

SPIDERS COLLECTED IN RESIDENCES FROM MUNICIPALITIES OF BARBALHA, CRATO AND JUAZEIRO DO NORTE, STATE OF CEARÁ, BRAZIL

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ABSTRACT

The present work reports the fauna of spiders collected in residences of the municipalities of Barbalha, Crato and Juazeiro do Norte, in the state of Ceará, Brazil. Ten random neighborhoods were selected in each municipality, including central and border neighborhoods. In each neighborhood, 10 houses were randomly selected, totalizing 30 neighborhoods and 300 houses surveyed. Manual collections were carried out in the interior and exterior of the residences, without replication during the months. Pholcidae was the richest family (3 species). *Smeringopus pallidus* (Blackwall, 1858) was the unique species that occurred in all municipalities sampled. Species like *Sicarius cariri* Magalhaes, Brescovit & Santos, 2013 and *Leprolochus oeiras* Lise, 1994 were found inside residences by the first time.

Key words: Araneae, Arthropods, Buildings, Araripe Plateau.

RESUMEN

Arañas recolectadas en residencias de los municipios de Barbalha, Crato y Juazeiro do Norte, CE, Brasil. El presente trabajo reporta la fauna de arañas recogidas en residencias de los municipios de Barbalha, Crato y Juazeiro do Norte. Se seleccionaron 10 barrios aleatorios en cada municipio, contemplando barrios centrales y limítrofes. En cada barrio, 10 casas fueron seleccionadas aleatoriamente, totalizando 30 barrios y 300 casas visitadas. Se realizaron colectas manuales en el interior y exterior de las residencias, sin replicación a lo largo de los meses. Pholcidae presentó mayor riqueza de especies (S = 3). *Smeringopus pallidus* (Blackwall, 1858) fue la única especie que ocurrió en los tres municipios muestreados. Especies como *Sicarius cariri* Magalhaes, Brescovit & Santos, 2013 y *Leprolochus oeiras* Lise, 1994 fueron encontradas por primera vez en el interior de las residencias.

Palabras Clave: Araneae, Artrópodos, edificios, Chapada del Araripe.

INTRODUCTION

Urban environments are characterized by intensive human activity (McIntyre, 2000) and this is one of the most problems for biodiversity conservation (McKinney, 2002). Environmental changes caused by urbanization affect organisms in different ways (Lutinski *et al.*, 2013). Therefore is critical to understand if different taxa and how it will respond to alterations in landscape structure (Shochat *et al.*, 2004; Magura *et al.*, 2008).

Spiders are abundant and dominant components of the arthropod predatory guild in most communities (Wise, 1993), and in some cases, they are influenced positively by urbanization and habitat fragmentation. Miyashita *et al.* (1998) observed a positive relation between forest fragment sizes and spiders species density and Magura *et al.* (2010) also collected more species in urban areas when associated to urbanization gradient.

As a result of urbanization process, many insects and arachnids live with human been inside their residences (Mourier *et al.*, 1979; McIntyre, 2000; Durán-Barrón *et al.*, 2009). One of the reasons why spiders inhabit human residences is the absence of predators and the presence of food resource, like insects (Jímenez, 1998). But how urbanization process affects spiders communities is poorly known (Shochat *et al.*, 2004).

Spiders from urban residences were studied along the Americas: in Canada (Williams, 1999); Cuba (Armas, 2003); Mexico (Jiménez, 1998; Cupul-Magaña & Navarrete-Heredia, 2008; Durán Barrón *et al.*, 2009) and USA (Cutler, 1973; Kaston, 1983; Guarisco, 1999). For Brazil, Brazil *et al.* (2005) reports the occurrence of 13 synantropic species from residences; Fischer & Vasconcellos-Neto (2005) analyzed microhabitats indoor and outdoor residences occupied by *Loxosceles intermedia* Mello-Leitão, 1934 and *Loxosceles laeta* (Nicolet, 1849) (Araneae: Sicariidae) in Curitiba, state of Paraná, Brazil. Fischer *et al.* (2011) studied the spider fauna associated to Sicariidae inside residences. Brescovit *et al.* (2011) compiled a species list of 875 species reported for state of São Paulo and highlight the occurrence of 70 synantropic species.

