



# Parasitism by *Amblyomma ovale* on domestic dog in the central region of the state of Rio Grande do Sul, Brazil

Julia Somavilla Lignon<sup>\*1</sup>, Thiago Fernandes Martins<sup>2,3</sup> and Silvia Gonzalez Monteiro<sup>1</sup>

<sup>1</sup>Laboratório de Parasitologia Veterinária, Santa Maria Universidade Federal de Santa Maria, Av. Roraima, 1000, Cidade Universitária, Bairro Camobi, 97105-900, Santa Maria, Rio Grande do Sul, Brazil. <sup>2</sup>Departamento de Medicina Veterinária Preventiva e Saúde Animal, Faculdade de Medicina Veterinária e Zootecnia, Universidade de São Paulo, São Paulo, Brazil. <sup>3</sup>Instituto Pasteur, Area Técnica de Doenças Vinculadas a Vetores e Hospedeiros Intermediários, Secretaria de Estado da Saúde, São Paulo, São Paulo, Brazil. \*Author for correspondence. E-mail: julialignon@gmail.com

**ABSTRACT.** Ticks are obligate ectoparasite arthropods of the class Arachnida distributed worldwide and can parasitize many animals. They constitute one of the most important groups of vectors of infectious diseases, including zoonoses. The objective of this study was to report the parasitism by *Amblyomma ovale* Koch, 1844 in a domestic dog (*Canis lupus familiaris* Linnaeus, 1758) in Santa Maria, in the central region of the state of Rio Grande do Sul, Brazil. Two specimens of ectoparasites found on a domestic dog, living in a rural property, were sent to the Laboratory of Veterinary Parasitology at the Federal University of Santa Maria for taxonomic identification. The two specimens found were classified as adult male and female of *A. ovale*. Through this study, the parasitism of this species is reported for the first time in the central region of the state of Rio Grande do Sul, Brazil, in a domestic dog, allowing the infestation and transmission of diseases to humans.

**Keywords:** tick; ectoparasite; infestation.

Received on December 17 2021.

Accepted on April 13 2022.

## Introduction

Ticks are obligate arthropod ectoparasites of the class Arachnida that are distributed worldwide and can parasitize many animals, including terrestrial vertebrates, amphibians, reptiles, birds and mammals (Aragão, 1936; Vieira et al., 2004; Rio Grande Do Sul, 2018).

They comprise about 982 species, described in the world, divided between “hard” and “soft” ticks. The specimens popularly known as “hard” ticks, characterized by having a heavily sclerotized shield at all stages of development, are grouped in the family Ixodidae and in Brazil, the fauna of these ticks is represented by 53 species, mainly of the genus *Amblyomma* (Barros-Battesti, Arzua, & Bechara, 2006; Dantas-Torres, Martins, Muñoz-Leal, Onofrio, & Barros-Battesti, 2019).

These arthropods constitute one of the most important groups of infectious disease vectors for animals and humans. They are responsible for transmitting pathogens, such as bacteria of the genera *Anaplasma*, *Borrelia*, *Ehrlichia* and *Rickettsia*, and protozoa, such as *Babesia*, *Hepatozoon*, *Rangelia* and *Theileria*, to domestic and wild animals, including humans (Vieira et al., 2004), in addition to causing injuries to their hosts during hematophagy, such as irritation, inflammation and hypersensitivity and, when present in large numbers, can cause anemia and reduce productivity, therefore, they are important for public and animal health (Barros-Battesti et al., 2006).

The objective of this study was to report the parasitism by *Amblyomma ovale* Koch, 1844 on a domestic dog (*Canis lupus familiaris*) Linnaeus, 1758 in Santa Maria, in the central region of the state of Rio Grande do Sul, Brazil.

## Material and methods

Two specimens of ectoparasites found on a domestic mixed breed dog (Figure 1) were sent to the Laboratory of Veterinary Parasitology, Federal University of Santa Maria, for taxonomic identification at the species level. The animal lived in a rural property in the municipality of Santa Maria, in the central region of the state of Rio Grande do Sul, Brazil (29° 41' 03" S; 53° 48' 25" W) and the parasite specimens were found after external investigation of the animal, by the owner.

Specimens were carefully removed from the animals with the aid of tweezers, by twisting their longitudinal axis and preserved in 70% alcohol for later taxonomic classification.

Specimens were identified with the aid of a Leica EZ4 HD binocular stereoscopic microscope under incident lighting. Ixodid identification was carried out using the taxonomic key for adults of the genus *Amblyomma* (Barros-Battesti et al., 2006).

The ticks (one adult male and one adult female) were identified and deposited in the National Tick Collection Danilo Gonçalves Saraiva, School of Veterinary Medicine and Animal Science, University of São Paulo (USP) under accession number CNC 4383.



**Figure 1.** Domestic dog parasitized by *Amblyomma ovale* Koch, 1844.

## Results and discussion

The two specimens found on the domestic dog were classified as male and female adults of the species *Amblyomma ovale* Koch, 1844.

The species is characterized by a brown shield with coppery and greenish spots and the presence of a marginal groove that delimits posteriorly all the festoons (Figure 2 – A and Figure 3 – A). They have a hypostome with three rows of teeth-like projections on each side (Hypostome 3/3) (Figure 2 - B and Figure 3 - B) and the coxa I has two long spines, where the external spine is slightly curved outwards and a little longer than the internal one (Figure 2 – B and Figure 3 – C). Coxa IV has one spine (Figure 2 – C and Figure 3 - C) (Barros-Battesti et al., 2006).



**Figure 2.** Adult male of *Amblyomma ovale* Koch, 1844, dorsally and ventrally. A- Brown colored shield with coppery and greenish spots and the presence of a marginal groove indicated by the arrow; B- Hypostomium 3/3 and coxa I with two spines; C- Coxa IV with one spine.



**Figure 3.** Adult female of *Amblyomma ovale* Koch, 1844, dorsally and ventrally. A- Brown colored shield with coppery and greenish spots and the presence of a marginal groove indicated by the arrow; B- Hypostomium 3/3; C- Coxa I with two spines and coxa IV with one spine.

According to Rubini, Paduan, Martins, Labruna, and O'Dwyer (2009), the protozoan *Hepatozoon canis*, in addition to bacteria of the genus *Rickettsia* (*R. parkeri*), has been associated with a possible vector capacity of ticks of the species *A. ovale* (Nieri-Bastos et al., 2016; Acosta et al., 2018; Seva et al., 2019). Brazilian Spotted Fever, for example, is a severe acute febrile infectious disease with high lethality caused by *Rickettsia rickettsii*, and *Amblyomma sculptum* (Cayenne tick) is considered its main vector, and, to date, there is no record of its occurrence in the state of Rio Grande do Sul. Nevertheless, the disease is diagnosed in the state with the involvement of other tick species, including *A. ovale*, as well as other variants and/or types of bacteria causing the disease and that are included in the Spotted Fever Group (Krawczak et al., 2016b; Rio Grande do Sul, 2018).

In 2010, a new agent belonging to the spotted fever group, called *Rickettsia* sp. strain Atlantic rainforest, was described from a patient in the state of São Paulo, southeastern Brazil (Spolidorio et al., 2010). In 2011, a second clinical case caused by this new agent was described in the state of Bahia, northeastern Brazil (Silva et al., 2011). And more recently, a third clinical case was reported in the state of Santa Catarina, southern Brazil (Krawczak et al., 2016c). These three clinical cases were epidemiologically linked to the tick *A. ovale* (Szabo et al., 2013; Barbieri et al., 2014; Nieri-Bastos et al., 2016), which proved to be a competent vector for *Rickettsia* sp. strain Atlantic rainforest (Krawczak, Agostinho, Polo, Moraes-Filho, & Labruna, 2016a).

