

Taxonomy and Systematic/Taxonomia e Sistemática

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

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Ademar Ferreira da Silva¹, Zeneida Teixeira Pinto¹, Rodrigo Hidalgo Teixeira², Rodolfo Armando Cunha¹, Cesar Carriço^{1,3}, Rebecca Leal Caetano^{1,4}, Gilberto Salles Gazeta¹ & Marinete Amorim¹

1. Instituto Oswaldo Cruz/Fundação Oswaldo Cruz (IOC/FIOCRUZ). 2. Parque Zoológico Municipal Quinzinho de Barros. 3. Instituto Brasileiro de Medicina de Reabilitação-IBMR/LAUREATE. 4. Universidade Estácio de Sá (UNESA).

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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 hydrophilus*, 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 sternal 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 hydrophilus*, que pode causar sepsis hemorrágica em cobras. Este é o primeiro registro *O. natricis* em *Python reticulatus* (Schneider) coletados em cativeiro, no Brasil. O estudo foi realizado com o auxílio de microscopia óptica e observações de MEV, gerando desenhos e micrografias, o que permitiu observar importantes características de identificação da fêmea de *O. natricis*: superfície dorsal com dois escudos, consistindo em propodosoma e pigidial, já a superfície ventral possui apenas o escudo esternal com forma trapezoidal, com dois pares de cerdas e poros na borda. A identificação das fêmeas adultas de *O. natricis* coletados 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; GUIMARÃES *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; FAJFER 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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✉ Corresponding author:

Zeneida Teixeira Pinto

✉ zeneida@ioc.fiocruz.br

🌐 <http://orcid.org/0000-0001-9926-0096>

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MATERIAL AND METHODS

Ten females of *O. natricis* were deposited under number CAVAISS-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 (LIRN) – 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; MORAZA *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 6s390LV 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, cribrium (c) present, anal valves (av) nude (Figure 4 A-C). The triosternum (tr) (length 84.8 μm) with hyaline lateral membrane (Figure 2 B).

