

THE PHYLOGENY AND EVOLUTION OF AQUATIC PLANTS, WITH FOCUS ON HYBRIDIZATION AND POLYPLOIDY

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Abstract: Several studies involving both morphological and molecular genetic approaches revealed that hybridization/polyploidy is an important factor in plant evolution (Reviewed in Soltis & Soltis 2009), yet there is a gap of knowledge among well-examined and less-examined taxa within the angiosperms. It is well known that all species have their own evolutionary history, but the underlying mechanisms and forces governing this process are poorly investigated. Based on this perspective, proactive systematic and holistic research should be conducted in critical lineages, e.g., aquatic plants.

The different aquatic plants on Earth include approximately 1,000 species, and a third of them are adapted to their environment by special pollination systems known as epi- and hypohydrophily (Sculthorpe, 1967). Under these systems, currents carry the pollen through the water or on the water surface, by that facilitating hybridization which obviously often has followed up by polyploidization as can be concluded from the common occurrence of polyploids among submerged aquatic plants. However, due to their extremely simplified morphology, it has been difficult to assess. Only recently, by application of molecular phylogenetic analyses this situation has changed. The authors studied the taxonomy and systematics of several submerged aquatic plants, including *Halodule* (Cymodoceaceae), *Najas* (Hydrocharitaceae), *Potamogeton* and *Zannichellia* (Potamogetonaceae), *Ruppia* (Ruppiaceae), and *Zostera* (Zosteraceae). As a result, a far more complicated evolutionary history than expected has been revealed. In submerged aquatic plants it is often taxon-specific. In this seminar, the first author shall report about the case study of *Ruppia*. For a long time, worldwide only one or two species were recognized, but it could be shown that multiple events of hybridization and polyploidy had happened. Consequently, several more taxa had to be established (Ito et al. 2010).

Reference: Ito, Y. T. Ohi-Toma, J. Murata and N. Tanaka (2010) Hybridization and polyploidy of an aquatic plant, *Ruppia* (Ruppiaceae), inferred from plastid and nuclear DNA phylogenies. *American Journal of Botany* 97: 1156-1167. Sculthorpe, C. D. (1967) The biology of aquatic vascular plants. Edward Arnold, London, UK. Soltis, P. S., and D. E. Soltis (2009) The role of hybridization in plant speciation. *Annual Review of Plant Biology* 60: 561 – 588