

科学家最新揭秘中国被子植物区系的进化史

Scientists Have Successfully Discovered the Evolutionary History of the Angiosperm Flora of China



1月31日,《Nature》期刊最新发表一篇题为“Evolutionary history of the angiosperm flora of China”的文章,由中国科学院植物研究所陈之端研究组与南京林业大学、美国佛罗里达大学和澳大利亚国家标本馆的科学家们合作完成。他们揭示了中国被子植物区系进化历史及多样性形成的时空格局。

研究团队通过比较4个叶绿体基因和1个线粒体基因的序列差异,重建了中国被子植物的系统发育树。研究人员发现,从时间上看,中国约66%的被子植物属是在2300万年前的中新世以后出现的;在过去的3000万年中,草本植物比木本植物经历了更加快速的分化。从空间上看,中国东西部植物分化格局存在显著差异。

分析显示,3000万年以来,中国西部草本植物属分化的比例远远高于木本植物属,是许多草本植物的起源地;而东部地区草本植物属和木本植物属在整个地质历史中的分化速率基本一致。相比于西部地区,中国东部的草本植物属都比较古老,但木本植物属则既有起源古老的,又有近期分化的。陈之端说,中国东部对草本植物起到了“博物馆”的保存效应,对木本植物则兼具“博物馆”和“摇篮”的作用。

研究人员明确了中国植物应该重点保护的热点地区——属水平的热点地区主要为广东、广西、贵州和海南4省区,种水平的热点地区为云南省。



Evolutionary history of the angiosperm flora of China

中国被子植物区系的进化史

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High species diversity may result from recent rapid speciation in a ‘cradle’ and/or the gradual accumulation and preservation of species over time in a ‘museum’. China harbours nearly 10% of angiosperm species worldwide and has long been considered as both a museum, owing to the presence of many species with hypothesized ancient origins, and a cradle, as many lineages have originated as recent topographic changes and climatic shifts—such as the formation of the Qinghai - Tibetan Plateau and the development of the monsoon—provided new habitats that promoted remarkable radiation. However, no detailed phylogenetic study has addressed when and how the major components of the Chinese angiosperm flora assembled to form the present-day vegetation. Here we investigate the spatio-temporal divergence patterns of the Chinese flora using a dated phylogeny of 92% of the angiosperm genera for the region, a nearly complete species-level tree comprising 26,978 species and detailed spatial distribution data. We found that 66% of the angiosperm genera in China did not originate until early in the Miocene epoch (23 million years ago (Mya)). The flora of eastern China bears a signature of older divergence (mean divergence times of 22.04 - 25.39 Mya), phylogenetic overdispersion (spatial co-occurrence of distant relatives) and higher phylogenetic diversity. In western China, the flora shows more recent divergence (mean divergence times of 15.29 - 18.86 Mya), pronounced phylogenetic clustering (co-occurrence of close relatives) and lower phylogenetic diversity. Analyses of species-level phylogenetic diversity using simulated branch lengths yielded results similar to genus-level patterns. Our analyses indicate that eastern China represents a floristic museum, and western China an evolutionary cradle, for herbaceous genera; eastern China has served as both a museum and a cradle for woody genera. These results identify areas of high species richness and phylogenetic diversity, and provide a foundation on which to build conservation efforts in China.