First record of Ophionyssus natricis (Gervais) (Acari: Macronyssidae) on Python reticulatus (Schneider) (Pythonidae) in Brazil

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Abstract. Ophionyssus natricis (Gervais) frequently parasitizes snakes kept under human care. This mite is known to mechanically transmit the bacteria Proteus hydrophillus, which can cause hemorrhagic sepsis in snakes. This is the first record of O. natricis mite in Python reticulatus (Schneider) collected in captivity, in Brazil. The micrographs and drawings generated in this study, based on optical light microscopy and SEM observations, highlight an important identifying characteristic of O. natricis: The dorsal surface has two shields, consisting of propodosomal and pygidial, and the ventral surface has only the external shield trapezoidal with two pairs of setae, and pores on the edge. The identification of adults female of O. natricis mites in P. reticulatus collected in wild animals kept under human care, in Brazil, provides additional anatomical information to help identify the species by providing more necessary information to understand the morphology of snake mites.

Keywords: Acari; Neotropical Region; Ectoparasite; Snake; Taxonomy.


Primeiro registro de Ophionyssus natricis (Gervais) (Acari: Macronyssidae) em Python reticulatus (Schneider) (Pythonidae) no Brasil

Resumo. Ophionyssus natricis (Gervais) frequentemente parasita cobras mantidas sob cuidados humanos. Este ácaro é conhecido por transmitir mecanicamente a bactéria Proteus hydrophillus, que pode causar sepse hemorrágica em cobras. É o primeiro registro de O. natricis em Python reticulatus (Schneider) coletados em cativeiro, no Brasil. As micrografias e desenhos gerados neste estudo, baseados em microscopia óptica e observações de MEV, destacam um importante característico identificatório de O. natricis: a superfície dorsal tem dois escudos, consistindo em propôsoma e pígidio, e a superfície ventral tem apenas o escudo esternal trapezoidal, com dois pares de cerdas e poros na borda. A identificação das fêmeas adultas de O. natricis em P. reticulatus mantidas sob cuidados humanos no Brasil, fornece informações anatômicas adicionais para ajudar na identificação da espécie fornecendo mais informações necessárias na compreensão da morfologia dos ácaros das cobras.

Palavras-chave: Acari; Região Neotropical; Ectoparasita; Cobra; Taxonomia.

Many members of Macronyssidae family are bat parasites, several genera occur on birds, rodents and reptiles (Flechtmann 1975; Gimarães et al. 2001; Krantz & Water 2009). This family has medical-veterinary importance and some species can affect breeding of domestic fowl, snakes, and rodents. Their infestations can also be debilitating to snakes. These mites may also temporarily infest humans and can transmit typhus, and cause anemia and dermatitis (Flechtmann 1975; Fain & Bannert 2000; Faiffer 2012; Amanatfard et al. 2014).

This family comprises 24 genera collected throughout the World and the genus Ophionyssus Megnin, includes 17 valid species (Moraza et al. 2009). All species have been found in the Old World, with the exception of Ophionyssus natricis (Gervais), commonly known like “snake mites, which are cosmopolitan and can be found on snakes kept under human care (Fain & Bannert 2000; Simonov & Zinchenko 2010; Wozniak & DeNardo 2000). In addition, Fain (1962) states that this mite is rarely a parasite of snakes in their natural environment. They are commonly called “snake mites” by some authors (Fain & Bannert 2000; Simonov & Zinchenko 2010).

The aim of this investigation was reported for the first time the mite O. natricis in P. reticulatus in collected in captivity, in Brazil.

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MATERIAL AND METHODS

Ten females of *O. natricis* were deposited under number CAVAISC-ACA-2856 at Coleção de Artrópodes Vetores Ápteros de Importância em Saúde das Comunidades (CAVAISC) – Fundação Oswaldo Cruz (FIOCRUZ) as a partnership between the Laboratório de Referência Nacional em Vetores das Riquetsioses (LRRN) – Instituto Oswaldo Cruz (IOC) / FIOCRUZ and Parque Municipal Quinzinho de Barros-Sorocaba-São Paulo-Brazil.

All mites were mounted in Hoyer’s medium (Flechtmann 1975) and measured under optical light microscopy Primo Star iLED (Zeiss). The specimens were properly identified following (Zhang &UCHIKAWA 1992; KRANTZ & WATER 2009; MoraSA et al. 2009). Specimens were stored in 70% ethanol until they undergo scanning electron microscope (SEM). Then, these mites were processed for SEM examination by transferring them into a 2.5% glutaraldehyde mixture in phosphate-saline (PBS) for 24 h. After that, they were rinsed twice, with PBS with 10 minutes intervals and postfixed with 1% osmium tetroxide at room temperature for 3 days. Afterwards, the mites were rinsed twice, with PBS and dehydrated with increased ethyl alcohol concentration (30, 50, 70, 80 and 90%) for 12 h during each step. Thereafter, they were placed in absolute alcohol, followed by a treatment in acetone. In the next step, the specimens were subjected to critical point drying in order to complete the dehydration process, and mounted on SEM stubs by making use of conductive adhesive tabs, coated with a thin gold layer (20–30 nm), and examined under a JEOL 6590LV scanning electron microscope (SEM) (Akishima, Tokyo, Japan).

