

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Song Guo

PhD Program: Life Sciences

Title of Thesis: Using RNA expression as a quantitative molecular phenotype to study human and vertebrate evolution

Supervisor: Professor Philipp Khaitovich

Name of the Reviewer: Mikhail Gelfand

I confirm the absence of any conflict of interest

Date: 01-11-2021



Reviewer's Report

The dissertation is comprised of two main parts, analysis of miRNA expression in human placenta in different populations and comparative analysis of developmental transcriptome series in several vertebrate species. Following published papers, each part has its own Materials and Methods section, whereas the Introduction, Discussion and Conclusions are common. While there is some thematic gap between these two directions of research, they are integrated by the object - gene expression in development, including miRNAs in both cases - and the functional analysis of the results.

These results are interesting and non-trivial. While the results of the placenta study are largely as expected (although still important), the analysis of the vertebrate development series yielded several novel observations, in particular, identification of genes evolving under the Haeckel and von Boer dynamics and functional analysis of genes with different expression profiles. Specifically, the candidate has demonstrated that early developmental genes ("gradual decreasing pattern") tend to have conserved expression profiles and are involved in essential functions, whereas late-expressing genes ("increasing expression pattern") are less conserved and more functionally diverse. Moreover, miRNAs with conserved organ-dependent development profiles tend to have similar regulatory effects, unlike organ-specific and young miRNAs.

The candidate published three papers in Q1 and NI journals, in one of them she is the first author. Her personal contribution to these papers is specified. Hence the formal requirements for Skoltech PhD theses are satisfied.

Nothing is said about conference presentations. As there are formal requirements in this respect as well, this needs to be clarified during the defense.

The technical comments to the previous versions of the thesis have been addressed adequately.

Provisional Recommendation

I recommend that the candidate should defend the thesis by means of a formal thesis defense

~~I recommend that the candidate should defend the thesis by means of a formal thesis defense only after appropriate changes would be introduced in candidate's thesis according to the recommendations of the present report~~

~~The thesis is not acceptable and I recommend that the candidate be exempt from the formal thesis defense~~