Ticks of the species *A. ovale* have a wide geographic distribution in several countries in Central and South America (Barros-Battesti et al., 2006). Gomes, Pesenti, and Müller (2015) have already reported parasitism by *A. ovale* on nine-banded armadillos (*Dasypus novemcinctus*) in Camaquã, state of Rio Grande do Sul (RS). Krawczak et al. (2016b) reported the occurrence of this tick on domestic dogs, on the rodent, montane grass mouse (*Akodon montensis*) besides the marsupial white-eared opossum (*Didelphis albiventris*) in the municipality of Cerro Largo, northwest of the state of Rio Grande do Sul. They have also been reported in other states parasitizing dogs (Labruna et al., 2001; Ferreira, Bezerra, Carvalho, Almeida, & Mafra, 2013) and wild animals (Andrade, Avila, Carvalho, & Bricarello, 2015; Lavina, Souza, Sartor, & Moura, 2015; Gianizella, Martins, & Onofrio, 2018). However, there are no records in the central region of the state of Rio Grande do Sul.

Although it is a species with clearly wild habits, commonly found in canids, felids and described in procyonids and mustelids (Labruna et al., 2005), this is the first report of parasitism by *A. ovale* on domestic dogs in the studied region. The species has also been reported parasitizing humans in the state of Santa Catarina and Rio Grande do Sul (Jaguezeski, Lavina, Orsolin, & Silva, 2018; Reck et al., 2018), therefore, it deserves attention from public health services, since the proximity between dogs, which enter the woods close to the residences and can carry ticks of wild fauna into the house, and for men. In addition, human hunting behavior and ecotourism activities end up facilitating contact and human infestation by the tick, in addition to contracting diseases (Rio Grande do Sul, 2018).

## Conclusion

Through this study, the parasitism by *Amblyomma ovale* Koch, 1844 is reported for the first time in Santa Maria, in the central region of the state of Rio Grande do Sul, Brazil, in a domestic dog, allowing the infestation and transmission of diseases to humans.

