



Biota Neotropica
ISSN: 1676-0611
cjoly@unicamp.br
Instituto Virtual da Biodiversidade
Brasil

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Biota Neotropica, vol. 13, núm. 4, octubre-diciembre, 2013, pp. 365-367

Instituto Virtual da Biodiversidade

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First record of acari *Arrenurus* Dugès, 1834 as a parasite of Odonata species in Brazil

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RODRIGUES, M.E., CARRIÇO, C., PINTO, Z.T., MENDONÇA, P.M. & QUEIROZ, M.M.C. **First record of acari *Arrenurus* Dugès, 1834 as a parasite of Odonata species in Brazil.** Biota Neotrop. (13)4: <http://www.biotaneotropica.org.br/v13n4/en/abstract?short-communication+bn00413042013>

Abstract: Water mites are common and widespread parasites of some aquatic insects in freshwater habitats. This is the first record of acari *Arrenurus* Dugès, 1834, as a parasite of Odonata in Brazil. Water mites were sampled from *Miathyria marcella* (Selys, 1857) and *Ischnura fluviatilis* (Selys, 1876).

Keywords: dragonfly, parasitism, water mites.

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Resumo: Ácaros aquáticos são parasitas comuns de alguns insetos aquáticos em habitats de água doce. Este é o primeiro registro do ácaro *Arrenurus* Dugès, 1834, como parasita de Odonata no Brasil. Ácaros aquáticos foram coletados em *Miathyria marcella* (Selys, 1857) e *Ischnura fluviatilis* (Selys, 1876).

Palavras-chave: libélulas, parasitismo, ácaros aquáticos.

Introduction

Water mites are common and widespread parasites of some aquatic insects in freshwater habitats (Milne et al. 2009, Rolff 2000). Mites establish a brief phoretic association, they use one animal by another for transportation, finding food, finding more favorable environmental conditions and expanding the species' range (Lajeunesse 2007, MuMcuonglu & BraverMan 2010). Their hosts during a very vulnerable stage: the larvae's transition from its aquatic habitat to the terrestrial habitat of the adult (Andrés & Cordero 1998, Forbes et al. 1999, Rolff et al. 2001). Hydrachnidia (Hydracarina) is the most diversified and abundant group of Acari in freshwaters (Sabatino et al. 2000). According to Andrew et al. 2012, water mites that use odonates as hosts are predominantly *Arrenurus* and at least 55 species have been described as ectoparasites of Odonata. Studies indicate that mite parasitism can affect longevity, the flight, the fecundity impeding the copulation or by blocking sperm transference to the male's secondary genitalia (Bonn et al. 1996, Forbes 1991, Forbes & Baker 1991).

The genus *Arrenurus*, contains 800 species (Smit 2010), is the largest within the Arrenuridae and 161 of these species occur in South America (Rosso-de-Ferradás & Fernández 2005, Rosso-de-Ferradás 2006). The basic life cycle of *Arrenurus* consists of seven stages: egg, inactive prelarvae, larvae, protonymph, deutonymph, tritonymph, and adult (Smith 1988). The larval stage is the only parasitic phase. *Arrenurus* larvae are parasites of some species of Odonata, Diptera, and Coleoptera (Smith 1988, Zawal 2006). For example, in Europe *Arrenurus* was recorded on the following species of Odonata: *Ceragrion tenellum* (De Villers, 1789); *Coenagrion puella* (Linnaeus, 1758); *C. hastulatum* (Charpentier, 1825); *C. pulchellum* (Vander Linden, 1823), and *Erythromma najas* (Hansemann, 1823) (Andrés & Cordero 1998, Rolff 2000, Zawal 2006). In North American, Lajeunesse (2007), recorded *Arrenurus* in *Argia fumipennis atra* Gloyd, 1968; *Ischnura hastata* (Say, 1840); *Ischnura ramburii* (Selys, 1850), and *Nehalennia gracilis* Morse, 1895. Reports and records of the interactions between Odonata and mites have been explored very little (Smith 1988), mainly in the Neotropical Region. In Brazil water mite parasitism (Acari: Hydrachnidia) within and among odonate species is scarce, many species could only be identified as morphospecies of particular genera (Rosso-de-Ferradás 2006).

Our study is the first record of *Arrenurus* parasitism on *Miathyria marcella* (Selys, 1857) and *Ischnura fluviatilis* Selys, 1876 in the Neotropical region. *Miathyria* Kirby, 1889 is a Neotropical genus that comprises two species, *M. marcella* and *M. simplex* (Rambur, 1842), both of which occur in Brazil (Garrison et al. 2006). *Ischnura* Charpentier, 1840 is cosmopolitan genus, with three described species in Brazil: *I. capreolus* (Hagen, 1861) *I. ramburii* (Selys, 1850) and *I. fluviatilis* (Selys 1876) (Lencioni 2006, Garrison et al. 2010).