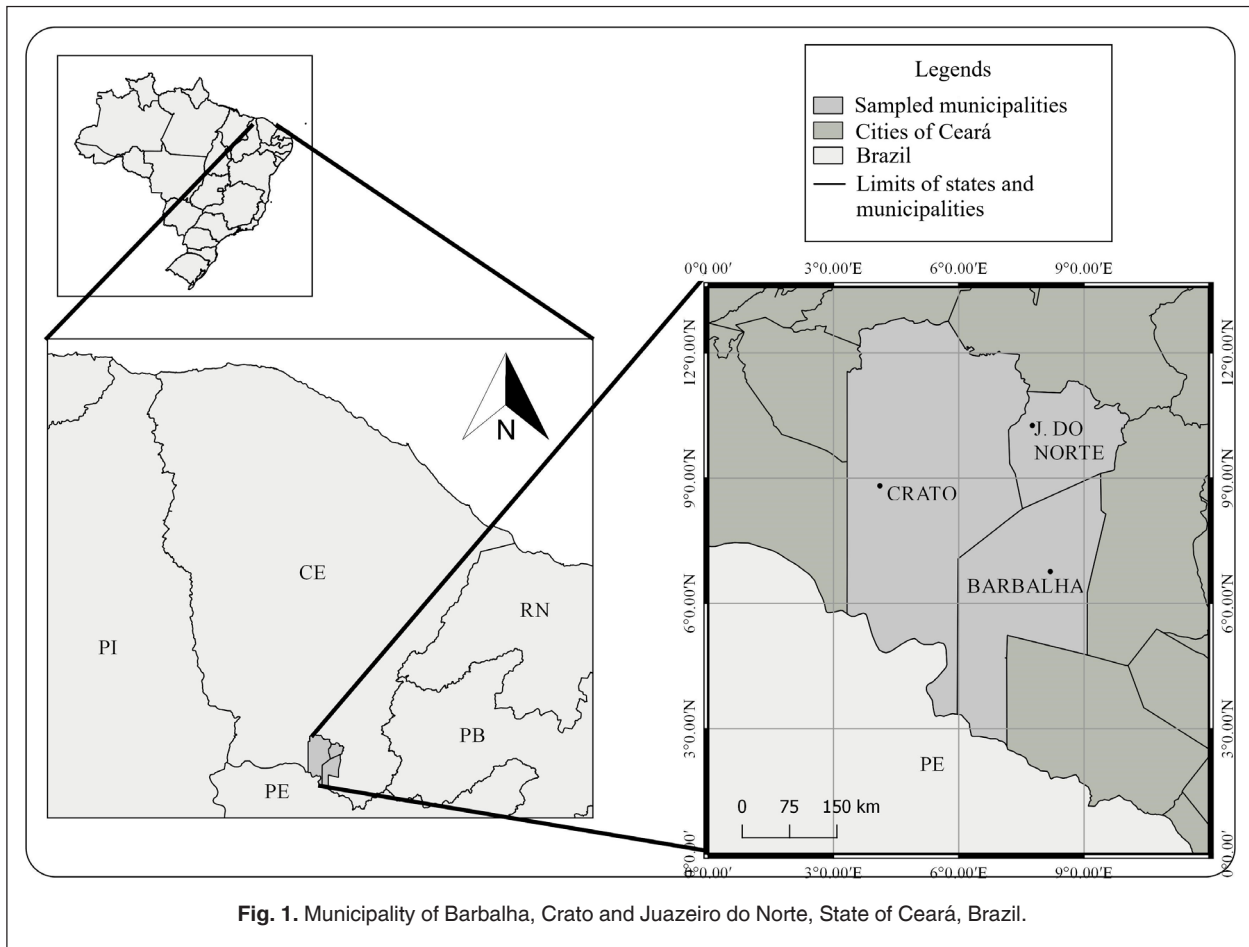


Fig. 1. Municipality of Barbalha, Crato and Juazeiro do Norte, State of Ceará, Brazil.

The cities of Barbalha, Crato and Juazeiro do Norte are the most populous municipalities of the Araripe Plateau, South of State of Ceará (Ipece, 2007), Northeast, Brazil. Some authors have described some species from these municipalities, e.g. *Soesilarishius cearensis* Ruiz, 2013 (Salticidae) (Ruiz, 2013) and *Micropholcus crato* Huber, Carvalho & Benjamin, 2014 (Pholcidae), (Huber *et al.*, 2014). More recently, a general arachnid species list from Araripe Plateau was registered by Azevedo *et al.* (2016) composed by 68 species, which 53 species are spiders/morphospecies belonging to 25 families.

