New records of mites (Acari: Spinturnicidae) associated with bats (Mammalia, Chiroptera) in two Brazilian biomes: Pantanal and Caatinga

Novos registros de ácaros (Acari: Spinturnicidae) associados com morcegos (Mammalia, Chiroptera) em dois biomas brasileiros: Pantanal e Caatinga

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Abstract

A first survey of mite species that ectoparasitize bats in the states of Ceará and Mato Grosso was conducted. The specimens of bats and their mites were collected in areas of the Caatinga and Pantanal biomes. A total of 450 spinturnicids representing two genera and ten species was collected from 15 bat species in the Private Reserve of the Natural Patrimony Serra das Almas, Ceará State, Northeast Brazil and 138 spinturnicids represented by two genera and four species were found in seven bat species collected in the Private Reserve of the Natural Patrimony Sesc Pantanal, Mato Grosso State, Central-Western Brazil. The occurrence of Cameronieta genus and the species Mesoperiglischrus natali as well as four new associations (Periglischrus iheringi - Chiroderma vizottoi; P. micronycteridis - Micronycteris sanborni; P. paracutisternus – Trachops cirrhosus; Spinturnix americanus - Myotis riparius) are registered for the first time in Brazil.

Keywords: Periglischrus, Mesoperiglischrus, Cameronieta, Caatinga, Pantanal, Brazil.

Resumo

Ácaros ectoparásitos de morcegos são reportados pela primeira vez para os Estados do Ceará e Mato Grosso. Os espécimes de morcegos com seus ectoparasitos foram coletados em áreas dos biomas Caatinga e Pantanal. Foi coletado o total de 450 espínturnícidos representados por dois géneros e dez espécies desde 15 espécies de morcegos na Reserva Particular do Patrimônio Natural Serra das Almas, Ceará, Nordeste Brasileiro e em sete espécies de morcegos coletadas na Reserva Particular do Patrimônio Natural Sesc Pantanal, Mato Grosso, Centro-Oeste Brasileiro foram encontrados 138 espínturnícidos representados por dois géneros e quatro espécies. A ocorrência do gênero Cameronieta e da espécie Mesoperiglischrus natali, além de quatro novas associações (P. iheringi - Chiroderma vizottoi; Periglischrus micronycteridis - Micronycteris sanborni; P. paracutisternus – Trachops cirrhosus; Spinturnix americanas - Myotis riparius) são registradas pela primeira vez no Brasil.

Palavras-chave: Periglischrus, Mesoperiglischrus, Cameronieta, Caatinga, Pantanal, Brasil.

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Introduction

The family Spinturnicidae comprises hematophagous mites found exclusively on bats. These mites go through five life cycle stages, including the egg, larva, protonymph, deutonymph, and adult. The egg and larval stages occur inside a pregnant female (RUDNICK, 1960), and, according to Almeida et al. (2015), nymph and adult mites infest the plagiopatagium of bats. The most recent taxonomy for the Spinturnicidae lists four genera in the New World (HERRIN & TIPTON, 1975): Cameronieta Machado-Allison, 1965, which are exclusive to mormoopidae bats; Periglischrus Kolenati, 1857, the largest genus, found in phyllostomidae bats; Spinturnix Von Hayden, 1826, a cosmopolitan genus, with a majority of known species occurring in association with Old World bats of the subfamily Vespertilionidae, and seven species recorded in the New World (HERRIN & TIPTON, 1975); Paraspinturnix Rudnick, 1960, a monotypic genus that parasitizes the anal orifice of Myotis bats; and a fifth genus Mesoperiglischrus (DUSBÁBEK, 1968) presented by Morales-Malacara in the 10th Internacional Congress of Acarology (2001) as a valid genus with two species found in Natalidae bats (MORALES-MALACARA, 2001).