RESULTS

Female snake mites collected from the body surface of *Python reticulatus* had the following features: 1. Dorsal: Oval body (Figure 1 A) and, 2. Length and width of idiosoma: 990.4 X 677.0 µm. The gnathosoma (had visible chelicera and pedipalps) 180-183 µm in length (Figure 2 A). The dorsal surface has two shields, consisting of propodosomal (pps) (length and width 310.2 x 263.4 µm) (with submedian setae F3 and D4 as terminal ones) and pygidial (ps) with some pores. SEM revealed that the dorsal shields have shieldlets posterior to propodosomal shield (Figure 1A); ten pairs of pilose setae in the pps (Figure 1 B) and nude in the ps (Figure 1 C).

Ventral - Sternal shield trapezoidal (ss) (Length and width: 45.4 X 112.2 µm) with two pairs of setae and pores on the edge. Peritreme (143.7 µm) extending to posterior one third of coxa II. Genital shield (Length and width: 274.6 X 288.4 µm) long (gs) with anterior border membranous with a triangular lobe, which extends to middle of sternal shield (Figure 3). Anal shield (as) inverse pear shaped with two pairs of setae, cribleum (c) present, anal valves (av) nude (Figure 4 A-C). The triosternum (tr) (length 84.8 µm) with hyaline lateral membrane (Figure 2 B).

DISCUSSION

It was observed *O. natricis* in populations of snakes in natural environments such as in America where snakes belonging to the genus *Nerodia* (Linnaeus) were found having this relationship, as well as in *Heterodon* (Linnaeus) (CAMIL 1948). In Panama, (MIRANDA et al. 2017) researchers found several *O. natricis* in the following snake species: *Boa constrictor* Linnaeus, *Epicrates maurus*Gray, *Corallus ruschenbergerii* (Cope), *Corallus caninus* (Linnaeus) and *Python regius* (Shaw). In Egypt, the following species were reported in: *Psammophis sibilans* (Linnaeus), *Psammophis diadema* (Schlegel), *Naja haje* (Linnaeus), *Telescopus dhara* (Forskal), *Elaphe dione* (Pallas), *Coluber karelini* (Brandt), *Macrovipera lebetina* (Linnaeus), *Echis carinatus* (Schneider) and *Dolichophis caspius* (Gmelin) (Yunker 1956); *O. natricis* was observed also in Russia and Siberia parasitizing *Natrix natrix* (Linnaeus) (Simonov & Zinchenko 2010; BELOVA & GRIGORIEV 1981; STANYUKOVICH & LOHANNSEN 2005). MirON & IVAN (2003) described *Ophionyssus viperae* from *Vipera ursinii* (Bonaparte) and was synonymized with *O. natricis* by MORAJA et al. (2009).
Figure 2. Scanning Electron Microscopy (SEM) of Ophionyssus natricis, (A) Dorsal view of gnathosoma and, (B) Ventral view of gnathosoma showing tritosternum (tr) with hyaline border.

Figure 3. Light Microscopy image of Ophionyssus natricis - Ventral view showing genital shield (gs).

Figure 4. Scanning Electron Microscopy (SEM) of Ophionyssus natricis, (A) General ventral view showing genital shield (gs), (B) Sternal shield (ss), (C) Anal details - Anal shield (as), Anal valve (av), Cribium (c).
The first record of *Ophionyssus natricis* in *P. reticulatus* in Brazil was presented in this study. This mite had previously only been described in this country parasitizing *Boa constrictor constrictor* Linnaeus, in wild animals kept under human care (Barbosa et al. 2006).

The measurements of the morphological structures of the dorsal and ventral regions of the *O. natricis* found on *P. reticulatus* in Brazil varied from those observed in other snakes by: Dik (2012) on the *Natrix tessellata* Laurentine, in Turkey; Zhang & Uchikawa (1992) on *Morelia viridis* (Schlegel) in Japan; Mirón & Ivan (2003) on *Vipera ursinii* (Bonaparte) in Romania. The *O. natricis* females observed in Brazil can be distinguished from those described by Zhang & Uchikawa (1992) for having eternal shield trapezoidal.

This is the first SEM study concerning the diagnosis of female *O. natricis* mites in *P. reticulatus* collected in wild animals kept under human care, in the Brazil, which provides more anatomical information of adult females, and therefore, increasing our knowledge of snake mites.

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