The objective of this work is present a species list of spiders found inside residences from municipalities of Barbalha, Crato and Juazeiro do Norte.

MATERIALS AND METHODS

The study was done in municipalities of Barbalha, Crato and Juazeiro do Norte (Fig. 1) from March to December 2017. From each municipality, 10 districts

were selected and 10 houses were randomly chosen in each district, totalizing 30 districts and 300 houses visited.

Manual and diurnal collections were performed inside and outside residences (Brazil *et al.*, 2005; Fischer *et al.*, 2009), during 20 minutes/month and each residence was visited only one time during all sample period. Each residence was examined inside and outside (walls and areas attached to the house, like area, edge windows and under washing sinks).

All material collected was examined at the Laboratório de Entomologia of Universidade Federal do Cariri - UFCA, preserved in 70% ethanol and deposited in the Arachnological Collection of Instituto Butantan São Paulo (IBSP, Curator: A.D. Brescovit).

The specimens were identified using the following keys: Pholcidae (Huber, 2000; 2012; Aharon *et al.*, 2017); Sicariidae (Magalhães *et al.*, 2013); Uloboridae (Grismado, 2008); Zodariidae (Lise, 1994), also by comparison with material housed in the IBSP collection.

Table 1. Species composition found on residences by municipalities Barbalha, Crato and Juazeiro do Norte, from march to december 2017.

Taxon	Municipality	District
PHOLCIDAE		
<i>Artema atlanta</i> Walckenaer, 1837	Crato	Vila Alta
<i>Smeringopus pallidus</i> (Blackwall, 1858)	Barbalha	Bela Vista, Bulandeira
	Crato	Caixa d'água, Granjeiro, Muriti, Pimenta, São Miguel, Seminário, Sossego, Vila Alta
	Juazeiro do Norte	Salesianos
<i>Metagonia</i> sp.	Crato	Caixa d'água, Granjeiro, Lameiro, Pimenta, São Miguel, Seminário, Sossego, Vila Alta
SICARIIDAE		
<i>Sicarius cariri</i> Magalhães, Santos, Brescovit 2013	Crato	Lameiro
<i>Loxosceles amazonica</i> (Gertsch, 1967)	Crato	Barro Branco
ULOBORIDAE		
<i>Zosis geniculata</i> (Olivier, 1789)	Crato	Muriti, Vila Alta
	Juazeiro do Norte	Jardim Gonzaga
ZODARIIDAE		
<i>Leprolochus oeiras</i> Lise 1994	Juazeiro do Norte	Planalto

RESULTS AND DISCUSSION

Seven urban spiders species belonging to three families (Table 1) were collected (Fig. 2). Pholcidae was the richest family. *Smeringopus pallidus* occurred in all municipalities sampled. *Artema atlanta* and *Sicarius cariri* occurred only in the municipality of Crato and *Leprolochus oeiras* occurred only in the municipality of Juazeiro do Norte.

The genus *Smeringopus* has pholcids relatively large, with elongated abdomen and restrict to Africa. *Smeringopus pallidus* is one of the exceptions to genus distribution been considered a Pantropical species (Huber, 2012). *Smeringopus natalensis* Lawrence, 1947 is related as an introduced species in Australia, probably result from misidentification of *S. pallidus* - for more details, see Huber (2001). In Brazil, *S. pallidus* is considered a common and synanthropic species inside residences (Mello-Leitão, 1918; Brazil *et al.*, 2005; Brescovit *et al.*, 2011). Along South America, it's reported to Ecuador continental (Duperré, 2017), Paraguay (Kochalka *et al.*, 1996), to north of Chile (Taucare-Ríos, 2012) and is considered one of the less abundant resident spider species (Taucare-Ríos *et al.*, 2013).

Artema atlanta is an introduced species which records initially refers it's occurrence from United States to Paraguay (Brignoli, 1981). Over time for now, also with reports for Cuba (Gonzalez, 1996), Venezuela (Colmenares-García, 2008) and Argentina (Huber, 2014), for more details, see Aharon *et al.* (2017). This species inhabit dark and sheltered cavities like caves and human buildings, like basements (Huber & Kwapong, 2013; Aharon, 2016). *A. atlanta* was considered very common along the Brazilian Coast (Mello-Leitão, 1918), however, nowadays it's occurrence had decreased along Brazilian Coast, mainly from littoral of state of Rio Grande do Sul to littoral of state of Rio Grande do Norte (Huber, unpublished data). This species has a worldwide distribution, probably due human-aided transport, although it is not clear why this species has spread all over the world (Aharon *et al.*, 2017).

