Phylogeny and systematics of the endoparasitic astigmatid mites (Acari: Sarcoptiformes) of mammals: families Gastronyssidae, Lemurnyssidae, and Pneumocoptidae

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Accepted by O. Seeman: 1 Oct 2008; published: 5 Dec. 2008
Abstract

We reconstruct the phylogenetic relationships of the mammal-associated endoparasitic mites belonging to 3 families, Gastronyssidae (42 species in 9 genera), Lemurnyssidae (4 species in 2 genera), and the monogeneric Pneumocoptidae (4 species) on the basis of maximum parsimony analysis of 120 morphological characters. In the strict consensus tree (all characters unordered and unweighted, Branch and Bound search option), these 3 families form a monophyletic group with the first dichotomy between Pneumocoptidae-Lemurnyssidae and Gastronyssidae. The node joining these families is mainly supported by setal reductions. Such regressive characters alone provide relatively weak evidence for the monophyly of the group due to a greater probability of their homoplastic origin. On the other hand, the monophyly of each family is well supported by several progressive character changes. The family Gastronyssidae splits into 2 clusters. The first cluster represents the subfamily Yunkeracarinae and the second includes the subfamilies Gastronyssinae and Rodhainyssinae. With respect to current classifications, there are 2 unexpected results in the tree: the position of the genus Gastronyssus Fain, 1955 (Gastronyssinae) within the core of the subfamily Rodhainyssinae and the polyphyly of the genus Opsonyssus Fain, 1959. The surprising placement of the genus Gastronyssus has the following explanation. In our data matrix, all distinctive derived character states characterizing this genus appear as autapomorphies and, therefore, do not affect the tree pattern. At the same time, these mites, being stomach parasites, exhibit the greatest degree of morphological reduction, including setae. Most of the character states shared with rodhainyssines are setal reductions and are of lesser reliability. The strict consensus of 14 trees obtained after successive weighting differs from the previous consensus tree mostly by the position of the genus Gastronyssus, which is the sister group to the all other rodhainyssine genera, excluding Phyllostomonyssus Fain, 1970. The genus Opsonyssus remained polyphyletic. We consider the 2 clusters observable in this tree as the subfamilies Yunkeracarinae (the genera Yunkeracarus Fain, 1957 and Sciuracarus Fain, 1964) and Gastronyssinae, respectively. The latter subfamily is divided onto 3 monophyletic lineages, which we rank as tribes: two monobasic tribes, Gastronyssini and Phyllostomonyssini tr. nov., and the tribe Rodhainyssini stat. nov., including the remaining genera, Eidolonyssus Fain, 1967, Mycteronyssus Fain, 1959, Opsonyssus, Rodhainyssus Fain, 1956, and the clade O. striatus Fain, 1967-O. phyllorhina Fain, 1959. A new genus Pseudoopsonyssus gen. nov. with species P. phyllorina (Fain, 1959) comb. nov. (type species), P. striatus (Fain, 1967) comb. nov., and P. zumpti (Fain, 1959) comb. nov. is established for this clade. The host-parasite associations of these endoparasitic mites are discussed, and a new hypothesis suggesting their secondary switching from the common ancestor of bats to myomorph rodents is proposed. Detailed taxonomic revisions of all 3 families based on examination of type materials are provided. Fifteen new species in 6 genera are described: Gastronyssus philippinensis Bochkov et OConnor sp. nov., Rodhainyssus saccopteryx Bochkov et OConnor sp. nov., Opsonyssus pseudoindicus Bochkov et OConnor sp. nov., O. pteropodi Bochkov et OConnor sp. nov., O. klompeni Bochkov et OConnor sp. nov., O. macroglossus Bochkov et OConnor sp. nov., Mycteronyssus haplonyciteri Bochkov et OConnor sp. nov., Eidolonyssus myersi Bochkov et OConnor sp. nov., Yunkeracarus apomys Bochkov et OConnor sp. nov., Y. ratus Bochkov et OConnor sp. nov., Y. limnomys Bochkov et OConnor sp. nov., Y. lophuromys Bochkov et OConnor sp. nov., Y. otomys Bochkov et OConnor sp. nov., Y. hyloymyscus Bochkov et OConnor sp. nov., and Y. alticola Zabludovskaya sp. nov.

Key words: endoparasitic mites, Gastronyssidae, Lemurnyssidae, Pneumocoptidae, phylogeny, systematics, mammals, bats, rodents