

Opponent's review

of the doctoral thesis

“Microevolutionary processes in selected genera of the Rosaceae family”

presented by Mgr. Lenka Macková

The doctoral thesis of Mgr. Lenka Macková “Microevolutionary processes in selected genera of the Rosaceae family” consists of 160 pages, including 54 pages of general introduction, 106 pages of three case studies including supplementary material, which are already published as articles in international peer-reviewed scientific journals, and one page of general conclusions. In the presented thesis the candidate addressed the contribution of polyploidization, hybridization, and apomixis in the evolution of selected woody genera of Rosaceae (*Prunus*, *Cotoneaster*) which have been insufficiently studied before. Besides the “curiosity-driven” research questions (chapter 6.6, questions 1-3), also applied aspects have been addressed involving mainly conservation implications of crop-to-wild hybridization (chapter 6.6, question 4).

In the reticulately evolving taxa it is crucial to uncover microevolutionary processes in order to understand e.g. macroevolutionary patterns, species' distribution ranges, or define taxonomic concepts and conservation priorities. Hence, I consider the topic of the thesis scientifically interesting and up-to-date. Moreover, especially in the context of climate change, a better knowledge of crop wild relatives, their interaction with cultivated crops, and processes shaping their genetic diversity might be beneficial for future breeding programs.

The thesis is written well, formatted consistently, without major mistakes. The comprehensive introduction reviews the current state of the knowledge about the family Rosaceae using up-to-date literature. The first two case studies are similar concerning the studied model, design, and methodological approach and recovered that wild *P. fruticosa* might be endangered through homoploid as well as heteroploid hybridization with cultivated congeners. The use of genome size as a species-specific marker was proposed here, which might be well received by applied researchers. In the third study, a diverging proportion of sexually derived seeds was discovered in facultatively apomictic polyploid taxa of *C. integerrimus* s.l. with implication for taxonomy and a possible center of European *Cotoneaster* diversity in the Western Alps was identified. In all three studies appropriate statistical methods were applied and the conclusions are well supported by the newly generated data.

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All three published case studies went through a peer-review process so there is not much place for major critique, although in the *Prunus*-studies I am missing the information if and where herbarium vouchers have been deposited. Concerning additional reservations, mainly in the general introduction, I noticed rather unorthodox use of passive voice and tenses, some formulations reveal a certain degree of redundancy (e.g. chapters 6.2.1 and 6.2.2) and some chapters and paragraphs were not always ideally structured as some phenomena are mentioned rather scattered throughout particular chapters (e.g. focus at studies rather than focus on currently accepted clades, chapter 6.2.1). Moreover, in my opinion, the research aims of the thesis could have been formulated more precisely as a generalization for the whole family Rosaceae might be questionable when dealing only with selected aspects of two genera.

Nevertheless, the above-mentioned comments do not significantly decrease the quality of the presented thesis and I consider the thesis suitable for the award of a Ph.D. degree. Here, I would also like to highlight that the candidate acted as the first author in all three published articles, with major contributions including thorough field and lab work as well as data analyses. In order to complement the view on the studied topic I would like the candidate to respond to the following three questions:

1. The presence of woody apomicts in Rosaceae seems like a unique feature. However, when compared to temperate North America (e.g. *Amelanchier*) and temperate Asia (e.g. *Cotoneaster*, *Prunus*) the species richness of apomicts (but also of sexuals) in Europe is much lower. How can you explain this pattern?
2. In the third case study, it was revealed that the Western Carpathians do not represent a cytotype diversity hotspot of *Cotoneaster integerrimus* s.l. in contrast to the Western Alps. What could have possibly caused this contrast?
3. Could you shortly outline the background and the differences of the “gene pool” and the “taxon-group” concept related to crop wild relatives?

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