

Evaluation of the dissertation entitled “*The effect of immune system state and function on the sexual selection in birds*” by Michal Vinkler

The main aim of the present dissertation is to apply a wide variety of immunological and molecular methods to study immunity and sexual signaling in birds. The candidate has among others carried out extensive field studies of the scarlet rosefinch and conducted lab based studies using zebra finches. Furthermore, the candidate has performed reviews of the literature, as well as provided clarifications and advices regarding the use of various terms in the field of immunology. The dissertation consists of ten papers in which the candidate is the first author of eight. The first paper summarizes the literature on carotenoids and health signaling and will be published as a chapter in an edited book. The second paper also reviews the literature on the same subject, but provides a novel hypothesis for the association between carotenoid maintenance and sexual signaling. The study has been published in *Naturwissenschaften* (impact factor 2.25). The third paper tested the effect of two phytohaemagglutinin isolectins on immune responsiveness in male zebra finches. The unique approach applied revealed a significantly stronger effect of one of the isolectins (erythroagglutinin) on immune responsiveness, which has important implications for interpreting findings from the widely used (PHA-) test in immunoecology. The paper has been published in *Functional Ecology* (impact factor 4.65). Paper fourth examined the relationship between male ornamentation and variation in reproductive success, and revealed that colorful males sired more (particularly extrapair-) offspring. This finding corroborates some previous studies in other species and highlights the importance of extrapair fertilizations for understanding the evolution and maintenance of male ornamentation in socially monogamous species. The paper has been published in *Journal of Evolutionary Biology* (impact factor 3.47). Paper five describes various hematological traits in the scarlet rosefinch and reveals an association between immature erythrocytes and nestling growth rate. The paper is published in *Journal of Ornithology* (impact factor 1.30). Paper six shows that cuckoldry in scarlet rosefinches is related to MHC class I diversity, but that extrapair offspring is not superior in terms of MHC heterozygosity. The findings do not provide support in favor of the hypothesis that females seek extrapair fertilizations to obtain complementarity genes. The paper has been published in *Journal of Avian Biology* (impact factor 2.31). Paper seven reviews the literature on immunity genes in general and toll-like receptors in particular. The paper has been published in *Folia Zoologica* (impact factor na). Paper eight provides the first description of toll-like receptors in a passerine bird species, which may have important implications for the study of avian immunity given the pivotal function of these receptors in the vertebrate immune system. The paper has been published in *Tissue Antigens* (impact factor 3.02). Paper nine discusses the widely (mis-) used term ‘immunocompetence’ and provides valuable recommendations for its application in avian immunoecology. The paper has been submitted to *Journal of Avian Biology*. The final paper, paper ten, reveals that less colorful male scarlet rosefinches mount a stronger immune response to phytohaemagglutinin than more colourful males. The paper has been submitted to *Animal Behaviour*. The synopsis clearly frames the topic of the included papers.

Although the book chapter, manuscripts and papers are all co-authored, the candidate appears to have made a significant independent contribution. The candidate has applied a broad approach to reach the goal of the thesis by performing both field and lab studies, used a combination of immunological and molecular methods, tested and proposed novel hypotheses, as well as performed reviews.

The scientific standard of the dissertation is very good given the fact that eight of the ten included papers have already been published or accepted for publication in good quality journals. Three of the papers have also been published in well-respected journals with impact factor above 3. A weakness does seem to appear in some of the papers. That is, the candidate acknowledges in the synopsis the importance of, among others, age and sex when evaluating an individual's immune responsiveness. Age and/or sex of the individuals do however not seem to have been taken into account in papers V, VI and X. Further, although an impressive number of papers are included in the dissertation, leaving some of them out would still have resulted in a solid, yet more, at least from my point of view, clearly focused, dissertation.

The candidate seems to have a good perspective on the research area evidenced through the reviews of the literature as well as the ability to provide suggestions for changes in terminology. The candidate has also collected an impressive amount of data and tested various hypotheses.

The quality of the text, figures and tables, as well as the English standard is overall good.

In conclusion, the candidate has produced an excellent thesis worthy of being defended and I look forward to discussing it with him.

Svanvik, 25.08.2011



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