

# Distribution extension of Solifugids (Arachnida: Solifugae) to Atlantic Forest of Brazil

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**ABSTRACT:** Solifugids have previously been recorded in three Brazilian biomes. The present work extends the records for this order to the Atlantic Forest biome, specifically in restinga (sandy coastal plains) ecosystems. The specimen was identified as *Mummucia* aff. *mauryi* Xavier & Rocha, 2001.

Solifugids (Arachnida: Solifugae) comprise the seventh richest order among the arachnids, and are thus considered a mesodiverse group (Harvey 2002). These animals are distributed throughout the tropics and subtropics, principally in desert or other hot environments (Dunlop and Klann 2009). This group is little-known in South America, with only eight species described for Brazil (see Rocha and Carvalho 2006; Carvalho *et al.* 2010), distributed in the Amazon, Caatinga (dryland), and Cerrado (Brazilian savanna) biomes. There have been no reports of solifugids from other Brazilian biomes (Carvalho *et al.* 2010).

The Atlantic Forest is one of 34 recognized global biodiversity hotspots and is considered one of the top four in terms of conservation priority (Myers *et al.* 2000; Conservation International 2011). It is probably the most devastated and seriously threatened biome on the planet, with 70% of the Brazilian population (including the largest cities and industrial centers) living in the region formerly dominated by this forest (IBGE 2011).

Restinga ecosystems make up part of the Atlantic Forest biome, and they have likewise experienced extreme anthropogenic pressure, which has highly modified their natural landscapes (Ab'Saber 2003; Rocha *et al.* 2004). Located on coastal plains, restingas are characterized as habitats of elevated small-scale spatial heterogeneity (Assis *et al.* 2011; Magnago *et al.* 2011). These areas have sandy soils (Lima *et al.* 2011) with high salinity, and the vegetation cover is highly influenced by edaphic characteristics (Assis *et al.* 2011; Magnago *et al.* 2010). The vegetation cover is open and dominated by shrubs and herbaceous plants presenting xerophytic adaptations (Assis *et al.* 2011; Lima *et al.* 2011), with the presence of associated forest elements (Magnago *et al.* 2011).

The present work reports the first record of the order Solifugae for the Atlantic Forest, in a restinga ecosystem. This species was first captured in October/2010, in the Litoral Norte Environmental Protection Area, a locality

within the district of Jandaíra in Bahia State, Brazil (11°41'45" S, 37°30'28" W). Twenty-five pitfall traps were installed in each of the four phytophysiognomies of the local restinga (beach front, shrub area, humid zone, and forest) during four consecutive days, totaling 96 hours of collection efforts. Samples were collected in accordance with the authorization of collection number 23111-1 MMA / SISBIO.

Only a single individual of the order Solifugae was collected in a pitfall trap located in the transition zone between the restinga shrub and tree zone – an environment with mainly forest characteristics. The specimen was sent to the Butantan Institute in São Paulo for identification and subsequent incorporation into its permanent Arachnological collection (IBSP, curator: I. Knysak). The specimen was identified by Lincoln Suesdek Rocha as *Mummucia* aff. *mauryi* Xavier & Rocha, 2001 (Figure 1).

In spite of the fact that solifugids are usually found in arid habitats (Dunlop and Klann 2009), this specimen was encountered in a shrub to tree restinga transition zone. The sandy soil is characteristic of the restinga ecosystem (Lima *et al.* 2011), and it is apparently the required kind of soil for *Mummuciidae* Roewer 1934 species (see Xavier and Rocha 2001; Rocha and Cancellato 2002; Martins *et al.* 2004; Rocha and Carvalho 2006). One solifugid species of genus *Mummucia* Simon 1879, *Mummucia Ibirapemussu* Carvalho, Candiani, Bonaldo, Suesdek & Silva, 2010, was only recorded from arboreal Caatinga and shrubland Caatinga environments (Carvalho *et al.* 2010). Another species, *Mummucia mauryi* Xavier & Rocha, 2001, recorded only during dry periods, is known to prefer localities less exposed to direct sunlight, which could be associated with predator evasion and/or the avoidance of extreme environmental conditions (Xavier and Rocha 2001). The collection of the single specimen of *M. aff. mauryi* may be attributed to its behavior and habitat preference, as it was captured during the dry season and in a transition area environment in the restinga region of Bahia State.



FIGURE 1. Photo of *Mummucia* aff. *mauryi*.

In Northeast Brazil there are records for three solifugids species from Maranhão, Piauí and Bahia states (Carvalho *et al.* 2010). These three species were captured in Caatinga and Cerrado biome (Xavier and Rocha 2001; Carvalho *et al.* 2010). In Bahia state, there is only one species record of *M. mauryi*, which was originally described for the caatinga dryland biome (Xavier and Rocha 2001). A series of factors may have been determinant to the occurrence of the present species in the restinga: 1) it possesses environmental and vegetation characteristics similar to Caatinga and Cerrado biomes (Marques *et al.* 2011), 2) it is largely influenced by these adjacent biomes (Rocha *et al.* 2004), and 3) there is an isolated area of Caatinga vegetation in the proximity of the collection station (SEMA 2011).

This collection increases the known distribution of Solifugae to the Atlantic Forest, a biome that has suffered enormous anthropogenic pressure due to poorly controlled tourism activities and land-use and real estate speculation. This record of *M. aff. mauryi* will aid in conservation efforts directed toward this area of elevated biological importance and exemplifies the importance of small-scale studies of the faunal composition of natural areas.

**ACKNOWLEDGMENTS:** The authors would like to thank the entire team that participated in these collection efforts, as they all had some part in this discovery; Lacerta Ambiental for their logistic and materials support; the Centro de Ecologia e Conservação Animal; the Instituto Butantan for identifying and registering the specimen; the Universidade Católica do Salvador for their support of M.C.L. Peres; and to Ricardo Marques for the English support.

