Perianth evolution in the early-divergent family Annonaceae

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Despite the considerable taxonomic diversity of the Annonaceae, floral structure in the family is remarkably uniform in its underlying 'Bauplan': Annonaceae flowers are characterised by three perianth whorls (sepals, outer petals and inner petals), with three organs per whorl; and a floral vascular system in which the traces feeding the perianth organs are basally fused. The Annonaceae are of particular phylogenetic interest as they show several apomorphic characteristics, including a differentiated (dipartite) perianth of distinct sepals and petals, which is hypothesised to have evolved independently from that of eudicots. Important evolutionary changes in perianth morphology within the Annonaceae include: the origin of a dipartite corolla, with morphologically distinct outer and inner petals; the origin of partially enclosed pollination chambers; the compression of two perianth whorls into one; the gain or loss of a perianth whorl; and changes in perianth organ identity. Many of these changes have occurred in parallel on multiple occasions, suggesting that they either provide a major selective advantage (e.g., affecting pollination ecology or breeding system), or else that they are the consequence of common causal explanations. The latter is possibly due to the disruption of the homeotic control of organ identity during floral development, involving MADS-box genes.