Loxosceles amazonica is a species already reported for residences in state of Ceará, in municipality of Sobral, north of state (Azevedo *et al.*, 2014). *Sicarius cariri* is one of the six-eyed sand spiders from the Brazilian Caatinga (Magalhães *et al.*, 2013) and it's also already reported to Araripe Plateau (Azevedo *et al.*, 2016). Its occurrence inside a residence probably

is occasional and can be attributed to fact of be closeness to a basis of Araripe Plateau, also urbanization process associated to local deforestation (Carvalho & Ribeiro, 2006).

Leprolochus oeiras is also already reported for Araripe Plateau (Azevedo *et al.*, 2016). The genus *Leprolochus* can be found from dry to wet environments (Jocqué, 1988), from Panamá to Argentina (World Spider Catalogue, 2018). Although it be noted that *Leprolochus* species responses to anthropic disturbance (Torres *et al.*, 2016), the presence of *L. oeiras* in a residence probably consist on an occasional recorder, and this unique record does not allow to make assumptions about its occurrence associated with residences.

CONCLUSIONS

Pholcidae are more distributed along the neighbors of municipality of Barbalha, Crato and Juazeiro do Norte, and *Smeringopus pallidus* and *Metagonia* sp. were present in all districts from municipality of Crato.

Sicarius cariri and *Leprolochus oeiras* constitutes species related to local, and more sample process should be conducted aiming get more data about its distribution and colonization on residences.

This research results the first species list from residences from state of Ceará. They also increase the number of species for Araripe Plateau therefore contributing to knowledge of local spider fauna.

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REFERENCES

- Aharon S. 2016. Ecology and Taxonomy of the Family Pholcidae in Israel: Species Richness, Geographic Distributions and Taxonomical Revision of the Genus *Artema* (Pholcidae, Araneae). MSc thesis, Ben-Gurion University of the Negev, Israel. Available from <http://nnhc.huji.ac.il/wp-content/uploads/2017/01/aharonshlomi.pdf> [accessed 17 Sep. 2018].
- Aharon S., Huber B.A. & E.G. Regev. 2017. Daddy-long-leg giants: revision of the spider genus *Artema* Walckenaer, 1837 (Araneae, Pholcidae). *European Journal of Taxonomy*, 376: 1-57.
- Armas, L.F. 2003. Notas sobre los arácnidos de mi casa (Chelicerata, Arachnida). *Revista Ibérica de Aracnología*, 8: 143-149.
- Azevedo R., Texeira P.M.S., Siqueira R.C.L. & A.D. Brescovit. 2014. New record and distribution of *Loxosceles amazonica* Gertsch, 1967 (Araneae: Sicariidae) in the State of Ceará, Brazil. *Check List*, 10(1): 207–208.
- Azevedo R., Moura E.S., Lopes A.S., Carvalho L.S., Dias S.C. & A.D. Brescovit. 2016. Arachnids from Araripe Plateau, Ceará, Brazil. *CheckList*, 12(4): 1920.
- Brazil T.K., Silva L.M.A., Leite C.M.P., Silva R.M.L., Peres, M.C.L. & A.D. Brescovit. 2005. Aranhas sinantrópicas em três bairros da cidade de Salvador, Bahia, Brasil (Arachnida, Araneae). *Biota Neotropica*, 5(1a): 163-169.
- Brescovit A.D., Oliveira U. & A.J. Santos. 2011. Aranhas (Araneae, Arachnida) do Estado de São Paulo, Brasil: diversidade, esforço amostral e estado do conhecimento. *Biota Neotropica*, 11: 1-32.
- Brignoli P.M. 1981. Studies on the Pholcidae, I. Notes on Genera *Artema* and *Physocyclus* (Araneae).



Fig. 2. Species sampled on residences of municipalities Barbalha, Crato e Juazeiro do Norte. 2A: *Zosis geniculata*, credits: Antonio Brescovit. 2B: *Sicarius cariri*, credits: Ivan Magalhães.

