathways.

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Notes/Comments: