



A new solifugae species of *Mummucina* Roewer, 1934 (Solifugae, Mummuciidae) from the Northwest of Argentina

GONZÁLEZ REYES¹, ANDREA XIMENA & JOSÉ ANTONIO CORRONCA²

¹UNSa-IEBI, Cátedra de Invertebrados I, Facultad de Cs Naturales, Universidad Nacional de Salta, Av. Bolivia 5150, CP 4400-Salta, Argentina. E-mail: axgonzalezr@yahoo.com.ar

²CONICET-UNSa-IEBI, Cátedra de Artrópodos, Fac. de Cs. Naturales, Universidad Nacional de Salta, Av. Bolivia 5150, CP 4400-Salta, Argentina. E-mail: jcorronca@gmail.com

Abstract

A new species of Mummuciidae, *Mummucina puna* sp. nov. (male and female) from Northwest Puna eco-region of Salta province, Argentina, is described and illustrated. A key and distribution map of known species of the genus *Mummucina* are provided.

Key words: Sun spiders, new species, dry desert, Puna eco-region

Introduction

The solifugid family Mummuciidae Roewer, 1934 comprises 19 species known to the Americas, belonging to eight genera: *Cordobulgida* Mello-Leitão, 1938; *Gaucha* Mello-Leitão, 1924; Mello-Leitão, 1937; *Metacleobis* Roewer, 1934; *Mummucia* Simon, 1879; *Mummucina* Roewer, 1934; *Mummucipes* Roewer, 1934 and *Uspallata* Mello-Leitão, 1938. *Mummucina* is a genus distributed in the west of South America and comprises five species: *M. colinalis* Kraus, 1966 (male and female), and *M. romero* Kraus, 1966 (female) from Chile; *M. exlineae* Mello-Leitão, 1943 (female), and *M. masculina* Lawrence, 1954 (male) from Peru, and *M. titschacki* Roewer, 1934 (female) from Ecuador. This genus is characterized by the absence of dorso-apical spine-like setae on tibiae of legs II and III and by the presence of nine (1. 2. 2. 4) latero-ventral spine-like setae on tarsi of legs II and III, 12 (2.2. 2-2. 4) latero-ventral spine-like setae on tarsi of leg IV, and three anterior teeth on the cheliceral fixed finger (Roewer 1934; Muma 1971).

The species of *Mummucina* are distinguished by colouration and markings, cheliceral dentition and body size (Muma 1971). This genus has not been recorded in Argentina, but the material collected from arthropods in the Prepuna-Puna of northwestern Argentina allowed us to record several solifugids species of Mummuciidae and Ammotrechidae, and a new species of *Mummucina*. This new species was collected from the Central Andean Dry Puna eco-region, Salta province, Argentina. This eco-region is a cold desert situated between 3000 and 4000 m a.s.l., limited by the Andes mountain range to the east and west. This area is characterized by high levels of endemism and is currently undergoing a degradation process due to erosion, overexploitation of ligneous and cactaceous species, and mining activity (Bertonatti & Corcuera 2000).

In this paper we describe and illustrate *Mummucina puna* sp. nov. (male and female), and provide the first record of the genus *Mummucina* in Argentina. We provide a species key for the genus and a map of its distribution using known distributional records.

Material and methods

Study area and sampling: The new species was collected from three sampling sites in the Argentine Puna eco-

region (PU) from Salta province (Argentina): PU1 (Route 51, 4 km northwest of Las Cuevas: 24°21'25''S 66°04'36''W, 3600 m a.s.l.); PU2 (Cuesta de Muñano: 24°19'38''S 66°06'39''W, 3898 m a.s.l.); and PU3 (Route 51, 10 km north of Muñano: 24°18'05''S 66°08'14''W, 3980 m a.s.l.) (Fig. 1). The climate in the area is cold and dry, with low rainfall during summer, decreasing from northeast to southwest (100-200 mm annually), and with minimum temperatures in winter reaching -15°C. Due to the extreme dryness of the environment, there is a great daily thermal amplitude, with variations of more than 25°C in summer (Reboratti 2006). The vegetation is typical of a steppe, consisting mainly of low bushes of *Paraestrepia* sp., *Adesmia horrida*, and *Azorella compacta* in the sampling sites PU2 and PU3. Grasses appear occasionally in 'vegas' (PU1 site), local depressions where spring water accumulates, creating a different micro-environment.

The specimens of *M. puna* were collected from spring 2005 to summer 2006 using pitfall traps of 7.5x12.2x5.2 cm (upper diameter x depth x lower diameter) containing saline solution (1:8 salt (kg)-water (l), plus detergent drops); traps were active during seven days in each season. The specimens collected were deposited in the Museo de Ciencias Naturales (Collection IEBI-FCN) of the Universidad Nacional de Salta (Argentina) (MCN-U.N.Sa). The terminology used to describe the species follows Maury (1970). Somatic and genitalic characters of the male and the female were photographed with scanning electronic microscope (SEM) at LASEM (Laboratorio de Microscopía Electrónica de Barrido, ANPCyT/UNSa/CONICET, Salta, Argentina). Measurements are expressed in millimetres.

***Mummucina* Roewer, 1934**

Mummucina Roewer, 1934:589; Muma, 1971:10, Muma, 1976:24.
 Type species. *M. titschacki* Roewer, 1934 (from original designation).

Key of the known species of *Mummucina*

Note. We did not include *Mummucina exlineae* Mello-Leitão, 1943 in the key, because according to the original description, the fixed finger of the chelicerae has two equal-sized anterior teeth, one intermediate tooth, and one strongest principal tooth, which does not agree with the diagnosis of the genus proposed by Roewer (1934). Furthermore, the original description of *M. exlineae* did not include any figures and the type specimen, a female, is considered lost or possibly destroyed (Kury and Nogueira 1999). Hence, we consider this species as *Incertae Sedis*. The distribution of the genus and the known species is shown in Fig. 2.

1. Females 2
- Males 5
2. Movable finger of the chelicerae with two intermediate teeth *M. titschacki* Roewer
- Movable finger of the chelicerae with only one intermediate tooth 3
3. Anterior, intermediate, and principal teeth of the cheliceral fixed finger equal in size. *M. colinalis* Kraus
- Teeth of the cheliceral fixed finger not equal in size. 4
4. Three fondal ectal teeth on the fixed finger of the chelicerae; chelicerae and propeltidium colouration without markings *M. romero* Kraus
- More than three fondal ectal teeth, usually five, on the fixed finger of the chelicerae; chelicerae and propeltidium white-greyish with dark markings *M. puna* sp. nov.
5. Oval flagellum, narrowed in basal portion, with an anterior end wider than the basal portion *M. masculina* Lawrence
- Vesicular flagellum, with the wide portion in basal position and narrow anterior end 6
6. Cheliceral fixed finger with anterior teeth subequal in size, first two anterior teeth very small and equal in size; anterior end of the flagellum reaching the middle portion of the first anterior tooth *M. colinalis* Kraus
- Second anterior tooth normal, not so small, first and third anterior teeth equal in size and greater than the second; anterior end of the flagellum reaching beyond the first anterior tooth *M. puna* sp. nov.

***Mummucina puna* sp. nov.**

(Figs. 3–12)

Type. Male holotype, four male paratypes (19/VII/2006), and four female paratypes (24/II/2006) from Cuesta de

Muñano (24°19'38"S 66°06'39"W, 3898 m a.s.l.), Salta province (Argentina), Cols. González Reyes A.X & J. A. Corronca, deposited in MCN-UNSa.

Etymology. The specific name is a noun in apposition taken from the Puna eco-region.

Diagnosis. Females of *Mummucina puna* **sp. nov.** resemble those of *M. romero* in the presence of one subequal tooth on the cheliceral fixed finger (Fig. 10), but differ from these in the presence of dark markings on the chelicerae and propeltidium (Fig. 3), and in the greater number of fondal ectal teeth on the fixed finger of the chelicerae (Fig. 11). The males of the new species share the general shape of the flagellum with the males of *M. colinalis* (Fig. 5); however, in the new species the flagellum is longer, reaching beyond the first anterior tooth, which is a typical trait (Fig. 4).

Male holotype (colouration in 70% ethanol): Prosoma with the propeltidium white-greyish, with a central diamond pale grey spot and a slender dark grey band on the posterior border of the propeltidium (Fig. 3), as well as on the anterior border on either side of the eyes. Parapeltidium white-greyish; mesopeltidium and metapeltidium with a central dark grey stripe, and a lateral white stripe wider than the central one. Chelicerae of ashy colour with a central-anterior white longitudinal band; basal portion of the chelicerae with two slender subtriangular pale grey spots, leaving a light and narrow band between them (Fig. 3). Palpi brown, gradually darkening from the tibia to the end of tarsi; legs white-yellowish, tarsi darker. Ashy-coloured legs, dotted, with numerous and distinct dark grey marks. All malleoli with dark edges, median malleoli pale brown and distal ones dark brown. Opisthosoma ashy, with a central and longitudinal dark grey band narrowing posteriorly, absent in the last two segments (Fig. 3). Laterally, two slender and longitudinal grey bands accompanying the central one delimit two pale white-greyish areas, with a few small dark dots. Pale grey translucent bifid setae with brown sockets covering the white-greyish area of the tergites of the opisthosoma. Pleurites white on the ventral portion, and dorsal portion light grey. Sternites of the opisthosoma ashy, with white-greyish lateral edges. Anal segment almost completely pale white-grey.

Measurements. Total body length, 7.0. Chelicerae, 1.3 long, 0.6 wide. Propeltidium, 1.1 long, 1.3 wide. Opisthosoma, 4.4 long, 1.8 wide. Length of pedipalpi, 4.7. Total length of legs (I–IV): 3.4, 2.5, 4.0, 6.3.

Morphology and chaetotaxy: Propeltidium with some scattered bifid setae, and separated from lateral lobes by dorsal grooves. Ocular tubercle prominent with one transverse row of anteriorly oriented bifid setae. Distance between eyes about 1.5 times the eye diameter. Pro-, meso- and metapeltidium with scattered bifid setae of different sizes. Meso and metapeltidium trapezoidal, with bifid setae on posterior margin. The first two post-spiracular opisthosomal sternites with 30 to 60 golden ctenidia, arranged in two rows, those of the first sternite lighter at their bases.

Chelicerae with stridulatory apparatus on mesal face with 6 ridges (Fig. 4). Movable finger with three teeth (Fig. 4): one anterior, one intermediate, and one principal. Fixed finger with five teeth: three anterior, one intermediate and one principal. The second anterior tooth always the smallest, first and third teeth equal (Fig. 4). Five ectal fondal teeth, I and IV bigger and the remaining ones sub-equal in size. Three mesal fondal teeth, the proximal smallest, and other two sub-equal and separated by a diastema (Fig. 4). Chelicerae teeth hidden behind feathery setae (Fig. 5).