#### LITERATURE CITED

Ab'Saber, A.N. 2003. *Os domínios de natureza no Brasil: potencialidades paisagísticas*. São Paulo: Ateliê Editorial. 160 pp.  
 Assis, M.A., E.M.B. Prata, F. Pedroni, M. Sanchez, P.V. Eisenlohr, F.R. Martins, F.A.M. Santos, J. Y. Tamashiro, L.F. Alves, S.A. Vieira, M.C. Piccolo, S.C. Martins, P.B. Camargo, J.B. Carmo, E. Simões, L.A. Martinelli and C.A.

- Joly. 2011. Florestas de restinga e de terras baixas na planície costeira do sudeste do Brasil: vegetação e heterogeneidade ambiental. *Biota Neotropica* 11(2): 103–121.  
 Carvalho, L.S., D.F. Candiani, A.B. Bonaldo, L. Suesdek and P.R.R. Silva. 2010. A new species of the sun-spider genus *Mummucia* (Arachnida: Solifugae: Mummuciidae) from Piauí, northeastern Brazil. *Zootaxa* 2690(29): 19–31.  
 Conservation International. 2011. *Biodiversity Hotspots*. Accessible at <http://www.biodiversityhotspots.org>. Captured on 12 March 2011.  
 Dunlop, J.A. and A.E. Klann. 2009. A second camel spider (Arachnida: Solifugae) from Baltic amber. *Acta Geologica Polonica* 59(1): 39–44.  
 Harvey, M.S. 2002. The neglected cousins: What do we know about the smaller arachnid orders? *The Journal of Arachnology* 30(1): 357–372.  
 IBGE, Instituto Brasileiro de Geografia e Estatística. 2011. *Cidades*. Accessible at <http://www.ibge.gov.br/home>. Captured on 20 March 2011.  
 Lima, R.A.F., A.A. Oliveira, A.M.Z. Martini, D. Sampaio, V.C. Souza, and R.R. Rodrigues. 2011. Structure, diversity, and spatial patterns in a permanent plot of a high Restinga forest in Southeastern Brazil. *Acta Botanica Brasílica* 25(3): 633–645.  
 Magnago, L.F.S., S.V. Martins, C.E.G.R. Schaefer and A.V. Neri. 2010. Gradiente fitofisionômico-edáfico em formações florestais de Restinga no Sudeste do Brasil. *Acta Botanica Brasílica* 24(3): 734–746.  
 Magnago, L.F.S., S.V. Martins and O.J. Pereira. 2011. Heterogeneidade florística das fitocenoses de restingas nos estados do Rio de Janeiro e Espírito Santo, Brasil. *Revista Árvore* 35(2): 245–254.  
 Marques, R., M.S. Tinóco, D. Couto-Ferreira, C.P. Fazolato, H.C. Browne-Ribeiro, M.L.O. Travassos, M.A. Dias and J.V.L. Mota. 2011. Reserva Imbassai Restinga: inventory of snakes on the northern coast of Bahia, Brazil. *Journal of Threatened Taxa* 3(11): 2184–2191.  
 Martins, E.G., V. Bonato, G. Machado, R. Pinto-da-Rocha, L.S. Rocha. 2004. Description and ecology of a new species of sun spider (Arachnida: Solifugae) from the Brazilian Cerrado. *Journal of Natural History* 38(1): 2361–2375.  
 Myers, N., R.A. Mittermeier, C.G. Mittermeier, G. A. B. Fonseca and J. Kent. 2000. Biodiversity hotspots for conservation priorities. *Nature* 403(1): 853–858.  
 Rizzini, C.T. 1963. Nota prévia sobre a divisão fitogeográfica (florístico-sociológica) do Brasil. *Revista Brasileira de Geografia* 25(1): 3–64.  
 Rocha, C.F.D., H.G. Bergallo, M.A.S. Alves and M.V. Sluys. 2004. A restinga de Jurubatiba e a conservação dos ambientes de restinga do Estado do Rio de Janeiro; pp. 341–352, in: C.F.D. Rocha, F.A. Esteves and F.R. Scarano (ed.). *Pesquisa de longa duração na restinga de Jurubatiba: ecologia, história natural e conservação*. São Carlos: Editora Rima, 374 pp.  
 Rocha, L.S. and E.M. Canello. 2002. Redescription of *Metacleobis fulvipes* Roemer from Brazil (Solifugae, Mummuciidae). *The Journal of Arachnology* 30(1): 104–109.  
 Rocha, L.S. and M.C. Carvalho. 2006. Description and ecology of a new Solifuge from Brazilian Amazonia (Arachnida, Solifugae, Mummuciidae). *The Journal of Arachnology* 34(1): 163–169.  
 SEMA (Secretaria do Meio Ambiente, Bahia). 2007. *Projeto Biomas e Ecossistemas da Bahia*. Dccessible at [http://www.semah.ba.gov.br/pdf/UCs%20Bahia\\_BIOMAS\\_A0\\_2007.pdf](http://www.semah.ba.gov.br/pdf/UCs%20Bahia_BIOMAS_A0_2007.pdf). Captured on 23 March 2011.  
 Xavier E. and L.S. Rocha. 2001. Autoecology and description of *Mummucia mauryi* (Solifugae, Mummuciidae), a new Solifuge from Brazilian semi-arid Caatinga. *The Journal of Arachnology* 29(1): 127–134.

RECEIVED: July 2012

ACCEPTED: January 2014

PUBLISHED ONLINE: February 2014

EDITORIAL RESPONSIBILITY: Cibele Bragagnolo