Studies on the occurrence of Spinturnicids in Brazil have been conducted with bats collected in the capital city of Brasília, in regions of the Cerrado (GETTINGER & GRIBEL, 1989), in Atlantic forest areas in the states of Minas Gerais (AZEVEDO et al., 2002; MORAS et al., 2013), Pernambuco (DANTAS-TORRES et al., 2009), Rio Grande do Sul (SILVA et al., 2009), Rio de Janeiro (ALMEIDA et al., 2011), and in the Pantanal region, state of Mato Grosso do Sul (SILVA & GRACIOLLI, 2013), besides of Confalonieri dissertation (1976) that present a biometric study of P. iheringi and P. ojastii. In the present paper, it is reported the diversity and distribution of ectoparasitic Spinturnicidae species found in surveys conducted in the Pantanal region in the state of Mato Grosso and in the Caatinga region in the state of Ceará.

Materials and Methods

Species inventories were conducted in different areas of two Brazilian biomes, the Private Reserve of the Natural Patrimony (RPPN, from the original Portuguese) Serra das Almas and RPPN Sesc Pantanal. The RPPN Serra das Almas (05° 15' S/41° 00' W) comprises 6,146 hectares and is considered an Outpost of the Caatinga Biosphere Reserve situated in the municipality of Cratéus, state of Ceará (ARAÚJO et al., 2011). The RPPN Sesc Pantanal (16° 41' S/56° 24' W) represents the largest RPPN in Brazil, with approximately 106,000 hectares between the rivers Cuiabá and São Lourenço in the municipality of Barão de Melgaço, state of Mato Grosso. It is an important area for the protection of Brazilian biodiversity and the preservation of genetic resources (SILVA & ABDON, 1998).

In the RPPN Serra das Almas, bats were collected during nine nights in the dry season (August 2012) and 10 nights in the rainy season (February 2013). In the RPPN Sesc Pantanal bats were collected during 15 nights in dry season (May 2008).

In both areas, bats were collected with mist nets measuring from 6 to 18 meters in length and 2.5 meters in height placed in existing trails or above streams. The sampling period extended for six hours after sunset. Bat specimens that were returned to the wild were released at the capture site following their identification in the field and voucher specimens were fixed in 10% formaldehyde and preserved in 70% alcohol, as previously described by Vizotto & Taddei (1973) and Handley (1988), and catalogued in the National Museum (MN, from the original Portuguese) Mammal Collection and the Adriano Lucio Peracchi (ALP) collection, Universidade Federal Rural do Rio de Janeiro, Rio de Janeiro, Brazil.

Silva et al. (2015) and Tavares (2009) describe the bat species collected in both study areas. The taxonomic nomenclature applied to bat species follows the one proposed by Nogueira et al. (2014).

Mites were collected from live bats with fine-pointed tweezers and conditioned in flasks containing 70% alcohol. In the National Reference Laboratory for Rickettsioses Vectors, Fundação Oswaldo Cruz, Rio de Janeiro, mites were mounted as per Flechtmann (1990) and identified according to the taxonomic keys proposed by Tibbetts (1957), Machado-Allison (1964, 1965a, b), Dusbábek (1967, 1968), Herrin & Tipton (1975), Morales-Malacara (2001) and Morales-Malacara & Juste (2002).

Results and Discussion

A total of 450 Spinturnicidae mite specimens, representing two genera and 10 species, were collected from 15 bat species captured in RPPN Serra das Almas. In the RPPN Sesc Pantanal, seven bat species were collected carrying 138 mites distributed in two genera and four species of the same family (Tables 1 and 2).

Mite family, genera and species are presented in alphabetical order and by collection area. The host species is listed along with the parasite load information. Released bats are listed following the same norms, but with month, in roman numerals, and year of capture (number of host), followed by parasite load.

The following results constitute the first survey of Spinturnicidae mites for the Caatinga in the state of Ceará and for the Pantanal biome in Mato Grosso.

Spinturnicidae (Acari, Mesostigmata)
Cameronieta Machado-Allison 1965
Cameronieta sp.

