

## **Review of the PhD thesis of Mgr. Azucena Claudia Reyes Lerma entitled “Karyotype analysis of selected groups of tetrapulmonate arachnids”**

Reviewer: RNDr. Martina Johnson Pokorná, Ph.D.

The thesis represents a compilation of published scientific articles with a comprehensive introduction and summarising discussion.

It focuses on the analysis of the karyotypes and sex chromosomes in selected species of tetrapulmonate arachnids. Spiders in general are one of the groups with the largest number of species. Although in some groups the knowledge of genome organisation and sex chromosome constitution is deep, in the majority of species it is lacking. Any new information is therefore of great value.

It is apparent that the diversity in chromosome number and morphology in spiders and more closely in haplogyne spiders which are the main focus of this thesis is substantial. To follow evolutionary trends in genome organisation it is important to gather knowledge from the basal lineages. Therefore, I appreciate that this thesis focuses on those lineages. I find it fascinating that species of the Dysderoidea superfamily have holocentric chromosomes. The author claims that the holocentric chromosomes evolved at least three times among arachnids. In Dysderoidea this event seems to be also connected with the ancestral genome duplication. The chromosomal diversity between Dysderoidea and caponiid lineages is very interesting with the lower and higher number of chromosomes described.

The diversity in sex chromosomes in arachnids is remarkable. In the Dysderoidea studied in this thesis the author found a wide range of the number of sex chromosomes while in Whip spiders (Charinidae) no differentiated sex chromosomes were observed. The fact that the sex chromosomes seem not to represent a constraint on polyploidization is indicative of the interesting way of sex determination in arachnids which is based probably more on the number of X sex chromosomes rather than on the specific sex determiner located on differentiated sex chromosome pair.

I also highly value proven advantages of using cytogenetics to uncover cryptic species as demonstrated in amblypygids.

The thesis represents a compact text where the chapters are well linked together. Articles were published in good journals and especially the first one is well cited. As they went through the peer review process, they are scientifically sound. The introduction is well written and gives the reader an important perspective about the studied groups and their cytogenetic characteristics. The aims are clearly formulated and fulfilled. The discussion at the end of the thesis brings the results together and emphasizes the significance of any discovery in non-model groups of animals as it could alter our thinking about the entire system and its evolutionary processes. The whole thesis is written in clear language with minimum mistakes.

For all the above reasons I would like to congratulate Azucena Claudia Reyes Lerma for her achievements and for presenting such a scientifically interesting thesis. I recommend the thesis to be approved by the committee.

Specific questions:

I would like to ask the author to expand the theory about the evolution of the holocentric chromosomes from monocentric in connection to previous polyploidization. What do you think could be the molecular mechanism of such transition?

Does the author think that the remarkable variability in chromosome number between Dysderoidea and caponiids is also connected with the genome duplication? Could there be an alternative explanation?

There was a hint in the thesis that female heterogamy may be present in ambypygid. That would be very unusual for arachnids. Can the author expand on what leads her to this possibility?

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