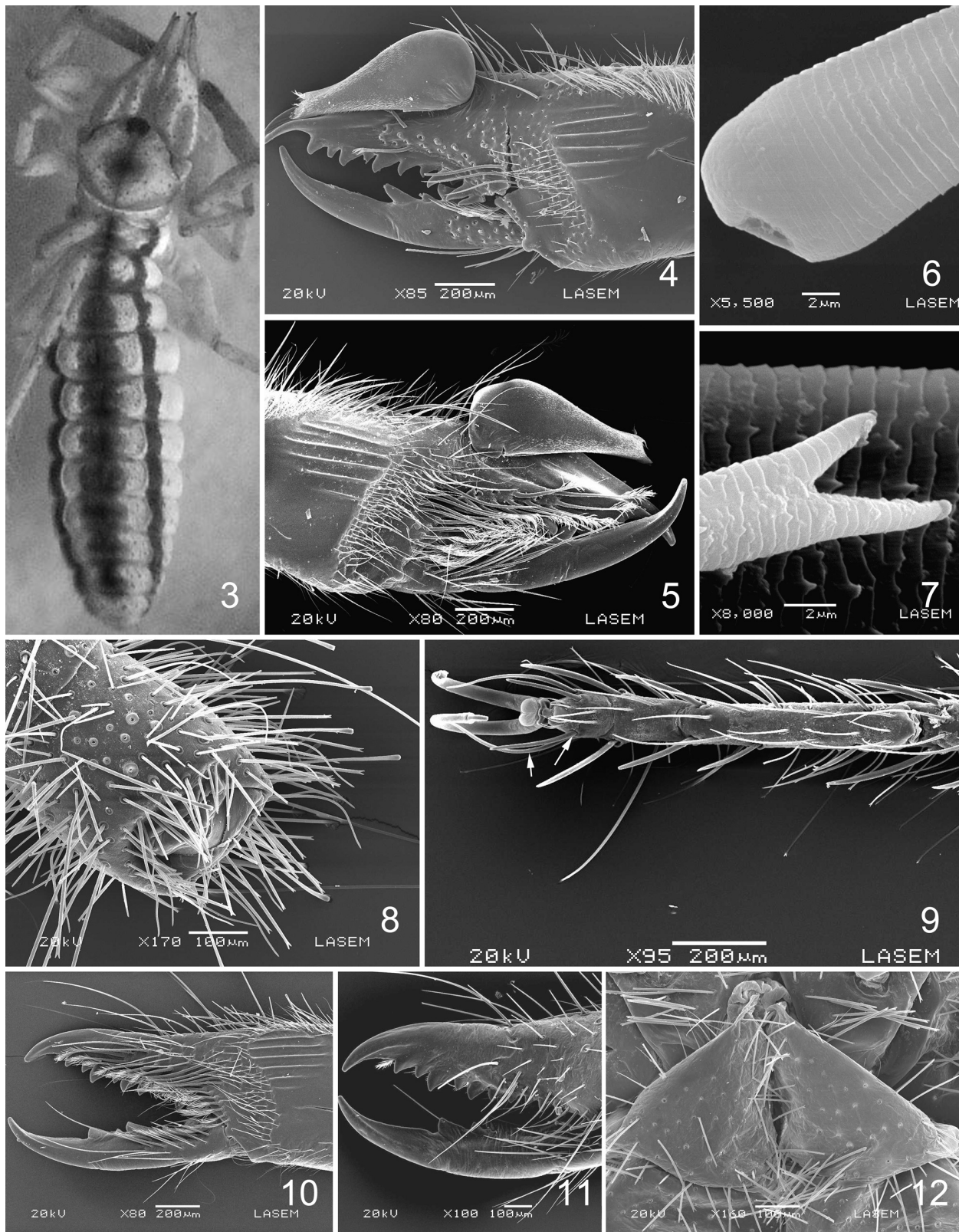
Flagellum, 0.63 long and 0.27 wide, as a translucent and immobile membrane, laterally flattened as in other mummuciids; vesicular in shape, upper surface with more convex border in basal position (Fig. 5). End of the flagellum reaching the middle portion of cheliceral mucron of the fixed finger, with the anterior portion narrowing toward the frontal portion, terminating in a small bezel-shaped ectal opening (Fig. 4). Upper edge of the vesicle covered by a dense short pilosity (Fig. 5), the lower edge covered by longer ones, with long hairs around the ectal opening of the flagellum.

Palpi without spines but with a dense covering of different types of setae (Fig. 8): bifurcated (Fig. 7), blunt and clubbed setae (Fig. 6).