Specimens examined: Brazil, Ceará State, RPPN Serra das Almas. Host: Pteronotus gymnonotus II/2013 (2); one ♀, one protonymph. Host: P. parrelli II/2013 (24): 57♀, 34♂, three deutonymphs ♀, two deutonymphs ♂, 26 protonymphs; ALP 10183: five ♀, two deutonymphs ♂, one protonymph; ALP 10188: three ♀, three ♂, one deutonymph ♀.

Comments: Cameronieta genus is exclusive to mormoopidae bats (HERRIN & TIPTON, 1975) and is comprised of six species: C. strandmanni (TIBBETTS, 1957); C. thomasi (MACHADO-ALLISON, 1965b) and C. elongatus (FURMAN, 1966) reported from Venezuela and C. machadoi Dusbábek, 1967; C. tibettsi Dusbábek, 1967 and C. torrei Dusbábek, 1967 reported from Cuba. Although P. parrelli have been already associated with C. elongatus and C. tibettsi in Venezuela and Cuba, respectively (DUSBÁBEK, 1967; HERRIN & TIPTON, 1975), the specimens
collected could not be allocated to any known species because the position of sternal setae and the length of podosomal and metasternal setae (ALMEIDA et al., unpublished). Furthermore, this is the first time the genus is reported in Brazil.

Mesoperiglischrus natali (FURMAN, 1966)

Specimens examined: Brazil, Ceará State, RPPN Serra das Almas. Host: Natalus macrourus - ALP 10173; two ♂, one protonymph. Comments: Furman (1966) described the species Mesoperiglischrus natali as a member of the genus Periglischrus. However, Dusibéck (1968) described a new genus and species, Mesoperiglischrus nyctellinus and considered P. natali to be a congener, recombining the name to M. natali. Years after Morales-Malacara (2001) analyzed morphologically the genus Periglischrus and the results supported this conclusion. Considered an exclusive parasite of the bat genus Natalus (FURMAN, 1966; MORALES-MALACARA, 2001), M. natali had not been reported in Brazil until this moment, but in Venezuela it has been reported in association with N. tumidirostris Miller, 1900 (HERRIN & TIPTON, 1975).

Periglischrus Kolenati, 1857

Periglischrus sp.

Specimens examined: Brazil, Ceará State, RPPN Serra das Almas. Host: Tonatia bidens - VII/2012(1): five ♂, two deutonymphs ♂, one protonymph; II/2013(2): 17♂, eight ♀, one deutonymph ♀, eight protonymphs; ALP 10157: four ♂, three ♀, one protonymph; ALP 10384: one ♂, one ♀, two protonymphs; ALP 10460: three ♀, one protonymph.

Comments: Herrin & Tipon (1975) described Periglischrus tonattii as a primary parasite of the genus Tonatia, and reported the occurrence of the mite in association with T. silvicola, T. brasilienis and T. carrkeri, all of which currently belong to the genus Lophostoma (Lee et al., 2002). In southeast Mexico and Panama, Morales-Malacara & Juste (2002) described P. steresotrichus, a species morphologically close to P. tonattii, and P. eryстernus, which is close to P. paratorrealbai, both in association with T. evotis (currently Lophostoma evotis) and T. saurocephala, respectively. The specimens obtained from T. bidens in the RPPN Serra das Almas are phenetically close to P. torrealbai, but they belong to a new species in description process.
Spinturnicids from Pantanal and Caatinga biomes

Periglischrus caligus Kolenati, 1857

Specimens examined: Brazil, Ceará State, RPPN Serra das Almas. Host: Glossophaga soricina - ALP 10158: one ♂; ALP 10172: one ♂; ALP 10477: one ♀. Brazil, Mato Grosso State, RPPN Sesc Pantanal. Host: G. soricina - V/2008: three ♀; MN 71484: one ♂; MN 71499: six ♀; MN 71516: one ♂; MN 71521: four ♂, one deutonymph ♀; MN 71592: two ♂, two ♂, one protonymph.

