



Review of the dissertation "Trends of the evolution of epriphyoid mites (Acari, Eryphyoidea) on plants" submitted for the degree of Doctor of Biological Sciences by F.E. Chetverikov

Acariform mites are one of the most difficult animal taxa for ecological and evolutionary studies due to their small (often microscopic) size, enormously large number of species and rather cryptic way of life which make species identification especially tough. As a result, many mite groups are clearly understudied. The presented dissertation fills one of the gaps in our knowledge of evolution of acariform mites. In particular, the author carried out multifaceted study of evolution of eryphiids and their relationships with plants including micromorphology and molecular phylogenetics. Especially important component of the study is the development of an array of different, often highly sophisticated methods that in future will definitely be used by scientific community for studies of other microscopic animals. Traditionally, in reviews of dissertations, a reviewer describes the structure of the thesis including number of pages and number of references in reference list. I, personally, think that this as well as description of separate chapters is redundant because the thesis itself is good witness for this. Instead, I briefly note the main and the most important aspects of the study. First, the study suggests that eryphiids evolved their peculiar and 'minimalistic' morphological structure prior to switch to phytoparasitic way of life. In other words, these mites were pre-adapted to phytoparasitism.

Second, combination of molecular phylogeny and paleontological data coupled with the analysis of the relationships between eryphiids and host plants allowed to reconstruct phylogenetic history of the taxon at least at the deep phylogenetic level.

Third, despite morphological constraints associated with "minimalist", simplified body plan, eryphiids further evolved features allowing them successful exploitation of the plant hosts. Author convincingly describes main pathways of evolution and evolutionary modifications of eryphioid mouthparts, appendages and genitalia. In addition, author describes transformations of body shapes and morphological reversals as a source of recent diversity of eryphiids. Description of variation in body shape among seasonal generations of mites is of a particular interest. This phenomenon has been found in other arthropod taxa, although it is unclear whether it is an adaptation to seasonal changes in the environment or a 'ghost' of the response to past climatic fluctuations. Another important result of the study is description of switch to endoparasitism that occurred multiple times and independently across eryphioid lineages. In particular, this facilitated occupation of new niches and parasitism on various hosts.

Fourth, the study proposed a new hypothesis of the origin of Eryphioidea and their main evolutionary pathways from both morphological and ecological perspective.

In conclusion, this is a solid, fundamental and important study that can be a template for studying other taxa of microscopic animals. The study resulted in multiple publications in international periodicals such as Systematic and Applied Acarology, Experimental and Applied Acarology, Zootaxa. I have no doubt that F.E. Chetverikov deserves the degree of Doctor of Biological Sciences.

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