

Review of Serhii Ozerskyi's diploma thesis entitled Diversity of iris coloration during evolution of geckos (Gekkota).

In his master thesis, Serhii attempts to analyze the evolutionary history and trends of the iris coloration and venation patterns in the clade of squamate reptiles that is traditionally referred to as geckos (Gekkota). It is stressed throughout the text and it is absolutely correct that the topic is novel and definitely worth pursuing.

From a formal point of view, the thesis has a standard structure that includes seven main chapters: Summary, Introduction, Objectives, Materials and Methods, Results, Discussion, and Conclusions which are followed by a list of cited references. The Introduction provides a very solid overview of coloration and color change in animals with special emphasis on the coloration of the eye and its possible meaning and function. The Intro also describes in detail the clade that the thesis focuses on – the geckos – its diversity, updated taxonomy, and distribution. The Intro is followed by logically organized Objectives that enumerate key questions that will be tested. Up to this point, the quality of the thesis was very high and if it continued in this standard then it would have been one of the best Master theses I have reviewed. Sadly, that was not the case.

One of my main points of criticism is the description of the methods. Since the methods relied mostly on photographs of as many gecko species as Serhii could have gotten hold of, large part of the Materials and Methods are dedicated to how the eye and iris coloration was assessed and scored. In fact, more than six pages are about what characters were scored and how, including detailed descriptions of different types, subtypes, and modifications of eye venation. I will be honest, I got lost after reading two sentences of these descriptions. There are so many variables Serhii scored, each with several combinations of possible modifications that it was just impossible to keep track with them. On top of that, each variable had an abbreviation (e.g., c, g, nvdd, dvn, nrBSM... for venation types; DLD, DLN, DND for brightness patterns; 1–4 for confidence intervals; 1–4 for probability of errors) that were used throughout the text and one had to keep getting back to the methods to the variable descriptions to know what the text is currently about. The characters that were scored and which formed the basis for all the analyses is summarized in Table 2.1 on page 19. I, however, find this table extremely difficult to interpret and I must admit that it did not help me understand the logic of the data collection at all. Also, from the analytical perspective, having so many variables complicated the analyses and even more the interpretation of the results. Therefore, a simpler coding system (ideally binary) applied to only a handful of key characters would help a lot the readers to understand what the methods were actually about and what were the analyses supposed to test. This is evident from the GLM and PhyloGLM analysis of venation and brightness pattern that showed no power because the sample size (number of species in the data set) was too small for the number of variables included and which the author solved by reducing the original 13 variables to three.

In a sharp contrast to the lengthy descriptions of characters and traits, merely five lines of text are dedicated to the analytical part of the data (and the sentences are incomplete, on top). This part of the methods is severely neglected. Obviously, more analyses were conducted as is apparent from the Results. These are however not listed in the Methods (e.g. the Binary character evolution model). One limitation of the result interpretation is also the fact that all the test that considered the phylogeny of the group should be conducted on more trees than one. Normally this is done by taking a sample of posterior trees from a Bayesian analysis and running all downstream test on this sample of trees, thus accounting for phylogenetic uncertainty. I believe these posterior trees are available for the Zheng and Wiens phylogeny and if the author and his supervisor intend to publish the findings of this thesis as a published paper then they should consider this.

The Results and Discussion are fairly good, considering how difficult it was to follow the Methods. The graphics is one of the strengths of the thesis. The figures are original and appealing and mostly self-explanatory and nicely illustrate the results. The exceptions are the figures with results from the binary character evolution model analyses that are complex and lack detailed-enough explanation.

The thesis is written in English which is not always easy to follow and contains many grammatical mistakes. General errors in the text are numerous and contain, but are not limited to, font changes; citations that are cited only as a "reference" that were apparently meant to be put in but were forgotten about; websites and online databases (Reptile database, Tree of Life) should be cited properly; duplicated words; references to a wrong figure; repetitive text; figures and tables having captions on different pages; tables with captions below them while those should be on top. References are also packed with mistakes, for example inconsistent formatting; duplicated and even triplicated references; journal name, volume and pagination missing; italics in scientific species names missing; Flickr photos included in the references (should be more in the acknowledgements).

In all, the idea was there, the data apparently too, and so the potential of the thesis was massive. But the motivation for scoring so many variables is unclear and the analytical part was not described clearly enough. I recommend marking the thesis as 'Good' (Dobrý), provided the defense is impeccable.

Questions:

- 1) I was missing a table with all the species that were included in the analyses and the state of their iris and eye venation. What was the proportion of species included/missing from each gecko family? Was it proportional across the families or was one family represented substantially less/more than the others? Could you show some numbers?
- 2) The author mentions that nocturnal species have veined eyes to make them cryptic and prevent them from predators. Eublepharid geckos (in English called the eyelid geckos) have eyelids and are nocturnal. Can this affect the coloration of the iris and the venation pattern and are they any different from the other gecko groups in this sense?
- 3) The layer of tapetum lucidum is mentioned in the Introduction. Would you know in which genus of geckos it is present and what may be its function?
- 4) Has the fact that most geckos lack eyelids anything to do with the venation of the eye? Is it paralleled in other squamates that lack eyelids (e.g. snakes)?

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