- Bulletin of the American Museum of Natural History, 170: 1-11.
- Carvalho S.M & S.C. Ribeiro. 2006. Áreas de risco urbanas na cidade do Crato/Ce – Estudo das suas formas de relevo e declividades. *En: VI Simpósio de Geomorfologia. Geomorfologia Tropical e Subtropical: processos, métodos e técnicas.* Goiania, Goiás, Brasil. pp. 1-9.
- Colmenares-García P.A. 2008. Tres nuevos registros para la araneofauna Venezolana (Arachnida, Araneae, Pholcidae). *Boletín del Centro de Investigaciones Biológicas de la Universidad del Zulia*, 42: 85-92.
- Cupul-Magaña F. & J.L. Navarrete-Heredia. 2008. Artrópodos de las viviendas de Puerto Vallarta, Jalisco, México. *Ecología Aplicada*, 7: 187-190.
- Cutler B. 1973. Synanthropic spiders Araneae of the twin cities area. *Journal of the Minnesota Academy of Science*, 39: 38-39.
- Duperré N. 2017. Arachnids of Ecuador. Available from: <<http://aracnidos.otonga.org/index.html>>. [accessed 17 Jan. 2019].
- Durán-Barrón C.G, Francke O.F. & T.M. Pérez-Ortiz. 2009. Diversidad de arañas (Arachnida: Araneae) asociadas a viviendas de la ciudad de México (Área metropolitana). *Revista Mexicana de Biodiversidad*, 80: 55-69.
- Fischer M.L. & J. Vasconcellos-Neto. 2005. Microhabitats occupied by *Loxosceles intermedia* and *Loxosceles laeta* (Araneae: Sicariidae) in Curitiba, Paraná, Brazil. *Journal of Medical Entomology*, 42: 756-765.
- Fischer M.L., Bazilio S., Dos Santos T.V.B. & C.B. Grosskopf. 2009. Diagnóstico da ocorrência de aranhas do gênero *Loxosceles* Heineken e Lowe, 1832 (Araneae, Sicariidae) no município de União da Vitória, Paraná. *Biotemas*, 22(1): 155-159.
- Fischer M.L., Grosskopf C.B., Bazílio S. & J. Ricetti. 2011. Araneofauna sinantrópica associada com a família Sicariidae no município de União da Vitória Paraná, Brasil. *Sitientibus série Ciências Biológicas*, 11(1): 48-56.
- González, A.P. 1996. Sobre la ausencia del género *Crossopriza* (Araneae: Pholcidae) en Cuba, con una nueva sinonimia para *Artema atlanta* Walckenaer, 1837. *Caribbean Journal of Science*, 32: 431-432.
- Grismado C.J. 2008. Uloboridae. *En: Claps L.E., Debandi G. & S. Roig (Eds.) Biodiversidad de Artrópodos Argentinos* pp. 97-103. Buenos Aires, Sociedad Entomológica Argentina.
- Guarisco, H. 1999. House spiders of Kansas. *Journal of Arachnology*, 27: 217-221.
- Huber B.A. 2000. New World pholcid spiders (Araneae: Pholcidae): A revision at generic level. *Bulletin of the American Museum of Natural History*, 254: 1-348.
- Huber B.A. 2001. The pholcids of Australia (Araneae: Pholcidae): taxonomy, biogeography, and relationships. *Bulletin of the American Museum of Natural History*, 260: 1-144.
- Huber B.A. 2012. Revision and cladistic analysis of the Afrotropical endemic genus *Smeringopus* Simon, 1890 (Araneae: Pholcidae). *Zootaxa*, 3461: 1-138.
- Huber B.A. 2014. Pholcidae. *En: Claps L.E., Debandi G. & S. Roig-Juñent (Eds.) Biodiversidad de Artrópodos Argentinos*, vol. 3. pp. 37-46. Sociedad Entomológica Argentina, Mendoza.
- Huber B.A & P. Kwapong. 2013. West African pholcid spiders: an overview, with descriptions of five new species (Araneae, Pholcidae). *European Journal of Taxonomy*, 59:1-44.
- Huber B.A, Carvalho L.S. & S.P. Benjamin. 2014. On the New World spiders previously misplaced in *Leptopholcus*: molecular and morphological analyses and descriptions of four new species (Araneae: Pholcidae). *Invertebrates Systematics*, 28: 432-450.
- Ipece. 2007. O Ceará em mapas. Available from: <<http://www2.ipece.ce.gov.br/atlas/>>. [accessed 24 Sep. 2018].
- Jimenez M.L. 1998. Aracnofauna asociada a las viviendas de la ciudad de La Paz, B. C. S., México. *Folia Entomologica Mexicana*, 102: 1-10.
- Jocqué R. 1988. An updating of the genus *Leprolochus* (Araneae: Zodariidae). *Studies on Neotropical Fauna and Environment*, 23(2): 77-87.
- Kaston B.J. 1983. Synanthropic spiders. *En: Frankie G.W. & Koehler C.S. (Eds.) Urban entomology: interdisciplinary perspectives*, pp. 221-245. Praeger, Nueva York.
- Kochalka J., Torres D., Garcete B. & C. Aguilera. 1996. Lista de invertebrados de Paraguay pertenecientes a las colecciones de flora y fauna del museo de historia natural del Paraguay. *En: Romero M. (Ed.) Colecciones de flora y fauna del Museo Nacional de Historia Natural del Paraguay*, pp. 69-283. Ministerio de Agricultura y Ganadería, Asunción.
- Lise A.A. 1994. Description of three new species of *Leprolochus* Simon and additional illustrations of *L. spinifrons* Simon and *L. birabeni* Mello-Leitão (Araneae, Zodariidae). *Biociências*, 2: 99-117.
- Lutinski J.A., Lopes B.C. & A.B DeMoraes. 2013. Diversidade de formigas urbanas (Hymenoptera: Formicidae) de dez cidades do sul do Brasil *Biota Neotropica*, 13 (3): 332-342.
- Magalhães I.L.F., Brescovit A.D. & A.J. Santos. 2013. The six-eyed sand spiders of the genus *Sicarius* (Araneae: Haplogynae: Sicariidae) from the Brazilian Caatinga. *Zootaxa*, 3599 (2): 101-135.
- Magura T., Horváth R. & B. Tóthmérész. 2010. Effects