## References

- Acosta, I. C. L., Luz, H. R., Faccini-Martínez, Á. A., Leal, S. M., Junior, C. C., & Labruna, M. B. (2018). First molecular detection of *Rickettsia* sp. strain Atlantic rainforest in *Amblyomma ovale* ticks from Espírito Santo state, Brazil. *Revista Brasileira de Parasitologia Veterinária*, 27(3), 420-422. DOI: <https://doi.org/10.1590/S1984-296120180017>
- Andrade, B. V., Avila, T. S., Carvalho, O., & Bricarello, P. A. (2015). First Record of *Amblyomma ovale* (Koch, 1844) (Acari: Ixodidae) parasitizing *Lontra longicaudis* (Olfers, 1818) (Carnivora: Mustelidae) in Santa Catarina Island, Florianópolis, Sc, Brazil. *Otter Specialist Group Bulletin*, 32, 33-39.
- Aragão, H. (1936). Ixodidas brasileiros e de alguns países limítrofes. *Memórias do Instituto Oswaldo Cruz*, 31(4), 759-843.
- Barbieri, A. R., Filho, J. M., Nieri-Bastos, F. A., Souza, J. C. J., Szabo, M. P., & Labruna, M. B. (2014). Epidemiology of *Rickettsia* sp. strain Atlantic rainforest in a spotted fever-endemic area of southern Brazil. *Ticks and Tick-borne Diseases*, 5(6), 848-853. DOI: <https://doi.org/10.1016/j.ttbdis.2014.07.010>
- Barros-Battesti, D. M., Arzuza M., & Bechara, G. H. (2006). *Carrapatos de importância médico-veterinária da região neotropical: um guia ilustrado para identificação de espécies*. São Paulo, SP: Vox.
- Dantas-Torres, F., Martins, T. F., Muñoz-Leal, S., Onofrio, V. C., & Barros-Battesti, D. M. (2019). Ticks (Ixodida: Argasidae, Ixodidae) of Brazil: Updated species checklist and taxonomic keys. *Ticks and Tick-borne Diseases*, 10(6), 101252. DOI: <http://dx.doi.org/10.1016/j.ttbdis.2019.06.012>
- Ferreira, C. G. T., Bezerra, A. C. D. S., Carvalho, O. V., Almeida, M. R., & Mafra, C. (2013). First occurrence of *Amblyomma ovale* in the State of Rio Grande do Norte, Brazil. *Revista Brasileira de Parasitologia Veterinária*, 22, 167-170. DOI: <https://doi.org/10.1590/S1984-29612013000100032>
- Gianizella, S. L., Martins, T. F., & Onofrio, V. C. (2018). Ticks (Acari: Ixodidae) of the State of Amazonas, Brazil. *Experimental and Applied Acarology*, 74, 177-183. DOI: <https://doi.org/10.1007/s10493-018-0221-7>
- Gomes, S. N., Pesenti, T. C., & Müller, G. (2015). Parasitism by *Amblyomma ovale* and *Amblyomma fuscum* (Acari: Ixodidae) on *Dasybus novemcinctus* (Xenarthra: Dasypodidae) in Brazil. *Arquivos do Instituto de Biologia*, 82, 1-4. DOI: <https://doi.org/10.1590/1808-1657001132013>
- Jaguezski, A. M., Lavina, M. S., Orsolin, V., & Silva, A. S. (2018). *Amblyomma ovale* parasitizing a human. *Comparative Clinical Pathology*, 27, 535-537. DOI: <https://doi.org/10.1007/s00580-017-2591-3>
- Krawczak, F. S., Agostinho, W. C., Polo, G., Moraes-Filho, J., & Labruna, M. B. (2016a). Comparative evaluation of *Amblyomma ovale* ticks infected and noninfected by *Rickettsia* sp. strain Atlantic rainforest, the agent of an emerging rickettsiosis in Brazil. *Ticks and Tick-borne Diseases*, 7(3), 502-507. DOI: <https://doi.org/10.1016/j.ttbdis.2016.02.007>
- Krawczak, F. S., Binder, L. C., Oliveira, C. S., Costa, F. B., Filho, J. M., Martins, T. F., ... Labruna, M. B. (2016b). Ecology of a tick-borne spotted fever in southern Brazil. *Experimental and Applied Acarology*, 70, 219-229. DOI: <https://doi.org/10.1007/s10493-016-0070-1>
- Krawczak, F. S., Muñoz-Leal, S., Guztazaky, A. C., Oliveira, S. V., Santos, F. C. P., Angerami, R. N., ... Labruna, M. B. (2016c). Case Report: *Rickettsia* sp. strain Atlantic rainforest infection in a human patient from a spotted fever-endemic area in southern Brazil. *American Journal of Tropical Medicine and Hygiene*, 95(3), 551-553. DOI: <https://dx.doi.org/10.4269%2Fajtmh.16-0192>
- Labruna, M. B., Souza, S. L. P., Guimarães-Junior, J. S., Pacheco, R. C., Pinter, A., & Gennari, S. M. (2001). Prevalence of ticks on dogs from rural areas at northern region of Paraná. *Arquivo Brasileiro de Medicina Veterinária e Zootecnia*, 53(5). <https://doi.org/10.1590/S0102-09352001000500007>
- Labruna, M. B., Jorge, R. S., Sana, D. A., Jácomo, A. T. A., Kashivakura, C. K., Furtado, M. M., ... Barros-Battesti, D. M. (2005). Ticks (Acari: Ixodida) on wild carnivores in Brazil. *Experimental and Applied Acarology*, 36, 149-163. DOI: <https://doi.org/10.1007/s10493-005-2563-1>
- Lavina, M. S., Souza, A. P., Sartor, A. A., & Moura, A. B. (2015). Ixodids in wild animals of the mountainous plateau Region of Santa Catarina State, Brazil. *Semina: Ciências Agrárias*, 36(5), 3173-3180. DOI: <http://dx.doi.org/10.5433/1679-0359.2015v36n5p3173-3180>
- Nieri-Bastos, F. A., Horta, M. C., Barros-Battesti, D. M., Moraes-Filho, J., Ramirez, D. G., Martins, T. F., & Labruna, M. B. (2016). Isolation of the Pathogen *Rickettsia* sp. Strain Atlantic Rainforest From Its

