

Geographical Parthenogenesis in Plants

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Abstract : The term “Geographical parthenogenesis” describes the phenomenon that asexual organisms usually occupy larger and more northern distribution areas than their sexual relatives and tend to colonize previously glaciated areas. Several case studies in flowering plants confirm the geographical pattern, but the causal factors behind the phenomenon are still unclear. Previous authors regarded predominant polyploidy in asexual (apomictic) plants as the main factor. However, the geographical pattern is not the rule for sexual polyploids. Recent research confirmed a previous hypothesis of the author that a combination of factors is acting: Although uniparental reproduction provides better colonization abilities, it is most efficient in combination with polyploidy. I will present results on case studies in the genus *Ranunculus* of both autopolyploid and allopolyploid species and species complexes reproducing via facultative apomixis. Polyploidy seems to contribute mainly to a better tolerance of colder climates and temperate extremes, whereby epigenetic flexibility, changes in gene expression, and phenotypic plasticity play an important role in occupying ecological niches under harsh conditions. Phylogenomic studies entangle complex hybrid origins of asexual taxa, which increases intragenomic heterozygosity of asexual plants. Interestingly, our results suggest an association of sexuality with abiotic stresses, specifically with light stress, which might explain that still, most plants in high altitudes and in southern areas retain sexual reproduction despite other climatic conditions that would favor apomictic plants. We conclude that geographical parthenogenesis results from the complex interplay of the genomic constitution, mode of reproduction and environmental factors.

Keywords : apomixis, polyploidy, hybridization, abiotic stress, epigenetics, phylogenomics

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