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Review of the mite family Pachylaelapidae (Acari: Mesostigmata)

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Abstract

The family Pachylaelapidae Berlese, 1913 (Acari: Mesostigmata) includes a total of 16 valid and adequately described genera, namely *Chaetodellus* Mašán & Halliday, 2013, *Elaphrolaelaps* Berlese, 1910, *Mirabulbus* Liu & Ma, 2001, *Neopachylaelaps* Mašán, 2007, *Olopachys* Berlese, 1910, *Onchodellus* Berlese, 1904, *Pachydellus* Mašán, 2007, *Pachyglobolaelaps* Mašán, new genus, *Pachylaelaps* Berlese, 1888, *Pachylaelapsoides* Mašán, 2007, *Pachyseiulus* Moraza & Johnston, 1990, *Pachyseius* Berlese, 1910, *Pachysphaerolaelaps* Mašán, 2007, *Paralaelaps* Trägårdh, 1908, *Pseudopachys* Berlese, 1916 and *Sphaerolaelaps* Berlese, 1903. Three of these genera include subgenera, namely *Elaphrolaelaps* (*Incisosternum*) Elsen, 1974, *Olopachys* (*Olopachylaella*) Mašán, 2007 and *Pachylaelaps* (*Longipachylaelaps*) Mašán, 2007.

The family is classified here into three subfamilies, Pachyseiinae Karg, 1971 including *Pachyseius* and *Mirabulbus*; Pachyseiulinae Mašán, 2007 including *Pachyseiulus* and *Pseudopachys*; and Pachylaelapinae Berlese, 1913, with all the other genera. Pachylaelapinae is further divided into three tribes, Pachylaelapini, Paralaelapini and Onchodellini. Almost half of the known genera are monotypic: *Neopachylaelaps*, *Pachyglobolaelaps*, *Pachylaelapsoides*, *Pachyseiulus*, *Pachysphaerolaelaps*, *Pseudopachys* and *Sphaerolaelaps*, while *Onchodellus* and *Pachylaelaps* are the largest genera in the family.

Eleven genera that were provisionally classified as Pachylaelapidae cannot be reliably placed into a family on the basis of the available information, or have been incorrectly placed in the Pachylaelapidae: *Actinoseius* Berlese, 1916, *Beaurieuia* Oudemans, 1929, *Brachylaelaps* Berlese, 1910, *Bulbogamasus* Gu, Wang & Duan, 1991, *Megalolaelaps* Berlese, 1892, *Meliponapachys* Turk, 1948, *Neoparasitus* Oudemans, 1901, *Pachylaella* Berlese, 1916, *Platylaelaps* Berlese, 1905, *Pseudolaelaps* Berlese, 1916 and *Zygoseius* Berlese, 1916.

New synonymies are established for *Pseudoparasitus* (*Pseudopachys*) *parasitizans* Berlese, 1916 (= *Pseudopachyseiulus ignacii* Moraza & Johnston, 1993) and *Pseudopachys* Berlese, 1916 (= *Pseudopachyseiulus* Moraza & Johnston, 1993). *Brachylaelaps* and *Pachylaella* are here considered as genera of Neoparasitidae and Macrochelidae respectively, rather than Pachylaelapidae. The genus *Mirabulbus* is redefined and transferred from Bulbogamasidae to Pachyseiinae. *Paralaelaps* and *Elaphrolaelaps* are provisionally placed together in the Pachylaelapinae and the new tribe Paralaelapini. Altogether 44 new combinations are proposed.

Onchodellus slovacus Mašán and *Pachyglobolaelaps hallidayi* Mašán are introduced as new species. Mašán (2007a) described these species but did not designate holotypes for them, so their names are not available from that date.

Replacement names are proposed for five junior homonyms: (1) *Onchodellus michaelcostai* Mašán & Halliday, replacement name for *Pachylaelaps brevis* Costa, 1971, junior homonym of *Pachylaelaps brevis* Berlese, 1920; (2) *Onchodellus morazae* Mašán & Halliday, replacement name for *Pachylaelaps minutus* Moraza & Peña, 2005, junior homonym of *Pachylaelaps minutus* Oudemans, 1901; (3) *Pachylaelaps atlanticus* Mašán & Halliday, replacement name for *Pachylaelaps major* Van Driel, Loots & Marais, 1977, junior homonym of *Pachylaelaps* (*Paralaelaps*) *major* Berlese, 1918; (4) *Pachylaelaps schweizeri* Mašán & Halliday, replacement name for *Pachylaelaps latus* Schweizer, 1961, junior homonym of *Pachylaelaps* (*Platylaelaps*) *latus* Berlese, 1905; and (5) *Pachylaelaps similis* Mašán & Halliday, replacement name for *Pachylaelaps reticulata* Hafez & Nasr, 1982, junior homonym of *Pachylaelaps* (*Onchodellus*) *reticulatus* Berlese, 1904.

