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

F.E. Chetverikov belongs to the Russian school founded by V.G. Shevchenko, with a long tradition of eriophyoid studies. Main studies of his team were focused on the problem of co-evolution of eriophyoids and plants and resulted in an important series of articles on evolutionary morphology of Eriophyoidea. As the youngest successor, F.E. Chetverikov inherited the best of the tradition and improved significantly research in the field of eriophyology. The most prominent monography on Eriophyoidea, published at the end of XX century states that the critical description of morphology of Eriophyoidea and the most important data on the group's systematics are needed in the future. These include: a) the diagnosis of all suprageneric taxa; b) the data on anatomy, physiology and the details on reproductive biology and symbiotic relations with the host plants; c) the compilation on the evolution of Eriophyoidea and d) the relationships of Eriophyoidea with other Acariformes. In my opinion, F.E. Chetverikov pursued these ideas accomplishing the goals stated in the monography. Following the distinct research program to improve the understanding of the evolutionary trends in Eriophyoidea the studies within the dissertation were previously published in a series of papers in peer reviewed international periodicals such as Systematic and Applied Acarology, Experimental and Applied Acarology, Zootaxa. They were devoted to: a) descriptions of relict taxa, b) examination of species with aberrant life cycles and unusual traits of exoskeleton, c) cladistic methods in order to establish relationship between eriophyoids and soil Nematalycidae mites, d) molecular phylogeny of Eriophyoidea on the family level, e) the genetic mechanisms of gallogenesis, f) reconstruction of eriophyoid embryogenesis, g) providing new data of eriophyoid reproductive biology and to discovering of novel structures.

I shall mention here the most important particular results of this dissertation: a) New taxa of Eriophyoidea (7 genera, 16 species), including previously unknown endoparasites of the tissues of monocotyledonous plants were described, b) old collection by Alfred Nalepa kept in the Museum of Natural History (Vienna, Austria) was revised, c) new method for preparation of live microarthropod with laser microdissector in a drop of fixative was developed d) confocal laser scanning microscopic examination of the exoskeletons of parasitic mites and amber inclusions was introduced), e) new methodology for the study of the female internal genitalia, based on the comparisons of 3D-reconstructions, was proposed, as well as the method for detecting exuviae of the parasitic arthropods in herbaria using UV-light, f) a new mode of drawing microscopic objects using video projector was suggested.

The main points of the results of the dissertation can be summarized as follows:

a) cladistic analysis of morphological characters and partial sequences of six genes (18S, 28S, EF1- α , SRP54, HSP70, CO1) revealed sister relationship of Eriophyoidea and soil mites Nematalycidae,

b) Eriophyoids demonstrate high level of evolutionary plasticity, despite the limitations coming from narrow specialization and ultimate miniaturization, which occurred on early stages of evolution,

c) Eriophyoid ability to induce gallogenesis is based on manipulating with processes of normal histogenesis of plant tissues which is realized through alterations of expression levels of regulatory genes via the effect of mite saliva components on plant epidermal cells
and

d) macrophylogeny of Eriophyoidea reflects the major steps of colonization of higher plants and corresponds with the key events of host phylogeny.

It is worthwhile to stress the excellent quality of illustrations and images made by F.E. Chetverikov, himself.

In conclusion, this dissertation is a very important contribution to our understanding of eriophyoid evolution, supported by a broad range of results concerning all important aspects that are provided within the aims of the dissertation like explanation of high plasticity in spite of high specialization which prevents extinction of the group, confirmation of sister relation of Eriophyoidea with soil Nematalycidae and the hypothetical adaptation to interstitial life in the ancestral group of Eriophyoidea, and that macrophylogeny of Eriophyoidae reflects major steps of their hosts and the correspondence to their evolution.

I highly recommend accepting doctoral dissertation for the defense and think that F.E. Chetverikov after defense procedure, deserves the degree of Doctor of Biological Sciences.

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