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Genetic contribution of paleopolyploidy to adaptive evolution in angiosperms

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摘要	<p>Ancient whole-genome duplications (WGD or polyploidy) are prevalent in plants, and some WGDs occurred during the timing of severe global environmental changes. It has been suggested that WGDs may have contributed to plant adaptation. However, it still lacks of empirical evidence from genetic level to support the hypothesis. Here, we investigated the survivors of gene duplicates from multiple ancient WGD events on the major branches of angiosperm phylogeny, and aimed to explore genetic evidence supporting the significance of polyploidy. Duplicated genes co-retained from three waves of independent WGDs (~ 120 million years ago (Ma), ~ 66 Ma and <20 Ma) were investigated in 25 selected species. Gene families functioning in low temperature and darkness were commonly retained gene duplicates after the eight independently occurred WGDs in many lineages around the Cretaceous–Paleocene (K-Pg) boundary, when the global cooling and darkness were the two main stresses. Moreover, the commonly retained duplicates could be key factors which may have contributed to the robustness of the critical stress related pathways. In addition, genome-wide transcription factors (TFs) functioning in stresses tend to retain duplicates after waves of WGDs, and the co-selected gene duplicates in many lineages may play critical roles during severe environmental stresses. Finally, our results shed new light on the significant contribution of paleopolyploidy to plant adaptation during global environmental changes in the evolutionary history of angiosperms.</p>
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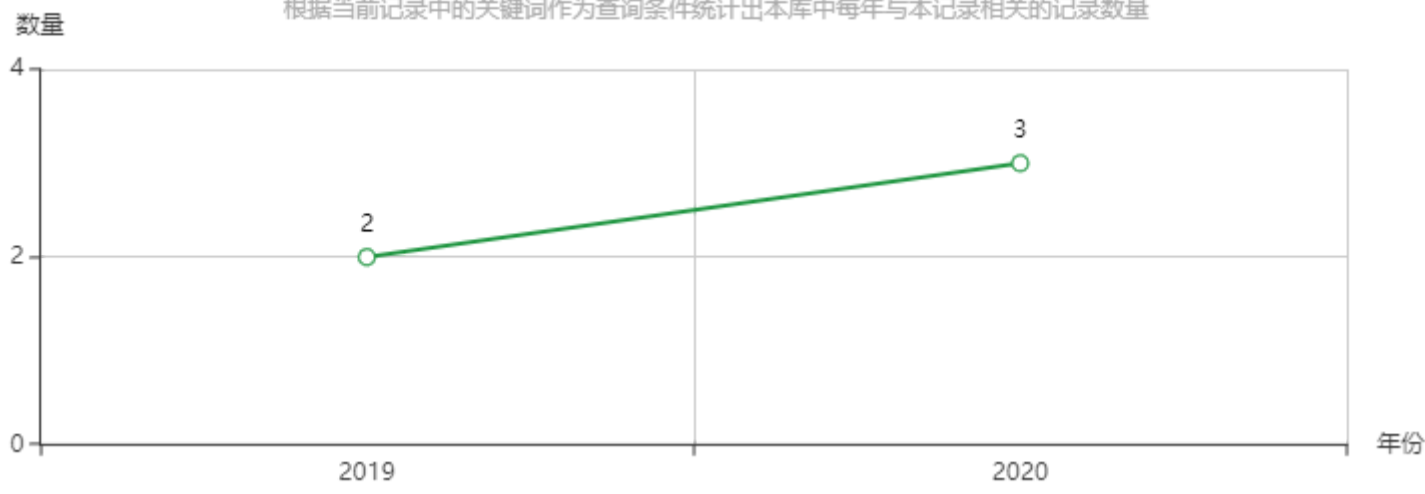
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