Andean orchids – not so ancient

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Cycnoches peruvianum, an orchid endemic to Amazonia region and a member of Cymbidieae, one of the most species-rich orchid groups in the American tropics. Credit: Pérez, O.

The Andes are the world's most species rich biological diversity hotspot, containing an astounding 15% of the world's plant species, despite making up only 1% of the earth's surface. Orchids are a key element of Andean plant life, but despite their importance and abundance, particularly epiphytic orchids (plants that grow on other plants) their

origin has not yet been studied in great detail. "Orchids are not only popular in horticulture but also great models to understand evolution" says Professor Alexandre Antonelli at the Gothenburg Global Biodiversity Centre, senior author of the study.

In this fascinating new research, led by Oscar Alejandro Pérez-Escobar of Kew and Guillaume Chomicki (University of Munich), scientists found that a remarkable 7,000 species of orchids from the American tropics – about 20% of all species worldwide living today – formed in relatively recent history: only 15 to 20 million years ago. Although this sounds like a very long time ago, these orchid species are very young indeed in comparison to the time when orchids first appeared on earth (about 110 million years ago).

This research also unveiled that the rise of the Andean mountains created new habitats and niches, clearing the way for this mass orchid evolution.

Restrepia contorta, an orchid endemic to Northern Andes region and a member of Pleurothallidinae, one of the most characteristic orchid groups of the Andean mountain flora. Credit: Pérez, O.

But did the rising mountains stop the orchids moving across the continent? Pérez-Escobar and colleagues found that several recent orchid migrations across South and Central America took place after most of the Andes were fully formed. Surprisingly, this is a different story than for many animals and other types of plants for which the Andes have been a significant barrier preventing migration.

Conquering the mountain

"The role of the Andean mountains as a geographical barrier for the migration of plant species in America has remained largely understudied", says Chomicki. He also explained that orchids may have conquered the mountains because of their extremely tiny, light-weight seeds that can spend a long time suspended in the air. Though migration of new orchid species across the Andes has been very successful, other factors such as orchids needing specific pollinators and fungi to survive have dictated where they have been able to spread to.

The compelling results scientists found in this study mean that there's a lot of potential for further research on orchids. One avenue to consider is how plant-insect interactions might also have contributed to the astonishingly high orchid diversity in South America. And, given the high diversity of these amazing plants, this research highlights the importance of conservation action needed to protect and nurture this wonderfully diverse hotspot.

Example of plant-insect interaction between a male Euglossine bee and a lowland orchid (Cycnoches guttulatum). Credit: Pérez, O.

More information: Oscar Alejandro Pérez-Escobar et al. Recent origin and rapid speciation of Neotropical orchids in the world's richest plant biodiversity hotspot, *New Phytologist* (2017). DOI: 10.1111/nph.14629

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