



Article

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Systematic revision of the genera *Geckobiella* Hirst, 1917 and *Hirstiella* Berlese, 1920 (Acari: Prostigmata: Pterygosomatidae) with description of a new genus for American species parasites on geckos formerly placed in *Hirstiella*

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Abstract

A cladistic analysis based on 274 morphological characters was performed including the 13 previously recognized species of the scale mite genus *Hirstiella*, 2 new species, 5 species in closely related genera, and 3 more distant out-group species. An analysis based on 148 informative characters resulted in one most parsimonious tree (L = 400, CI = 0.57 and RI = 0.79). According to this, the genus *Hirstiella* in its current concept is a polyphyletic taxon whose member species belong to three different clades. The first lineage (Bremer support and jackknife values 2 and 78%) includes the type species *H. trombidiformis* and seven additional species of *Hirstiella* that are parasites on iguanian lizards. The genus *Geckobiella* is included in this lineage, and the latter taxon name has priority over *Hirstiella*; therefore, the genus *Hirstiella* is considered a synonym of *Geckobiella* and no longer valid. For the second lineage (Bremer support and jackknife values of 2 and 73%) we propose the name *Bertrandiella* **gen. nov.**; it includes *H. tenuipes*, *H. otophila*, *H. jimenezi* and *Bertrandiella chamelaensis* **sp. nov.** The third lineage, and sister taxon of *Bertrandiella*, is a clade comprising *Pimeliaphilus* and the species *H. sharifi* and *H. insignis*. The latter taxa are transferred back to *Pimeliaphilus* (Bremer support and jackknife values >4 and 100%). Updated diagnoses are provided for the genera *Geckobiella* *sensu nov.* (including a new species *Geckobiella donnae* **sp. nov.**) and *Bertrandiella* **gen. nov.**, and for all their species, as well as for the genera *Pimeliaphilus* *sensu nov.* and *Tequisistlana*, based on the results of the phylogenetic analyses. The analyses support the hypothesis that lizards are the ancestral hosts for Pterygosomatidae; associations with arthropods (in *Pimeliaphilus*) appear to be secondary, the result of host switching from lizards.

Key words: *Bertrandiella* **gen. nov.**, *Pimeliaphilus*, *Bertrandiella chamelaensis* **sp. nov.**, *Geckobiella donnae* **sp. nov.**, phylogeny, serial homology

Introduction

The family Pterygosomatidae includes 10 genera with approximately 156 described species, most of them (eight genera) are external parasites of lizards, but the species of one genus, *Pimeliaphilus* Trägårdh, 1905 are found on arthropods and another monotypic genus *Bharatoliaphilus* Prasad, 1975 was found on a dove.

Within Pterygosomatidae the genera *Geckobiella* Hirst 1917, *Hirstiella* Berlese 1920 and *Pimeliaphilus*, have been considered less specialized and more “primitive or plesiomorphic, based on their general shape (body longer than wide and with long legs) (Cruz 1984; Bertrand 2002).

The genus *Geckobiella* currently includes two species of mite parasites of iguanian lizards, *G. texana* (Banks, 1904) on Phrynosomatidae in Central and North America and *G. harrisi* Davidson, 1958 on Tropicuridae in South America. This genus was diagnosed by Hirst (1917; 1926), Lawrence (1953), Lane (1954) and Davidson (1958), but of all the characters enumerated, the only valid autapomorphy is the presence of a specific type of idiosomal hypertrichy on the dorsum (different from that seen in *Geckobia* and *Pterygosoma*). Apart from these taxonomic studies, the biology of *Geckobiella* was studied by Goodwing (1954) and additional distributional records for *G. texana* were presented by Jack (1959), Hoffmann (1969) and Paredes-León *et al.* (2008).

The genus *Hirstiella* includes species of mite parasites of iguanian and gekkotan lizards. Thirteen species have been assigned to this genus, which was proposed originally for *Geckobiella (Hirstiella) trombidiformis* Berlese from Mexico off an unknown host. Later, Cunliffe (1949a; 1952) described three more species and carried out the first revision of *Hirstiella* and *Pimeliaphilus*, transferring two species to the former genus (*Pimeliaphilus insignis* (Berlese) and *P. tenuipes* (Hirst)). Jack (1961) made the second examination of both genera, described another species, and transferred *Pimeliaphilus sharifi* Abdussalam to *Hirstiella*. Subsequent studies of *Hirstiella* include the description of new species by Newell and Ryckman (1964), Hunter and Loomis (1966), Baker (1998) and Paredes-León and Morales-Malacara (2009). Cruz (1984) described the genus *Cyclurobia* with a single species, *C. javieri* Cruz, an ectoparasite of Cuban iguanas. This genus has been synonymized with *Hirstiella* by Bochkov (2008).

The genus *Pimeliaphilus* was proposed for *P. podapolipophagus* Trägårdh a mite associated with tenebrionid beetles. *Geckobia insignis* Berlese was also included in this genus. *Pimeliaphilus* has been assigned to the family Raphignathidae by Trägårdh (1905), Vitzthum (1942) and Jack (1961; 1964), and to the Pterygosomatidae by Hirst (1917; 1926) and Cunliffe (1952). Further, Vitzthum (1942) proposed the genus *Pimeliaphiloides* Vitzthum for two species of *Pimeliaphilus* parasitic on lizards (*i.e.*, *P. insignis* (Berlese) as type species and *P. tenuipes* Hirst) but Cunliffe (1952) synonymized *Pimeliaphiloides* with *Hirstiella*. Despite these issues, the genus *Pimeliaphilus* has