- Presumed Tick Vector, *Amblyomma ovale* (Acari: Ixodidae), From Two Areas of Brazil. *Journal of Medical Entomology*, 53(4), 977-981. DOI: <https://doi.org/10.1093/jme/tjw062>
- Reck, J., Kieling, E., Dall'Agnol, B., Webster, A., Michel, T., Doyle, R., ... Martins, J. R. (2018). Records of ticks on humans in Rio Grande do Sul state, Brazil. *Ticks and Tick-borne Diseases*, 9(5), 1296-1301. DOI: <https://doi.org/10.1016/j.ttbdis.2018.05.010>
- Rio Grande do Sul, Secretaria Estadual da Saúde, Centro Estadual de Vigilância em Saúde. (2018). *Guia de Vigilância Acarológica: vetores e hospedeiros da febre maculosa e outras riquetsioses no Rio Grande do Sul*. Porto Alegre: CEVS/RS.
- Rubini, A. S., Paduan, K. S., Martins, T. F., Labruna, M. B., & O'Dwyer, L. H. (2009). Acquisition and transmission of *Hepatozoon canis* (Apicomplexa: Hepatozoidae) by the tick *Amblyomma ovale* (Acari: Ixodidae). *Veterinary Parasitology*, 164(2-4), 324-327. DOI: <https://doi.org/10.1016/j.vetpar.2009.05.009>
- Seva, A. P., Martins, T. F., Munoz-Leal, S., Rodrigues, A. C., Pinter, A., Luz, H. R., ... Labruna, M. B. (2019). A human case of spotted fever caused by *Rickettsia parkeri* strain Atlantic rainforest and its association to the tick *Amblyomma ovale*. *Parasites and Vectors*, 12(471) 1-5. DOI: <https://doi.org/10.1186/s13071-019-3730-2>
- Silva, N., Eremeeva, M. E., Rozental, T., Ribeiro, G. S., Paddock, C. D., Ramos, E. A. G., ... Ko, A. I. (2011). Eschar-associated spotted fever Rickettsiosis, Bahia, Brazil. *Emerging Infectious Diseases*, 17(2), 275-278. DOI: <https://dx.doi.org/10.3201%2Faid1702.100859>
- Spolidorio, M. G., Labruna, M. B., Mantovani, E., Brandao, P., Richtzenhain, L. J., & Yoshinari, N. H. (2010). Novel spotted fever group rickettsioses, Brazil. *Emerging Infectious Diseases*, 16(3), 521-523. DOI: <https://dx.doi.org/10.3201%2Faid1603.091338>
- Szabo, M. P., Nieri-Bastos, F. A., Spolidorio, M. G., Martins, T. F., Barbieri, A. M., & Labruna, M. B. (2013). *In vitro* isolation from *Amblyomma ovale* (Acari: Ixodidae) and ecological aspects of the Atlantic rainforest *Rickettsia*, the causative agent of a novel spotted fever rickettsiosis in Brazil. *Parasitology*, 140(6), 719-728. DOI: <https://doi.org/10.1017/s0031182012002065>
- Vieira, A. M. L., Souza, C. E., Labruna, M. B., Mayo, R. C., Souza, S. S. L., & Camargo-Neves, V. L. F. (2004). *Manual de Vigilância Acarológica do Estado de São Paulo*. São Paulo, SP: SUCEN.