

Pleurothallidinae – a hyperdiverse subtribe with hyperdiverse genomes

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Although endoreplication of nuclear DNA is an important part of the cell differentiation process in many plant groups, progressively partial endoreplication (PPE) is a specific feature for about one third of orchid species from various phylogenetic groups. One of such is the understudied subtribe Pleurothallidinae, comprising more than 5000 morphologically highly diverse species in 20 to 100 genera native to tropical America. Pleurothallidinae represents an ideal model system to deepen our knowledge of PPE, and to investigate the orchid genome structure and its evolution. Therefore we employed Hyb-Seq sequencing, flow cytometry and karyology to get insight into phylogenetic relationships within Pleurothallidinae, nuclear genome sizes and endoreplication patterns, and chromosome numbers and rearrangements, respectively. Our preliminary phylogeny mostly supports the current taxonomic division. Nuclear genome size (1C-value) ranges from 0.22 to 5.41 pg and chromosome numbers span from 12 to more than 60, however, no direct link between the both traits was found. Approximately one half of the investigated species exhibit PPE, and the minimum proportion of replicated genome is about 19%. Our results indicate that the hyperdiverse morphological variation in Pleurothallidinae might stem from their extremely diverse genomes and a high diversification rate.