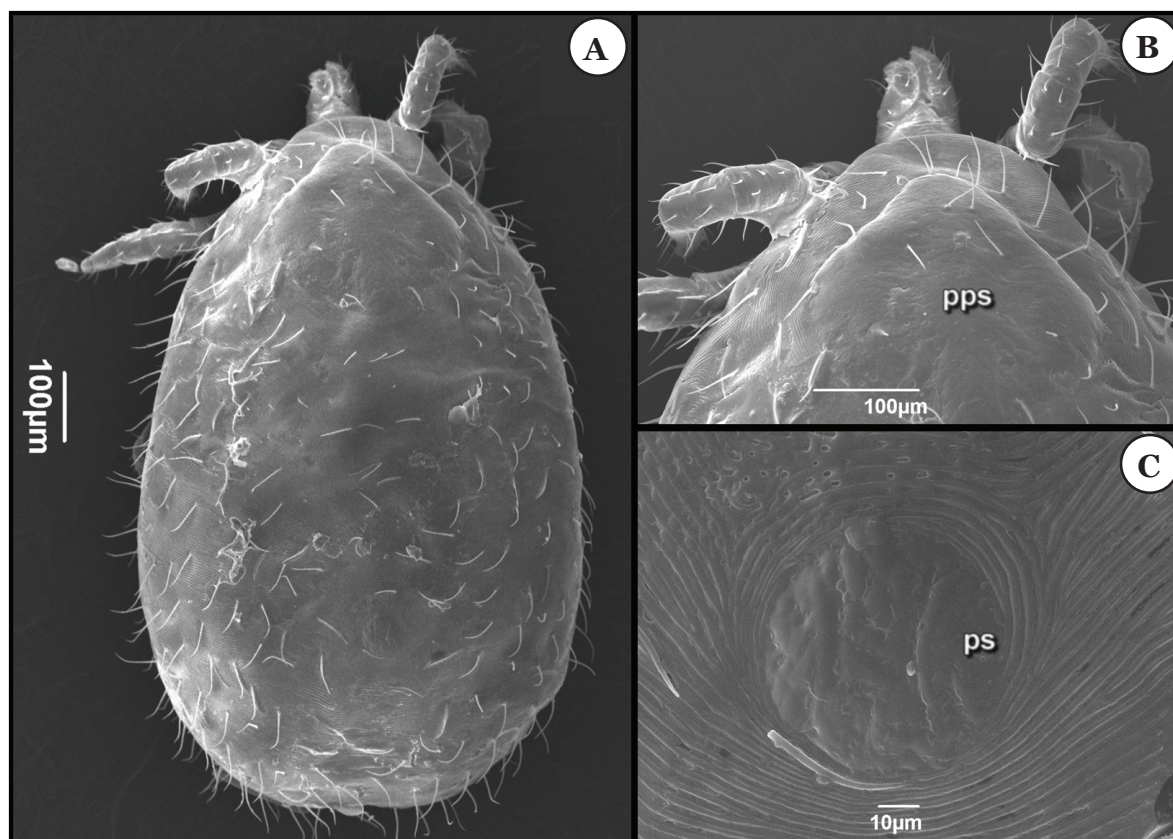


Figure 1. Scanning Electron Microscopy (SEM) of *Ophionyssus natricis* (A) Dorsal view, (B) Propodosomal shield (pps) and, (C) Pygidial shields (ps).

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) (CAMIN 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), *P*

schokari (Forskal), *Spalerosophis 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 & LOHANSEN 2005). MIRON & IVAN (2003) described *Ophionyssus viperae* from *Vipera ursinii* (Bonaparte) and was synonymized with *O. natricis* by MORAZA *et al.* (2009).

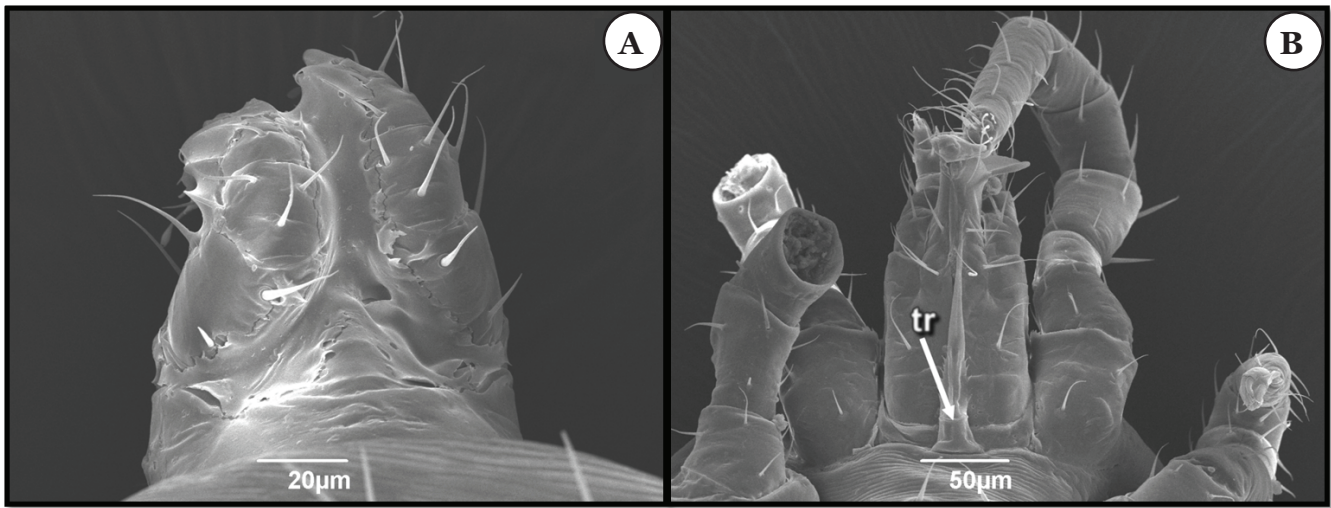


Figure 2. Scanning Electron Microscopy (SEM) of *Ophionyssus natricis*, (A) Dorsal view of gnathosoma and, (B) Ventral view of gnathosoma showing tritosternum (tr) with hyaline border.

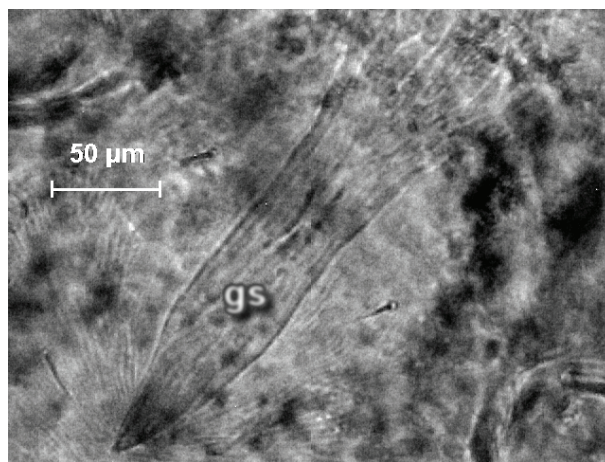


Figure 3. Light Microscopy image of *Ophionyssus natricis* - Ventral view showing genital shield (gs).

