

Evaluation of the diploma thesis of Magdalena Holcová by the supervisor Dr. Roswitha Schmickl

The diploma thesis „Molecular evolution of meiosis in diploids and tetraploids of *Arabidopsis arenosa*“ provides excellent insights into meiosis adaptation to temperature and whole genome duplication. The candidate used a population genomics approach to find evidence of positive selection on meiosis proteins in various diploid and the one known (up to now) tetraploid lineage of *Arabidopsis arenosa*. The applied tests for positive selection in combination with the visualization of amino acid substitutions in form of heat maps are a great refinement of genome scans for genes under positive selection by providing a link to putative functionally important changes in the proteins. Pollen viability was addressed as a reaction to a stepwise temperature continuum and to whole genome duplication, by using diploids and tetraploids. This ecological experiment nicely complemented the results of the tests for positive selection on meiosis proteins. All available *Arabidopsis arenosa* lineages have been used in the thesis, which sets the results on solid ground; published studies have so far only used a small subset of lineages.

The literature survey with a focus on selection and meiosis covers general relevant information and goes into detail where necessary. The selected topics and subtopics of this survey fit very well to the practical part of the thesis. The cited literature is appropriate and up-to-date. In the methods section the candidate demonstrates that she is well capable to handle large genomic datasets and perform scripting tasks in R and BASH. Statistical tests are appropriate. The utilized approaches show that the candidate understood existing methods and was able to modify them according to the needs of her research. She was able to understand and further develop complex circumstances on her own, only based on few discussions with other researchers, which I consider exceptional at her early career stage and shows her exceptional skills in scientific work. Also the results and discussion sections give this impression. The text follows the logic of argumentation and is written in fluent English. A major part of the research was conducted at the John Innes Centre in Norwich, UK, which required that the candidate had to be largely reliant on herself.

For all the reasons mentioned above I evaluate the diploma thesis of Magdalena Holcová as excellent.