Material and Methods

The specimens of Odonata were captured with an entomological net and examined under a stereoscopic microscope, the species was identified following the work of Heckman (2006) and Lencioni (2006). Only three specimens *M. marcella* and one *I. fluviatilis* were found with dust mites attached to the body. Two males of *Miathyria marcella*, were collected in Porto Murinho (22°9'41.55"S and 57°32'2.68"W) and one in Bodoquena (20°42'15.38"S and 56°50'58.99"W), in the state of Mato Grosso do Sul, Brazil. The specimen of *I. fluviatilis* was captured in the Estação Ecológica Águas Emendadas (15°34'48.36"S and 47°41'26.22"W) in Brasília, Distrito Federal, Brazil. Both the species were in inhabit slow lotic waters.

The mites removed from the odonates were put into lactophenol to make them transparent; semi-permanent slide mounts were made



Figure 1. Aquatic mites *Arrenurus* on the thorax and abdomen of *M. marcella*. (Picture by Carlos Fernando S. Andrade).

using Hoyer's mounting media as preservative and examined under optical light microscopy (40x, 100x, 400x), the species was identified according to the key of Krantz (1978). The species in question could not be determined since the most important subgenera from the genus *Arrenurus* have been originally identified based on Palaearctic species. This has changed subsequently since their boundaries and definitions have become confusing and, in many cases, completely overlap (Rosso-de-Ferradás 2006). In addition, samples were not sufficient for an exhaustive comparison. The specimens of Odonata and water mites are deposited in the Setor de Entomologia Médica e Forense, Instituto Oswaldo Cruz, Fundação Oswaldo Cruz (IOC/FIOCRUZ).

Results and Discussion

Two of the three specimens of *M. marcella* were found with five to 10 aquatic mites attached to the ventral side of their thorax and some attached ventrally on the abdomen (Figure 1). Second Rolff (2000) the abundance of mites can range from 1 to 45 mites per host. Of the three specimens *M. marcella* had only one aquatic mite on the thorax. In *I. fluviatilis*, two aquatic mites were found on the thorax and abdomen of the specimen. Zawal (2006) stated that mites show preference for the thorax and the middle segments of the abdomen. On the other hand, Mitchell (1959) suggested that the selection of the attachment site on the hosts is directly related to the way Odonata females lay eggs above the water surface, but Rolff (2000) and Lajeunesse (2007) no found differences in parasite abundance due to host sex. However the behavior the oviposition from Odonata species can increase significantly the rate from infestation in hosts with submerged oviposition (Rolff 1997). Specimens of *Arrenurus* were found on *M. marcella* during their larval phase, when they typically inhabit temporary or permanent lentic or slow lotic waters (Peckarsky et al. 1990) and Lajeunesse (2007) reported for North American *Arrenurus* parasitizing *I. hastata* and *I. ramburii* also inhabit temporary or permanent lentic or slow lotic waters. Some studies indicate that the abundance of water mites can be synchronised with host's emergence patterns (Rolff 2000). Therefore basic information on the natural history of water mite parasitism is urgently needed to assess the host range and geographic distribution of these parasites (Bush et al. 2001, Rolff 2001).

Acknowledgments

We are grateful to Dra. Marina Vianna Braga, Dr. Fabio de Oliveira Roque and Raquel Taminato for their helpful reviewing of the manuscript. We would like to thank the Conselho Nacional

de Desenvolvimento Científico e Tecnológico (CNPq), Fundação de Apoio ao Desenvolvimento do Ensino, Ciência e Tecnologia do Estado do Mato Grosso do Sul (FUNDECT), Programa Nacional de Cooperação Acadêmica (PROCAD) and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for grants and scholarships to the first author.