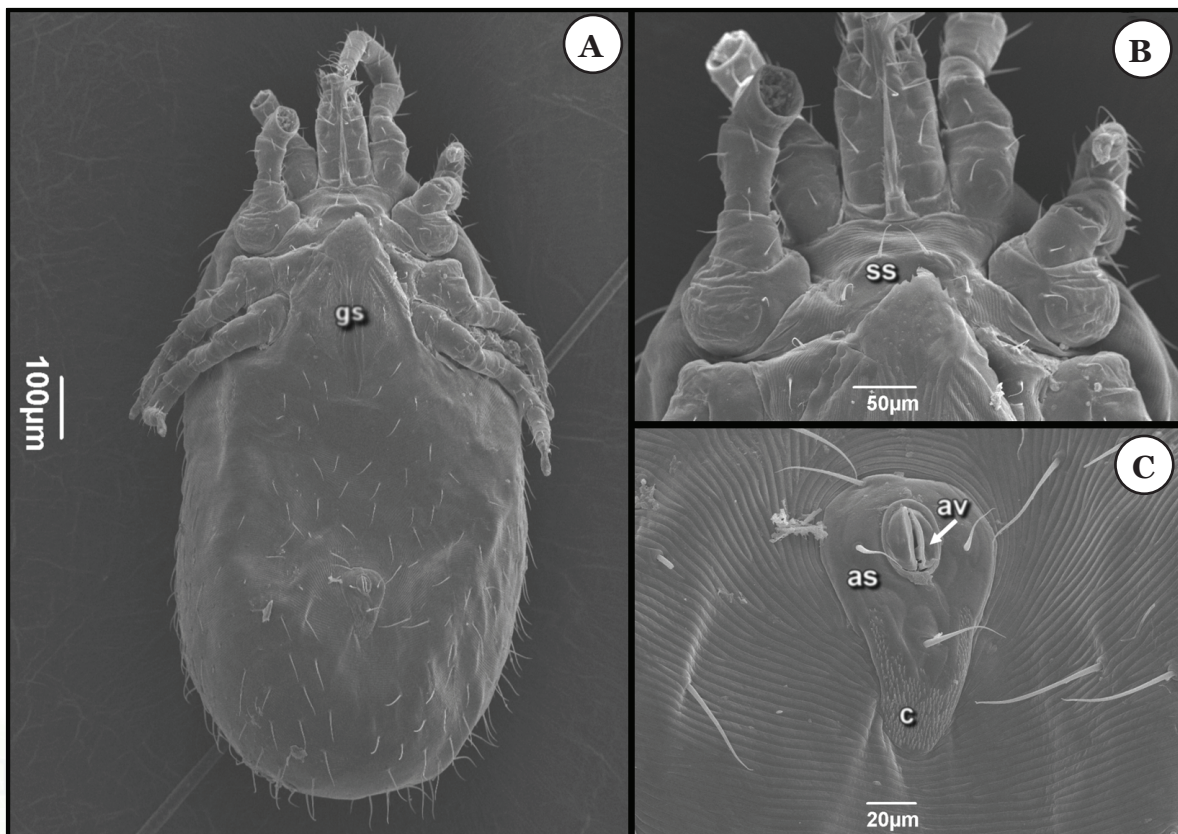


Figure 4. Scanning Electron Microscopy (SEM) of *Ophionyssus natricis*, (A) General ventral view showing genital shield (gs), (B) Sternal shield (ss), (C) Anal details - Anal shield (as), Anal valve (av), Cribrum (c).

