

## **Review of the Ph.D. Thesis submitted by Tomáš Urfus: Evolutionary mechanisms and relationship among taxa of genus *Pilosella***

Submitted Ph.D. thesis "Evolutionary mechanisms and relationship among taxa of genus *Pilosella*" comprises three papers published in the SCI journals (*Annals of Botany*, *Plant Systematic and Evolution* and *Journal of Biogeography*) and two manuscripts. Three particular studies focused on *Pilosella* taxa were complemented by two studies in the closely related genus *Picris* (both belong to the tribe Cichoriae (Asteraceae) to be understood microevolutionary processes in studied taxa.

The first paper "Cytogeography of *Pilosella officinarum* (Compositae): altitudinal and longitudinal differences in ploidy level distribution in the Czech Republic and Slovakia and general pattern in Europe" based on ploidy level analyses was focused on understanding distribution different ploidy levels in Central European *Pilosella officinarum*.

(1) In Key Results of this paper, focused particularly on cytogeography, you specify that in *Pilosella officinarum* complex were found "tetraploids reproducing sexually, apomictic pentaploids and mostly apomictic hexaploids". How did you obtain information on mating system in studied plants? In Methods it was not mentioned and also in Results it is not presented. In this group, where (regarding mating systems) "everything is possible", it is rather problematic to use only literature data.

(2) Difference in altitudinal distribution of pentaploid and hexaploid *P. officinarum* in Central Europe was found. Is there any hypothesis which could explain this distribution patterns? Was similar pattern found in other areas, where pentaploids and hexaploids of *P. officinarum* co-occur?

The manuscript "Hybridisation within the *Pilosella* population: a morphometric analyses" was focused on the knowledge of the direction of hybridisation in hybrid swarm with *P. officinarum* and *P. piloselloides* subsp. *bauhini* as parental species. Detected morphological variation within the "maternal" and "filial" data sets together with published data on variation in ploidy levels and breeding systems confirm that hybridization is common among both parental taxa and hybrids. Plants with sexual, apomictic and variable reproductive mode can serve as a mother plant in hybridization.

(3) In this hybrid swarm is evidently biased presence of hybrid "morphs" here presented as particular taxa, i.e., *P. brachiata* (morphologically closer to *P. officinarum*) is more frequent than *P. leptophyton* (morphologically closer to *P. piloselloides* subsp. *bauhinii*). How such a pattern could be explained?

In the manuscript "Morphological variation of *Pilosella officinarum*" multivariate morphometric analyses were done to detect the variation in Central European plants. The correlation was found between the morphology of plants and their ploidy level. Moreover, the correlation between involucre hairiness and breeding system was found in hexaploid plants of *Pilosella officinarum*.

(4) Selected morphological characters (capitulum diameter, length of rosette leafs and hair density of rosette leafs) were measured by Theodorus Gadella in Western European populations of *Pilosella officinarum*. Are his results consistent with those that you have detected?

(5) In this study you estimated mating system in *Pilosella officinarum* via emasculation test. Why you did not used much effective method of flow cytometric analysis of mature seeds as it is common in recent studies focused on detection of breeding systems in agamic complexes?

Last two papers are focused on closely related genus of *Picris*. In the paper "Complex pattern of genome size variation in polymorphic member of the Asteraceae" was studied genome size variation in the complex of *Picris hieracioides*. High variation in genomes size detected in this taxon was consistent with morphological variation. Evolution history of *P. hieracioides* is discussed regarding detected morphological and genome size heterogeneity. Last paper "The Balcan endemic *Picris hispidissima* (Compositae): morphology, nuclear DNA content and relationship to the polymorphic *P. hieracioides*" combines study of variation in morphology and genome size of *Picris hispidissima*. Variation in genome size detected in this taxon is explained as a consequence of hybridization with related *P. hieracioides*.

(6) If the hybridization is a putative source of genome size variation, then the intermediates in genome size of *P. hispidissima* should be of "intermediate" morphology? Did you find this pattern?

Thesis of Tomáš Urfus brings new insights to the understanding of microevolutionary processes in *Pilosella* agamic complex. During work Tomáš Urfus adopted numbers of working methods such as sampling strategy, conventional chromosome counting, mating systems detection, flow cytometry analyses, morphometric and statistic analyses. He demonstrated his ability to analyse the data and interpret them. Study of Tomáš Urfus possesses qualifications of a Ph.D. thesis and I recommended it for defence.