References

- ANDRÉS, J.A. & CORDERO, A. 1998. Effects of water mites on the damselfly *Ceragrion tenellum*. *Ecol. Entomol.* 23(2):103-109.
- ANDREW, R.J., THAKAR, N. & VERMA, P. 2012. Ectoparasitism of anisopteran dragonflies (Insecta:Odonata) by water mite larvae of *Arrenurus* spp. (Arachnida:Hydrachnida:Arrenuridae) in Central India. *Acarina* 20(2):194-198.
- BONN, A., GASSE, M., ROLFF, J., & MARTENS, A. 1996. Increase fluctuation asymmetry (FA) in the damselfly *Coenagrion puella* correlated with ectoparasite water mites: implication for fluctuation asymmetry theory. *Oecologia*. 108:596-598. <http://dx.doi.org/10.1007/BF00329031>
- BUSH, A.O., FERNANDEZ, J.C., ESCH, G.W. & SEED, J.R. 2001. Parasitism: the diversity and ecology of animal parasites. Univ. Press. Cambridge
- FORBES, M.R. 1991. Ectoparasites and mating success of male *Enallagma ebrium* damselfly (Odonata: Coenagrionidae). *Oikos*. 60(3):36-42. <http://dx.doi.org/10.2307/3545076>
- FORBES, M.R.L. & BAKER, R.L. 1991. Condition and fecundity of the damselfly, *Enallagma ebrium* (Hagen): the importance of ectoparasites. *Oecologia*. 86(3):35-41. <http://dx.doi.org/10.1007/BF00317598>
- FORBES, M.R., MUMA, K.E. & SMITH, B.P. 1999. Parasitism of Sympetrum dragonflies by *Arrenurus planus* mites: maintenance of resistance particular to one species. *Int. J. Parasitol.* 29(1):991-999.
- GARRISON, R.W., VON ELLENRIEDER, N. & LOUTON, J.A. 2006. Dragonfly genera of the New World: An illustrated and annotated key to the Anisoptera. Johns Hopkins University Press, Baltimore.
- GARRISON, R.W., VON ELLENRIEDER, N. & LOUTON, J.A. 2010. Damselfly Genera of the New World: An illustrated and annotated key to the Zygoptera. Johns Hopkins University Press, Baltimore.
- HECKMAN, C.W. 2006. Encyclopedia of South American Aquatic Insects: Odonata - Anisoptera. Illustrated Keys to Known Families, Genera, and Species in South America. Springer, Washington.
- KRANTZ, G.W. 1978. A manual of acarology. 2nd ed. Oregon State Univ. Book.
- LAJEUNESSE, M.J. 2007. Ectoparasitism of Damselflies by Water Mites in Central Florida. *Florida Entomologist*. 90(4): 643-649. [http://dx.doi.org/10.1653/0015-4040\(2007\)90\[643:EODBWM\]2.0.CO;2](http://dx.doi.org/10.1653/0015-4040(2007)90[643:EODBWM]2.0.CO;2)
- LENCIONI, F.A.A. 2006. Damselflies of Brazil: An illustrated identification guide - 2- Coenagrionidae families. All Print Editora, São Paulo.
- MILNE, M.A., TOWNSEND, V.J., SMELSER, P., FELGENHAUER, B.E., MOORE, M.K. & SMYTH, F.J. 2009. Larval aquatic and terrestrial mites infesting a temperate assemblage of mosquitoes. *Exp. Appl. Acarol.* 47(1):19-33. PMID:18807202. <http://dx.doi.org/10.1007/s10493-008-9194-2>
- MITCHELL, R. 1959. Life histories and larval behaviour of Arrenurid water-mites parasitizing Odonata. *J. New York Entomol. S.* 67(1):1-12.
- MUMCUOGLU, K.Y. & BRAVERMAN, Y. 2010. Parasitic and phoretic mites of Diptera in Israel and the Sinai Peninsula, Egypt. *Israel J. Entomol.* 40(1):195-203.
- PECKARSKY, B.L., FRAISSINET, P.R., PENTON, M.A. & CONKLIN, J.D. 1990. Freshwater Macroinvertebrates of Northeastern North America. Cornell University Press, New York.
- ROLFF, J. 2001. Evolutionary ecology of water mite-insect interactions: a critical appraisal. *Arch. Hydrobiol.* 152(1):353-368.
- ROLFF, J. 2000. Water mite parasitism in damselflies during emergence: two hosts, one pattern. *Ecography* 23(3):273-282. <http://dx.doi.org/10.1111/j.1600-0587.2000.tb00282.x>
- ROLFF, J. 1997. Better Hosts Dive: Detachment of Ectoparasitic Water Mites (Hydrachnellae: Arrenuridae) from Damselflies (Odonata: Coenagrionidae). *J. Insect Behav.* 10(6):819-827. <http://dx.doi.org/10.1023/B:JOIR.0000010415.14483.e3>
- ROLFF, J., VOGEL, C. & POETHKE, H.J. 2001. Co-evolution between ectoparasites and their insect hosts: a simulation study of a damselfly-water mite interaction. *Ecol. Entomol.* 26(6):638-645.
- ROSSO-DE-FERRADÁS, B. & FERNÁNDEZ, H.R. 2005. Elenco y Biogeografía de los ácaros acuáticos (Acari, Parasitengona, Hydrachnidia) de Sudamérica. *Graellsia* 61(2):181-224. <http://dx.doi.org/10.3989/graellsia.2005.v61.i2.19>
- ROSSO-DE-FERRADÁS, B. 2006. Arrenúridos de la cuenca del Río Paraná, Argentina (Acari: Parasitengona: Hydrachnidia). *Revista Entomol.* 65(4):23-34.
- SABATINO, A., GERECKE, R. & MARTIN, P. 2000. The biology and ecology of lotic water mites (Hydrachnidia). *Freshwater Biol.* 44(1):47-62. <http://dx.doi.org/10.1046/j.1365-2427.2000.00591.x>
- SMIT, H. 2010. Two new species of the genus *Arrenurus* from Pohnpei, Federal States of Micronesia (Acari: Hydrachnidia: Arrenuridae). *Zootaxa* 2006:50-54.
- SMITH, B.P. 1988. Host-parasite interaction and impact of larval water mites on insects. *Annu. Rev. Entomol.* 33(1): 487-507. <http://dx.doi.org/10.1146/annurev.en.33.010188.002415>
- ZAWAL, A. 2006. Phoresy and parasitism: water mite larvae of the genus *Arrenurus* (Acari: Hydrachnidia) on Odonata from Lake Binowskie (NW Poland). *Biol. Letters* 43(2):257-276.

Received 06/03/2013

Revised 08/29/2013

Accepted 10/07/2013