Comments: Considered a primary parasite of the genus Glossophaga this species has been reported in Brazil in association with G. soricina in Rio de Janeiro, São Paulo, Brasilia and Pernambuco (CONFALONIERI, 1976; GETTINGER & GRIBEL, 1989; DANTAS-TORRES et al., 2009).

Periglischrus iheringi Oudemans, 1902

Specimens examined: Brazil, Ceará State, RPPN Serra das Almas. Host: Artibeus lituratus - VII/2012(2): one ♂, one ♀; ALP 10166: one protonymph. II/2013(3): three ♀, one ♀, one protonymph. Host: A. planirostris - VII/2012(1): one ♂, 12 ♀, two deutonymphs ♂; I/2013(10): five ♂, eight ♀, four deutonymphs ♂, two protonymphs; ALP 10405: two ♂, five ♀, one protonymph; ALP 10412: one ♂; ALP 10441: one ♂, two ♀, one protonymph. Host: Carollia perspicillata - ALP 10434: one ♀. Host: Chiropetera vizottoi - VII/2012(1): three ♂; ALP 10196: three ♂; II/2013(7): nine ♂, two ♂; ALP 10423: one ♂. Host: Platyrhinus lineatus - I/2013(2): four ♂, three ♀, two deutonymphs ♂; ALP 10397: one ♂, two ♂; ALP 10403: one ♂, one deutonymph ♂; ALP 10425: six ♂, one ♀, one deutonymph ♂, one deutonymph ♀, two protonymphs. Brazil, Mato Grosso State, RPPN Sesc Pantanal. Host: Artibeus planirostris - V/2008 (12): 17 ♂, 33 ♀, four deutonymphs ♂, two deutonymphs ♀, seven protonymphs; MN 71505: one deutonymph ♂; MN 71502: two ♂, two ♀, one deutonymph ♀, two protonymphs; MN 71503: one ♂; MN 71504: two ♂; MN 71524: one ♂, two ♀, one protonymph; MN 71587: two ♂, two ♀. Host: A. lituratus, MN 71496: one ♂; three ♀; MN 71506: two ♂; MN 71514: one ♂. Host: P. lineatus - MN 71507: three ♂, three ♀, one protonymph. Host: P. incaram - MN 71523: three ♀, one ♂, one deutonymph ♀; MN 71581: one ♂.

Comments: This species is the most often cited in studies of bat parasites, and it is found in association with emballonurid, noctilionid, mormoopid species and with a majority of Phyllostomidae subfamilies (HERRIN & TIPTON, 1975). Given this wide range of hosts, it is possible that P. iheringi in fact comprises a number of species (HERRIN & TIPTON, 1975). In Brazil, this mite has been reported in Artibeus lituratus (GETTINGER & GRIBEL, 1989; DANTAS-TORRES et al., 2009; SILVA et al., 2009; ALMEIDA et al., 2011; CONFALONIERI, 1976). A. planirostris (GETTINGER & GRIBEL, 1989; DANTAS-TORRES et al., 2009), D. cineria (GETTINGER & GRIBEL, 1989), A. fimbriatus (SILVA et al., 2009), A. obscurus (ALMEIDA et al., 2011). Anoura caudifera (GETTINGER & GRIBEL, 1989; SILVA et al., 2009), Anoura sp. (SILVA et al., 2009), Carollia perspicillata (ALMEIDA et al., 2011; CONFALONIERI, 1976), Glossophaga soricina (SILVA et al., 2009), Plasbhrynyus lineatus (DANTAS-TORRES et al., 2009; SILVA & GRACIOLLI, 2013), Desmodus rotundus (CONFALONIERI, 1976), Chrotoperus auritus (CONFALONIERI, 1976), Peroptrerus macrotis (CONFALONIERI, 1976), Eptesicus brasiliensis (CONFALONIERI, 1976) and Sturnira lilium (AZEVEDO et al., 2002; ALMEIDA et al., 2011; DANTAS-TORRES et al., 2009; CONFALONIERI, 1976).