- of urbanization on ground-dwelling spiders in forest patches, in Hungary. *Landscape Ecology*, 25: 621-629.
- Magura T., Tóthmérész B., Hornung E. & R. Horváth. 2008. Urbanisation and ground-dwelling invertebrates. *En: Wagner L.N. (Ed.). Urbanization: 21st century issues and challenges*, pp. 213-225. Nova Science Publishers, Nueva York.
- McIntyre N.E. 2000. Ecology of urban arthropods: a review and call to action. *Annals of the Entomological Society of America*, 93: 825-835.
- McKinney M.L. 2002. Urbanization, biodiversity, and conservation. *BioScience*, 52(10): 883-890.
- Mello-Leitão C.F. 1918. Scytodidas e Pholcidas do Brasil. *Revista do Museu Paulista*, 10: 85-144.
- Miyashita T., Shinkai A. & T. Chida. 1998. The effect of forest fragmentation on web spider communities in urban areas. *Biological Conservation*, 86: 357-364.
- Mourier H., Winding O. & E. Sunsen. 1979. Guía de los animales parásitos de nuestras casas. Omega, Barcelona, 224pp.
- Ruiz G.R.S. 2013. Nine new species of *Soesilarishius* from Brazil (Araneae: Salticidae: Euophryinae). *Zootaxa*, 3664(4): 586-600.
- Shochat E., Stefanov W.L., Whitehouse M.E. & S.H. Faeth. 2004. Urbanization and spider diversity: influences of human modification of habitat structure and productivity. *Ecological Applications*, 1(4): 268-280.
- Taucare-Ríos, A. 2012. Primeros registros de *Smeringopus pallidus* en Chile (Araneae: Pholcidae). *Revista Chilena de Entomología*, 37: 81-85.
- Taucare-Ríos A., Brescovit A.D. & M. Canals. 2013. Synanthropic Spiders (Arachnida: Araneae) from Chile. *Revista Ibérica de Aracnología*, 23: 49-56.
- Torres V.M., González-Reyes A.X., Rodríguez-Artigas S.M. & J.A. Corronca. 2016. Efectos del disturbio antrópico sobre las poblaciones de *Leptolochus birabeni* (Araneae, Zodariidae) en el Chaco Seco del noroeste de Argentina. *Iheringia, Série Zoologia*, 106: e2016009.
- Williams, H. 1999. Spiders in houses. *Newsletter of the British Arachnological Society*, 84: 10-11.
- World Spider Catalog. 2018. Natural History Museum Bern. Available at: <<http://wsc.nmbe.ch>>. Accessed on: 2018-08-07.
- Wise D.H. 1993. Spiders in ecological webs. Cambridge University Press, New York, New York. 344 pp.

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