

Review and overall assessment of the Ph.D. thesis submitted by Petr Vít, "Evolutionary and conservation consequences of interspecific hybridization in rare plant species" at the Charles University in Prague in 2014

The thesis is clearly structured, comprises a general introduction and four published papers, two of them are first authored by the candidate.

The strength of the PhD thesis is the combination of a wide spectrum of methods: determination of ploidy levels via chromosome counting and flow cytometry; geometric morphometry and multivariate statistics for assessment of morphological variation; evaluation of pollen fertility and spore abortion; determination of distribution data via field collections and herbarium studies as well as the use of nuclear microsatellite markers for the determination of intraspecific genetic variation. I especially appreciate the employment of sophisticated methods to evaluate morphological variation which represent the state-of-the art in plant systematics.

The combination of methods and studied objects coupled with the integrative presentation of data gives a comprehensive picture and provides a bulk of novel information on the respective plant groups and the evolutionary significance of hybridization. Moreover, the studied plant groups give an example that the actual role of hybridization in vascular plants has been underestimated in the past. The thesis of Petr Vít shows also a good understanding of the theoretical background of plant systematics, such as fundamental knowledge of processes involved in interactions of populations, species and their environment, the role and importance of polyploidy, hybridization and different isolation mechanisms in plant speciation. The candidate also shows a good understanding of principles of species-level taxonomic work.

The aims of the study have clearly been accomplished. The study thus provides a major contribution to research on plant hybridization and also points out its impact on conservation strategies, as shown in several published papers. The work met all the criteria necessary for obtaining the Ph.D. degree at the Charles University in Prague and I consider it eligible for the defence.

Specific questions (unordered):

In the Introduction, page 7, line 17, you mentioned a mentor effect as one of the mechanisms that may overcome reproductive barriers against hybridization. Is it correct? Can you explain it? (based on your statement above in the text, you used the term hybridization in the widely accepted sense as "cross-fertilization between two individuals of different and isolated species")

According to your results and observations, the shady moist places in the forest and along the forest roads have the highest frequency of individuals of pure *C. alsinifolium*. Do you think that these habitats are better suited for this species than dry rocky outcrops or that the moist places are just less suitable for its competitors - *C. arvense* and hybrid individuals? I mean, do you assume that *Cerastium alsinifolium* would also inhabit dry heliophilous rocky outcrops, if there was not the competition of two other species? Do you have any speculative hypothesis how and when two parental species got into contact?

It is generally assumed that newly arisen hybrid individuals face the minority disadvantage. How would you explain that the hybrids of *C. arvense* and *C. alsinifolium* are so abundant and successful at the locality of their parents?

Did any of your accessions of *C. alpinum* from Scandinavia grow on serpentines? Did you observe or would you expect different genome sizes of plants of *Cerastium alpinum* agg. growing on serpentine and those growing on other substrates?

What are the most suitable molecular markers to prove and study hybridization (identification of hybrids and examination of single or recurrent origin of hybrids and the direction of hybridization)? What are the advantages and potential disadvantages of each of these markers?

What would you predict for Central European *Diphysastrum* populations? Do you think some of the basic species (genetically pure) are under the immediate threat of extinction in Central Europe due to the hybridization? What deserves more attention of conservationists: genetically pure populations of basic species or, instead, the hybrid swarms as a potential source of new quality with the evolutionary significance? Is it possible to suggest any meaningful conservation strategy for any of them?

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