The first record of *O. 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: DİK (2012) on the *Natrix tessellata* Laurente, in Turkey; Zhang & Uchikawa (1992) on *Morelia viridis* (Schlegel) in Japan; MIRON & 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 sternal 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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REFERENCES

- Amanatfard, E., R.Y. Mohammad. & A. Barimani, 2014. Human Dermatitis Caused by *Ophionyssus natricis*, a Snake Mite. Iran Journal of Parasitology, 9: 594-596.
- Belova, O.S. & O.V. Grigoriev, 1981. Occurrence of gamasid and ixodid ticks of reptiles of Western Siberia, 16-18 p. In: Borkin, L.J. (ed.): Herpetological investigations in Siberia and the Far East. Zoological Institute of the USSR Academy of Sciences. 148 p.
- Barbosa, A.B., H. Silva, H.N. Albuquerque & I.A.M. Ribeiro, 2006. Contribuição ao estudo parasitológico de jibóias, *Boa constrictor constrictor* Linnaeus, 1758, em cativeiro. Revista de Biologia Ciências Terra, 6: 1-19.
- Camin, J.H., 1948. Mite transmission of a hemorrhagic septicemia in snakes. Journal of Parasitology, 34, 345-354. DOI: <https://doi.org/10.2307/3273698>.
- Dik, B., 2012. Türkiye'de Bir Su Yılanında (*Natrix tessellata*, Laurente 1768) (Reptilia: Squamata: Colubridae) ilk *Ophionyssus natricis* (Gervais, 1844) Olgusu. Türkiye Parazitoloji Dergisi, 36, 112-115.
- Fain, A., 1962. Les acariens mesostigmatiques ectoparasites des serpents. Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, 38, 1-149.
- Fain, A. & B. Bannert, 2000. Two new species of *Ophionyssus* Mégnin (Acari: Macronyssidae) parasitic on lizards of the genus *Gallotia* Boulenger (Reptilia: Lacertidae) from the Canary Islands. International Journal of Acarology, 26: 41-50. DOI: <https://doi.org/10.1080/01647950008683634>.
- Fajfer, M., 2012. Acari (Chelicerata) - Parasites of Reptil. Acarina, 20: 108-129.
- Flechtman, C.H.H., 1975. Elementos de Acarologia. São Paulo, Livraria Nobel S.A, 344 p.
- Krantz, G.W. & D.E. Walter, 2009. A Manual of Acarology. 3rd ed. - Texas Tech University Press, Lubbock, 807 p.
- Miranda, R.J., J.E. Cleghorn, S.E. Bermúdez & M.E. Perott, 2017. Occurrence of the mite *Ophionyssus natricis* (Acari: Macronyssidae) on captive snakes from Panama. Acarologia, 57: 365-368. DOI: <https://doi.org/10.1051/acarologia/20164161>.
- Yunker, C.E., 1956. Studies on the snake mite, *Ophionyssus natricis*, in nature. Science, 124: 979-980. DOI: <https://doi.org/10.1126/science.124.3229.979>.
- Miron, L. & O. Ivan, 2003. O noua species a genului *Ophionyssus* Mégnin (1844) (Acari, Gamasida, Macronyssidae), ectoparazit pe *Vipera ursinii*. Scientia Parasitologica, 4: 172-174.
- Moraza, M.L., N.R. Irwin, R. Godinho, S.J.E. Baird & J.G. Bellocq, 2009. A new species of *Ophionyssus* Mégnin (Acari: Mesostigmata: Macronyssidae) parasitic on *Lacerta schreiberi* Bedriaga (Reptilia: Lacertidae) from the Iberian Peninsula, and a world key to species. Zootaxa, 58-68.
- Simonov, E. & V. Zinchenko, 2010. Intensive infestation of Siberian pit-viper, *Gloydius halys halys* by the common snake mite, *Ophionyssus natricis*. Journal of Zoology, 6: 134-137.
- Stanyukovich, M. & L. Lohanssen, 2005. Observations on the gamasid mites (Parasitomorpha, Gamasina, Macronyssidae, Laelapidae) parasitizing reptiles (Reptilia) from Russia and adjacent countries (ex-USSR). Herpetologia Petropolitana: Proceedings of the 12th Ordinary General Meeting of the Societas Europea Herpetologica / Russian Journal of Herpetology 12, Supplement, 310-311.
- Wozniak, E.J. & D.F. DeNardo, 2000. The Biological, clinical significance and control of common snake mite *Ophionyssus natricis*, in captive reptiles. Journal of Herpetology Medicine and Surgery, 10: 4-10.
- Zhang, M-Y. & K. Uchikawa, 1992. Occurrence of *Ophionyssus natricis* on zoo snakes in Japan (Mesostigmata, Macronyssidae). Journal of the Acarological Society of Japan, 2: 75-78. DOI: <https://doi.org/10.2300/acari.2.75>.

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