We provide a catalogue of the world species of Pachylaelapidae, which includes 253 named species (including synonyms), with details of their authorship, synonyms, nomenclatural and bibliographic details and generic placement.

Key words: Acari, soil mites, Pachylaelapidae, catalogue, keys, taxonomy

Introduction

Mites in the family Pachylaelapidae Berlese, 1913 are commonly found in decomposing organic matter, especially soil, humus, leaf litter, moss, decomposing wood, and plant debris, as well as the nests of mammals, birds, and social insects (Mašán, 2007a). They are predators that feed on a range of microinvertebrates (Lindquist *et al*., 2009). Many species are associated with coprophilous insects, especially with scarabaeid beetles, while some genera appear to be exclusively myrmecophilous (Mašán, 2007a).

The Pachylaelapidae, in the concept as considered in this paper, currently comprises 16 recognisable genera, whose species are found over all climatic zones of the world. Lindquist *et al*. (2009) characterised pachylaelapid mites as especially diverse in the Old and New World tropics, but the review presented here shows that the greatest number of named species and genera is actually known from Europe. Only two of the 16 genera documented in this paper are found exclusively in tropical regions. Pachylaelapidae often constitute an important component of the fauna in soil microhabitats of the temperate zone of the northern hemisphere, especially in the Palaearctic Region.

Discussion

The objective of this paper was not to present a detailed taxonomic revision of the family Pachylaelapidae, but to review the state of knowledge of the family and draw attention to some unresolved problems. The family Pachylaelapidae is taxonomically difficult, because of the high degree of morphological homogeneity in some groups. Precise and routine species identification is only possible if rich comparative material is available for examination. As stated by Costa (1971), individual species are often of almost identical appearance and difficult to separate. This difficulty may also be the reason for the existence of only a small number of papers strictly devoted to the European species of the genus *Pachylaelaps* (Evans & Hyatt, 1956; Hirschmann & Krauss, 1965; Koroleva, 1977a; Moraza & Peña, 2005c; Mašán, 2007a).

Unfortunately, many of the described species are not based on easy-to-recognise distinguishing characters and detailed morphological descriptions. Distinctions between the most similar species depend on small morphological details, especially of the idiosoma and leg chaetotaxy, metric data, dorsal shield adenotaxy and poroidotaxy, female sperm access system, cheliceral dentition, male spermatodactyl, male palp tibia, and male leg armature. That information is rarely presented in earlier studies of the family, so we are unable to recognise many of the species.

The classification of the tribe Onchodellini is especially difficult, and some of its genera should probably be placed in separate new tribes: (1) *Pachydellus*, with modified sperm access system and spermathecal tubes strongly reduced; (2) *Pachyglobolaelaps* and *Sphaerolaelaps*, with modified dorsal chaetotaxy, and some dorsal shield setae in unusual positions (e.g. J1 anterolateral to J2); (3) *Pachysphaerolaelaps*, with hypertrichous dorsal shield and integument.

This review of the family Pachylaelapidae includes 16 genera and 226 valid species, 17 which are systematically unplaced. Another 11 genera are not included in the Pachylaelapidae, and are here regarded having unknown systematic position, or incorrectly placed in the Pachylaelapidae. The most diverse genera are *Onchodellus* and *Pachylaelaps*, which include 79 (35%) and 55 (24%) listed species, respectively. Almost half of the genera are monotypic—*Neopachylaelaps*, *Pachyglobolaelaps*, *Pachylaelapsoides*, *Pachyseiulus*, *Pachysphaerolaelaps*, *Pseudopachys* and *Sphaerolaelaps*.

This review and the identification keys should provide a useful basis for identification of genera of Pachylaelapidae in future taxonomic research. However, the process of clarifying the family is obviously far from complete and should continue, especially with detailed study of taxa from tropical areas of the world. That study should include revisionary work on several related families that are inadequately known − Leptolaelapidae, Megalolaelapidae, Neoparasitidae (= Bulbogamasidae), and Pseudolaelapidae.

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