New research reveals plant wonderland inside China's caves

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Credit: Royal Botanic Gardens, Kew

Exciting new data on cave flora has been published today in *PLOS ONE* in a paper by researchers from the Royal Botanic Gardens, Kew and the Guangxi Institute of Botany in China.

Over five years (2009-2014) the researchers delved into the depths of some of China's most unexplored and unknown caves in the largest ever

study on cave floras. Surveying over 60 caves in the Guangxi, Guizhou and Yunnan regions, Kew's Alex Monro and his colleagues from Guangxi were able to assess the vascular plant diversity of cave flora in more detail than ever before.

From the 1950's to the 1970's, forests in SW China was virtually wiped out due to the demand for charcoal associated with rapid industrialisation during China's Great Leap Forward and the Cultural Revolution. This study documents 31 species known only from caves, leading the team to speculate that cave populations are all that remain of species which once grew in the 'understory' (the layer of vegetation between the forest canopy and the ground), which has been wiped out by recent deforestation. This discovery makes these caves and their flora significant and valuable for species conservation in South West China.

Lead researcher Alexandre Monro, at Royal Botanic Gardens, Kew says; "This collaboration with the Guangxi institute of Botany in China is a first attempt to document the presence of vascular plants in caves in Southeast Asia. Before we started we had no idea of the diversity of plants in caves, or that so many species are known only from caves. We hope that this work will lead to a greater interest in caves amongst botanists, and also to a greater interest in plants amongst cave biologists, prompting more study of cave-rich landscapes in Southeast Asia."

Over the course of the study, 418 species of vascular plants were recorded, with 7% of these species being endemic to caves and 37% of the species endemic to China. Once all caves have been samples in the region, the real figure is likely to be between 500 and 850 species, based on modelling conducted by this team.

The other conclusion of the study is that the twilight zones in caves can be considered distinct biomes for plants based on a combination of constant and aseasonal climate, as well as very low light. The authors

document plants growing in some of the lowest light levels recorded for vascular plants, suggesting a broad range of plants can photosynthesise at much lower light levels than originally thought.

Whilst exploring the entrance caverns, the team observed that almost half of the caves sampled were impacted by tourism or agriculture, with tourism being the more frequent and impactful.

More information: Alexandre K. Monro et al, Discovery of a diverse cave flora in China, *PLOS ONE* (2018). DOI: 10.1371/journal.pone.0190801

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