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A reanalysis of the morphological phylogeny of the spider genus *Physocyclus* Simon (Araneae: Pholcidae) with the description of a new species and description of the female of *Physocyclus paredesi* Valdez-Mondragón from Mexico

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Abstract

A new species of spider from Michoacán, *Physocyclus peribanensis* **sp. nov.** is described. This description is based on a male holotype and one female paratype. Also, the first description of the female of *Physocyclus paredesi* Valdez-Mondragón from Oaxaca, Mexico is provided, as well as the redescription of the male. This paper provides a cladistic reanalysis of the spider genus *Physocyclus* Simon, corroborating the monophyly of the genus with morphological data. The phylogenetic reanalysis was done with 54 morphological characters (44 binary and 10 multistate) using equal and implied weighting approach. The equal weighting analysis found two most parsimonious trees, whereas the analysis with implied weighting found just one most parsimonious trees with the concavity values ($K=5-10$). The genus *Physocyclus* is composed by two clades or species groups: the *globosus* and the *dugesi* groups. *Physocyclus peribanensis* **sp. nov.** belongs to the *dugesi* group composed of 21 species, and *P. paredesi* to the *globosus* group composed of 11 species. With the new species described here, the number of known species of the genus *Physocyclus* increases to 32 species. The *globosus* group has a biogeographical distribution pattern in the Mesoamerican and Mexican Mountain biotic components, whereas the *dugesi* group has a biogeographical distribution in the Mesoamerican and Continental Nearctic biotic components.

Key words: Cladistic analysis, morphology, taxonomy, Michoacán, Oaxaca

Resumen

Una nueva especie de Michoacán, *Physocyclus peribanensis* **sp. nov.** es descrita. La descripción está basada en el macho holotipo y una hembra paratipo. Además, se presenta la primera descripción de la hembra de *Physocyclus paredesi* Valdez-Mondragón de Oaxaca, México, así como la redescipción del macho. Este trabajo presenta un reanálisis cladístico del género de arañas *Physocyclus* Simon, corroborando la monofilia del género con datos morfológicos. El reanálisis filogenético se realizó con 54 caracteres morfológicos (44 binarios y 10 multiestado) utilizando el enfoque de pesos iguales y pesaje implícito. El análisis con pesos iguales encontró dos árboles más parsimoniosos, mientras que el análisis con pesaje implícito encontró solo un árbol más parsimonioso con los valores de concavidad ($K=5-10$). El género *Physocyclus* está compuesto por dos clados o grupos de especies: los grupos *globosus* y *dugesi*. *Physocyclus peribanensis* **sp. nov.** pertenece al grupo *dugesi* compuesto por 21 especies, y *P. paredesi* al grupo *globosus* compuesto por 11 especies. Con la nueva especie descrita aquí, el número de especies conocidas del género *Physocyclus* aumenta a 32 especies. El grupo *globosus* tiene una distribución biogeográfica en los componentes bióticos Mesoamericano y Mexicano de Montaña, mientras que el grupo *dugesi* tiene una distribución biogeográfica en los componentes bióticos Mesoamericano y Neártico Continental.

Introduction

The spider family Pholcidae Koch is the seventh largest family world wide and is the most diverse among the Haplogynae spiders (Platnick, 2014). Currently, Pholcidae includes 79 genera and 1406 species (Huber, 2013) and

wide embolic sclerites on retrolateral part of the palp bulb (char. 44:2) (Fig. 35). Subsequently, there is a transformation in *P. pedregosus*, which has small, wide and curved embolic sclerites (char. 44:5) (Valdez-Mondragón, 2010; fig. 93), which is an autapomorphy for the species (Fig. 35). The sister-group relationship between *P. hoogstraali* and *P. pedregosus*, which has a high Jackknife value (76%) (Fig. 35), is supported by two synapomorphies, the median protuberances in lateral part of the epigynum (char. 14:1) (Valdez-Mondragón, 2010; figs 60, 95) and by the embolus triangular-shaped dorsally and rounded-shaped ventrally (char. 39:5) (Valdez-Mondragón, 2010; figs 58, 93). Also, homoplastic character 51 supports this clade, as was discussed above.

The clade ((*P. reddelli* (*P. mysticus* + *P. marialuisae*)) is supported by the position of the sclerotized cones on male chelicerae, which is a derived character state: the sclerotized cones on prolateral part and toward prolateral part of lateral apophysis leaving an area with half-moon shape without cones between them (char. 24:3) (Fig. 35), with a posterior transformation and convergence between *P. marialuisae* and *P. franckei* as was explained above (Fig. 35).

Finally, although Jiménez & Palacios-Cardel (2013) did not assign *P. palmarus* to any species groups because the groups had not been proposed yet, the present phylogenetic reanalysis indicates that this species belongs to the *dugesi* species group.

Biogeography. Valdez-Mondragón (2013) mentioned that the *globosus* group has a distribution primarily in the Mesoamerican and Mexican Mountain biotic components, whereas the *dugesi* group is distributed the Mesoamerican and Continental Nearctic components (Valdez-Mondragón, 2013; figs 22, 23). Both biotic patterns are based on the biogeographical scheme of Mexico proposed by Morrone (2004, 2005, 2014). This biological pattern is the result of an extremely complex biogeography in Mexico, result of the transition between Nearctic and Neotropical biogeographical elements, known as the Mexican Transition zone (Morrone, 2014). *Physocyclus peribanensis* sp. nov., has a natural distribution in the Mexican Mountain biotic component, whereas *Physocyclus paredesi* Valdez-Mondragón in the Mesoamerican biotic component.

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