A lot of the research has been made in the field of plant polyploidy since the discovery of this phenomenon. However, the more we know, the more questions arise. Overall, the most insistent questions remain: How did the polyploids arise and become established? Is it advantageous to be polyploid? We chose a perennial herb *Vicia cracca* L. to study the causes and consequences of polyploidisation on microevolution of a diploid-tetraploid complex in central European conditions.

First, evidence from both flow cytometry and molecular markers (allozymes, DNA sequences, microsatellites) confirmed a hypothesised autopolyploid origin of tetraploids. Based on allozymes, we proved that tetraploids are genetically richer than diploid ancestors. However, we showed that the conclusions depend on statistics used for genetic variation measurements. Nevertheless, tetraploids of *V. cracca* suffered lesser reduction in seed production after artificial selfing than diploids. We thus infer that they profit from multiple allele dosage, which can mask deleterious alleles. We also corroborated an existence of a central European contact zone of diploids and tetraploids and discovered two other contact zones in south-western and south-eastern Europe.

The central European contact zone with several mixed-ploidy populations served us as a source of study material for common garden experiments, because sympatric plants should be exposed to the same environment and their performance thus should reflect intrinsic inter-cytotype differences. These experiments proved significant differences in germination and growth rates with tetraploids being superior to diploids. We also recorded a trade-off between vegetative growth and seed production in drought stressed tetraploids. Tetraploids thus seem to be more competitive in favourable conditions. On the other hand, they also seem to be able to respond to stress plastically by increased sexual reproduction. In contrast, diploids proved to be adapted to drier conditions by greater seed dormancy and drought tolerance. These results reflect the distribution pattern of cytotypes in Europe with tetraploids occupying western and northern part, whereas diploids inhabit predominantly southern and eastern Europe.

Plant performance as well as current distribution pattern was affected also by multiple origin of tetraploids and climate oscillations. Chloroplast sequences suggested that tetraploids arose at least twice. The most ancient tetraploid lineage arose probably before LGM in Iberian Peninsula. Three other tetraploid lineages emerged most probably simultaneously within an existing pool of cp haplotype variation in diploids in Black Sea/Caucasus region and adjacent Balkans. However, microsatellites indicated that recent *in situ* origin of tetraploids in south-eastern Europe cannot be ruled out. Moreover, the eastern margin of the Alps might be a place

where a new diploid cp lineage has arisen. Range expansions from glacial refugia caused secondary contacts of cytotypes and individual haplotypes within cytotypes. Interestingly, we revealed a remarkable loss of diploids at European scale, which is in line with findings obtained from historical data comparison. The extinction of diploids may be explained by siring disadvantage of minority cytotype, because molecular data suggested great gene flow between cytotypes through unreduced gametes. The inter-cytotype gene flow happens despite a strong triploid block, which we infer from a total absence of triploids in mixed-ploidy populations. New tetraploids arisen within diploids from union of unreduced gametes or inter-cytotype tetraploid hybrids seem to be then integrated into tetraploids' gene pool. Moreover, microsatellites suggested a possible introgression with *V. dalmatica* A. Kern. Overall genetic diversity of *V. cracca* cytotypes thus has been affected by polytopic origin of tetraploids, postglacial migration, introgressive hybridisation, and regarding highly discontinuous distribution of some cp haplotype also by anthropogenic seed dispersal.

To conclude our findings, tetraploids of *V. cracca* seem to be evolutionary more successful than diploids probably due to increased genetic diversity, ecological plasticity, better competitiveness, and majority cytotype advantage under absence of inter-cytotype breeding barriers in sympatric populations. However, considering a significant effect of ploidy level – population interaction on several phenotypic traits we have shown that the effect of polyploidisation on angiosperm microevolution is very complex, often without unambiguous trend. More generally, the distribution of cytotypes and plant performance has been determined by both adaptive (ecological) and non-adaptive (historical, stochastic) processes.