Here, we report for the first time an association between P. iheringi and C. vizottoi. Because of the vast number of cases we found, this association is likely correct.

Periglischrus microsternids Furman, 1966

Specimens examined: Brazil, Ceará State, RPPN Serra das Almas. Host: Micronycteris sanborni - ALP 10155: one ♂; one ♂, one protonymph; ALP 10160: one ♂; ALP 10385: three ♂; ALP 10442: one ♂; ALP 10459: five ♂, one protonymph.

Comments: This species represents a primary parasite of the genus Micronycteris (FURMAN, 1966). In the state of Rio de Janeiro, it has been found in association with M. megalotis Gray, 1842 by Almeida et al. (2011). The association with M. sanborni is reported here for the first time in Brazil.

Periglischrus ojasti Machado-Allison, 1964

Specimens examined: Brazil, Ceará State, RPPN Serra das Almas. Host: Sturmiina lilium - ALP 10133: one ♂; two ♂; ALP 10150: five ♂, four ♀, two deutonymphs ♀, two protonymphs; ALP 10189: one ♂, one deutonymph ♀, one protonymph; ALP 10445: two ♂, two deutonymphs ♀, two protonymphs.

Comments: Species commonly found in association with the genus Sturnina. In Brazil, it has been reported in association with C. perspicillata in the state of Pernambuco (DANTAS-TORRES et al., 2009), S. lilium in Espirito Santo (CONFALONIERI, 1976) and with S. lilium in Brasilia (GETTINGER & GRIBEL, 1989), Minas Gerais (CONFALONIERI, 1976; AZEVEDO et al., 2002) and Rio de Janeiro (CONFALONIERI, 1976; ALMEIDA et al., 2011).

Periglischrus paracutisserus Machado-Allison & Antequera, 1971

Specimens examined: Brazil, Ceará State, RPPN Serra das Almas. Host: Trachops cirrhosus - VII/2012(2): seven ♂, three ♀, one deutonymph ♂; II/2013(3): five ♂, three ♂; ALP 10137: one ♂, one ♀, one protonymph; ALP 10139: nine ♂, 14 ♀, one deutonymph ♀, eight protonymphs; ALP 10156: one ♂, one ♀; ALP 10419: 12 ♂, two ♀, two deutonymphs ♀, two protonymphs. Brazil, Mato Grosso State, RPPN Sesc Pantanal. Host: T. cirrhosus - MN 71578: six ♂, two protonymphs.

Comments: In Venezuela, Herrin & Tipton (1975) found this species in association with T. cirrhosus, its primary host. This is the first time that this association is reported to Brazil.

Periglischrus torrealbai Machado-Allison, 1965

Specimens examined: Brazil, Ceará State, RPPN Serra das Almas. Host: Artibeus planirostris - ALP 10391: seven ♂, ten ♀, one deutonymph ♀, five protonymphs; Host: P. discolor - ALP 10190: five ♂, one deutonymph ♀, one protonymph; ALP 10195: one ♂, two ♀, two protonymphs; ALP 10454: one ♂.

Comments: A primary parasite of the bat genus Phyllostomus (MACHADO-ALLISON, 1965a), this species has been reported in Brazil in association with P. discolor in Brasilia (GETTINGER & GRIBEL, 1989) and with P. hastatus in Rio de Janeiro (ALMEIDA et al., 2011) and Minas Gerais (CONFALONIERI, 1976). This is the first time that the association with A. planirostris is reported in Brazil; however, because we found it in only one host, this association requires further evaluation before being considered valid. The parasite has been reported in association with A. planirostris in Venezuela (HERRIN & TIPTON, 1975).
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