Legs covered with several bifid and blunt setae of different sizes. Leg I: thin, without claws and spines. Legs II and III: with tarsi with nine ventral spines (1.2.2.4), metatarsi usually with three ventral spines (0.1.2), sometimes with a weakly sclerotized basal spine resulting in 1.1.2 ventral spinal formula; presence of two retrolateral spines (1.1.0) and one dorsal spine (0.0.1), often on the same plane and difficult to recognize. Tibiae II and III with two ventral, paired and distal spines (0.0.2). Legs IV: tibiae with two ventral, paired and distal spines (0.0.2); tarsi with 12 ventral spines (2.2.2/2.4), the four distal spines with the inner medial pair thicker and shorter than the outer (Fig. 9); and metatarsi with four ventral spines (1.1.2 or 0.1.3).



FIGURES 1–2. Fig. 1. Collection localities of the *Mummucina puna* sp. nov., Fig. 2. Distribution of the known species of the genus *Mummucina*.



FIGURES 3–12. *Mummucina puna* n. sp., Fig. 3–9. Male. Fig. 3. Habitus of male holotype, dorsal view; Fig. 4. Right chelicera, mesal view showing dentation of the movable and fixed fingers, flagellum and stridulatory apparatus; Fig. 5. Left chelicerae, view showing flagellum and feathery setae; Fig. 6. Detail of clubbed setae of the palpi showing terminal pore. Fig. 7. Detail of the bifurcated setae of the palpi. Fig. 8. Palpi without spines but with a dense covering of different types of setae (bifurcated, blunt and clubbed). Fig. 9. Leg IV showing paired and distal spines, with the inner pair thicker and shorter than the outer. Fig 10–12. Female. Fig. 10. Chelicera showing dentation, chaetotaxy, and stridulatory apparatus. Fig. 11. Chelicera, ectal view, showing dentation on movable and fixed fingers. Fig. 12. Genital operculum, ventral view.

Female paratypes (Colouration in 70% ethanol): same as the male but paler. Other morphological characters as in male, except for the following feature: chelicerae (Fig.11) with stridulatory apparatus on mesal view with seven ridges (Fig. 10).

Measurements (largest female paratype). Total body length, 15.4. Chelicerae, 3.3 long, 1.1 wide. Propeltidium, 2.1 long, 2.6 wide. Opisthosoma, 9.5 long, 3.4 wide. Length of pedipalpi, 6.7. Total length of legs (I–IV): 5.3, 3.9, 5.5, 10.2. Genital operculum triangular (0.23 long, 0.77 wide) with straight side edges, the posterior edge slightly curved (Fig. 12).

Remarks. While 65% of the specimens (14 males and three females) had five ectal fondal teeth, two males showed supernumerary teeth (6 and 7), and six specimens (two males, three females and one immature) had four teeth. In the new species here described we found clubbed setae with terminal pores on the pedipalpi (Fig. 6), similar to those observed by Cushing and Casto (2012) for different types of setae recorded in Daesiidae and Ceromidae solifugids. This type of setae might function as chemoreceptors.

Other examined material. ARGENTINA: Salta province: Route 51, 4 km northwest of Las Cuevas (24°21'25"S 66°04'36"W, 3600 m a.s.l.): 7 males, 19/VIII/2006; male, 15/V/2006, Cols. González Reyes A.X. & J. A. Corronca, IEBI-MCN (UNSa). Cuesta de Muñano (24°19'38"S 66°06'39"W, 3898 m a.s.l.): female and immature, 22/XI/2005; male, 15/V/2006; male, 24/II/2006, Cols. González Reyes A.X. & J. A. Corronca, IEBI-MCN (UNSa). Route 51 at 10 km north of Muñano (24°18'05"S 66°08'14"W, 3980 m a.s.l.): 3 males, 19/VIII/2006; female, 24/II/2006, Cols. González Reyes A.X. & J. A. Corronca, IEBI-MCN (UNSa).

