# Report

on the dissertation by Mgr. Barbora Augstenová "Evolution of sex determination systems in toxicoferan reptiles"

The dissertation is dedicated to the study of sex determination in a large group of squamate reptiles – Toxocifera. In the era of genome sequencing and assemblies, a huge number of reptile species remains understudied, in many taxa sex determination systems are unclear and sex chromosomes are not described. From the evolutionary point of view, sex determination is especially interesting in squamates, where so many different types of sex chromosomes at different levels of differentiation are revealed. Here the author has applied novel molecular cytogenetic methods on a large set of toxicoferan species to demonstrate the presence of sex chromosomes, study their content, and make important conclusions about their evolution.

The dissertation is well-structured and written in a good literary language. The thesis consists of 6 chapters, based on previously published articles, each devoted to a specific toxicoferan group. The work is based upon a deep experience of the author in the field of reptile cytogenomics and has a solid foundation in existing knowledge. The project represents a further extension of previous successful research works of the group from the Prague university. The author successfully mastered modern molecular cytogenetic techniques to achieve impressive results. Especially important is the large set of species and representation of very rare understudied taxa.

The exact goals of the work are clearly defined and the molecular cytogenetic methodology is rigorously explained. The scientific importance of the thesis is supported by a high level of six publications in peer-viewed journals. The impact factors of publications vary between 2 and 4.4, whereas in four publications Mgr. Augstenova is the first author, who performed most experimental work and largely contributed to manuscript writing. Generally, the articles published in 2018-2021 have already been cited over 50 times, and the author reached H-index 7, which indicates a great interest of the scientific community and a high value of achievements.

Strong side of the project includes new biologically relevant information on a wide range of toxicoferan species, with special focus on sex chromosome evolution. Many species have

been described cytogenetically for the first time, some cases of triploidy are detected, demonstrating high genomic plasticity of reptiles.

Weaknesses of the thesis: I did not find any serious flaws, maybe a general summarizing review on sex determination in toxicoferans would make this work more complete, but it may be done later, when more taxa are involved into study.

The thesis looks very strong, the number and quality of publications well exceed requirements. I am looking forward to hearing about new interesting discoveries and to reading novel publications resulting from the author in highly ranked academic journals. Based on these reasons, I highly recommend the work for defense and I believe the author should be awarded a PhD degree.

I have three additional questions for discussion:

1) Do you have any experimental data or theoretical hypotheses of how degeneration of toxicoferan W chromosomes happens: if dominating mechanisms include gene pseudogenization by point mutations or whole gene/large genomic region deletions?

2) Do the discovered interstitial telomeric clusters have a potential in stabilizing potential chromosome fissions or in enhancing the rates of translocations?

3) Why do chameleons tolerate autosome/sex chromosomal translocations, which are usually rare in ZZ/ZW systems?

Vladimir TRIFONOV

13th September 2021

Institute of Molecular and Cellular Biology SB RAS

Lavrentiev ave 8/2

630090 Novosibirsk, Russia

Tel. +79137592499

Email: vlad@mcb.nsc.ru