Review of the thesis by Matthias Hartmann „Geographical parthenogenesis: evolutionary and ecological significance of apomictic reproduction in plants“

Thesis consists of rather long Introduction and four papers: two of them were already published in good journals. The author (and his colleagues) tested number of hypotheses connected with biology of studied plant, *Hieracium alpinum*. This species has diploid and triploid cytotypes with allopatric distribution and particular papers look for traits correlated with their distribution and responsible for it. Author confirmed that triploid plants are obligate apomicts and diploid obligate sexuals.
Author used many different approaches and particular papers are clearly written. **In my opinion this collection of papers has good quality and it is in agreement with the demands of the law and can be used for successful defence of the thesis.**

I have following comments

Many times it is mentioned that *Hieracium alpinum* is an ideal plant to test hypotheses on geographical parthenogenesis. However many hypothesis were not confirmed. This fact leads me to the opinion that this species is not so ideal model and one should look for some other reasons responsible for the present distribution. Could it be for example different history of individual cytotypes?

For example, the author mentioned that the species survived Glacial period in refugia. In my opinion the alpine species are in refugia, in alpine areas, now, both diploids and triploids. Some results of the thesis stressed differences between populations in Scandinavia and on the continent, especially the second paper.

On the p. 123 the authors write “This is likely because the Scandinavian sites receive much less energy due to their high latitudinal position which, in turn causes a considerable decrease in net primary production (..) leading to lower amount of available nutrients in the soil, including nitrogen (..).” I agree with the first part of the sentence but I have problems with second part. How the primary production influences the amount of nutrients?

In this chapter authors speculate about the nitrogen. Does the author know something about the amount of nitrogen coming to studied ecosystems from the atmosphere? There are two main sources of nitrates, natural from lightning and man made imissions. Are there differences in imissions on the continent and in Scandinavia, which could influence the amount of nitrogen content in biomass?

The other sources are soil microbes and decomposition of organic material. The decomposition is influenced by soil moisture and temperature. Even low precipitation connected with low temperature could lead to high soil moisture and low decomposition. In this respect the discussion is insufficient.

p. 23: The authors write about accumulation of deleterious mutations and their bad influence for plants in homozygous state. Does the author know any process preventing this? Usually deleterious mutations are mentioned for apomicts, but they are mostly polyploid and heterozygous.

p. 31: the authors write that *Hieracium alpinum* is the only case in *Hieracium* with sexual and apomictic cytotype: this is not true, the same case is known in *H.prenanthoides* and *H. racemosum*.

p. 41: In the description of procedures for germination experiments the authors mention storing of seeds in silicagel. As a consequence of this extremely questionable practice they found low seed germination. Why such step was involved? Usually collected seeds are stored under room temperature or in refrigerator (temperature influences germination in many species, and it is usually mentioned).

In the first paper the authors tested red-queen hypothesis with respect to seed predation. I missed information about the population sizes and their isolation, which could influence the number of predators. Could something be shown?

Formal comments

Fig. 3 , p. 74: the legend colours don not correspond to the figure.
Fig. S5, p. 142: insufficient legend

Paper 2: Many abbreviations used in the text are explained only in Fig. S6.

Průhonice 9 September 2018 Prof. RNDr. František Krahulec, CSc.