Acknowledgements

We thank CIUNSa (Consejo de Investigaciones de la Universidad Nacional de Salta), for financial support during the collecting projects conducted by the IEBI (Instituto para el Estudio de la Biodiversidad de Invertebrados) in different eco-regions of Salta province during 2005–2007. We also thank LASEM (Laboratorio de Microscopía Electrónica de Barrido, ANPCyT/UNSa/CONICET, Salta, Argentina), especially Pedro Villagrán and Silvia Blanco, for their support in the preparation of the material and the SEM photographs. JAC thanks CONICET (Consejo Nacional de Investigaciones Científicas y Técnicas) for constant support. J. Brasca and L. Lindgrin assisted with the English version of the manuscript.

References

- Bertonatti, C. & Corcuera, J. (2000) *Situación Ambiental Argentina 2000*. Fundación Vida Silvestre, Buenos Aires, Argentina, 577 pp.
- Cushing, P. & Casto, P. (2012) Preliminary survey of the setal and sensory structures on the pedipalps of camel spiders (Arachnida: Solifugae). *The Journal of Arachnology*, 40, 123–127.
<http://dx.doi.org/10.1636/b11-71.1>
- Kraus, O. (1966) Solifugen aus Chile (Arach.). *Senckenbergiana Biologica*, 47 (3), 181–184.
- Kury, A. & Nogueira, A. (1999) Annotated check list of type specimens of Arachnida in the Museu Nacional Rio de Janeiro i. Scorpiones, Pseudoscorpiones and Solifugae. *Publicações Avulsas do Museu Nacional Rio de Janeiro*, 77, 1–19.
- Lawrence, R.F. (1954) Some Solifugae in the collection of the British Museum (Natural History). *Proceedings of the Zoological Society of London*, 124 (1), 111–124.
<http://dx.doi.org/10.1111/j.1096-3642.1954.tb01483.x>
- Maury, E.A. (1970) Sobre la presencia de *Gaucha fasciata* Mello-Leitão, 1924 en la Argentina. *Physis*, 79, 357–362.
- Mello-Leitão, C. de. (1924) A new South American Solpugid. *Revista Chilena de Historia Natural Pura y Aplicada*, 28, 140–143.
- Mello-Leitão, C. de. (1937) Notes sur quelques solifuges de l'Amérique du Sud. *Annaes da Academia Brasileira de Ciencias*, 9, 83–86.
- Mello-Leitão, C. de. (1938) Solífugos de Argentina. *Anales del Museo Argentino de Ciencias Naturales "Bernardino Rivadavia"*, 40, 1–30.
- Mello-Leitão, C. de. (1943) Arácnidos recogidos en el Ecuador y el Perú por la señora H. E. Frizell Don. *Comunicaciones Zoológicas del Museo de Historia Natural de Montevideo*, 1 (5), 1–8.
- Muma, M.H. (1971) The Solpugids (Arachnida: Solpugida) of Chile with descriptions of a new family, new genera, and new species. *American Museum Novitates*, 2476, 1–23.

- Muma, M.H. (1976) A review of solpugid families with an annotated list of Western Hemisphere solpugids. *Publications of the Office of Research Western New Mexico University*, 2 (1), 1–33.
- Reboratti, C. (2006) Situación ambiental en las ecorregiones Puna y Altos Andes. In: Brown, A.D., Martínez Ortíz, U., Acerbi, M. & Corcuera, J. (Eds.), *La Situación Ambiental Argentina 2005*. Fundación Vida Silvestre Argentina, Buenos Aires, Argentina, pp. 28–31.
- Roewer, C.F. (1934) Solifugae, Palpigradi. In: Bronn, H.G. (Ed.), *Klassen und Ordnungen des Tierreichs. 5: Arthropoda. IV: Arachnoidea. Vol. 5 (IV) (4) (4–5)*. Akademische Verlagsgesellschaft M.B.H., Leipzig, pp. 481–723.
- Simon, E. (1879) Essai d'une classification des Galéodes, remarques synonymiques et description d'espèces nouvelles ou mal connues. *Annales de la Société Entomologique de France*, 5 (9), 93–154.