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Celebrating the past | Planning the future

Angiosperm flowers reached their highest morphological diversity early in their evolutionary history.

Andrea M. López-Martínez (Universidad Nacional Autónoma de México); Susana Magallón (Universidad Nacional Autónoma de México); Maria von Balthazar (University of Vienna); Jürg Schönenberger (University of Vienna); Hervé Sauquet (National Herbarium of New South Wales and University of New South Wales); Marion Chartier (University of Vienna).

Flowers are the complex and highly diverse reproductive structures of angiosperms. Because of their role in sexual reproduction, the evolution of flowers is tightly linked to angiosperm speciation and diversification. Accordingly, the quantification of floral morphological diversity (disparity) among angiosperm subgroups and through time may give important insights into the evolutionary history of angiosperms as a whole. Based on a comprehensive dataset focusing on 30 characters describing floral structure across angiosperms, we used 1201 extant and 121 fossil flowers, as well as 15 reconstructed ancestral nodes to measure floral disparity and explore patterns of floral evolution through time and across lineages. We found that angiosperms reached their highest floral disparity in the Early Cretaceous. However, decreasing disparity towards the present did not preclude the innovation of other complex traits at other morphological levels, which likely played a key role in the outstanding angiosperm species richness. Angiosperms occupy specific regions of the theoretical morphospace, indicating that only a portion of the possible floral trait combinations is observed in nature. The ANA grade, the magnoliids, and the early-eudicot grade occupy large areas of the morphospace (higher disparity), whereas nested groups occupy narrower regions (lower disparity).

Jürg Schönenberger: juerg.schoenenberger@univie.ac.at