

## SHORT COMMUNICATION

### FIRST RECORD OF *AMBLYOMMA OVALE* (KOCH, 1844) (ACARI: IXODIDAE) PARASITIZING *Lontra longicaudis* (OLFERS, 1818) (CARNIVORA: MUSTELIDAE) IN SANTA CATARINA ISLAND, FLORIANÓPOLIS, SC, BRAZIL

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**Abstract:** Three female and one male *Amblyomma ovale* (Acari: Ixodidae) were found parasitizing a neotropical otter (*Lontra longicaudis*) (Carnivora: Mustelidae) in Florianópolis, SC, Brazil. This is the first record of the occurrence of *A. ovale* in Santa Catarina Island and the second report of this ectoparasite in a mustelid species in Brazil. *A. ovale* has been reported in wild carnivores in several Brazilian states and is considered one of the main predominant species of the Atlantic rainforest. The *Amblyomma* ticks are primarily responsible for the spread of BSF in humans. Among the species of *Amblyomma* infesting dogs is the *A. ovale* and the proximity between man and the dog favors the parasite sharing. Santa Catarina Island has many rural and wild environments shared by domestic animals, especially dogs, such as the environment where the otter was found in this study. Proper determination of tick species and their distribution in different geographical regions is essential for the understanding of the epidemiology of Rickettsiosis.

Keywords: Ixodidae, ticks, mustelidae, carnivores.

This paper reports the discovery of four specimens of adult ticks attached to *Lontra longicaudis* (Olfers, 1818) (Mammalia: Mustelidae) in the southern part of Santa Catarina Island, state of Santa Catarina, Brazil. Three female and one male *Amblyomma ovale* (Koch, 1844) (Acari: Ixodidae) were collected from an otter killed by a car on Highway SC-401, which leads from Florianópolis to the airport.

The animal was collected and transferred to Ekko Brasil Institute's Otter Project located at Lagoa do Peri, on the southern tip of Santa Catarina Island. The Otter Project carries out research on the species *Lontra longicaudis* and treats injured otters, which are often attacked by dogs or hit by cars. Most of the research is with wild otters but in the last 5 years otters in captivity became also an important focus including studies on hematological and biochemical profile, concentrations of testosterone, progesterone, corticosterone and estradiol in fecal metabolites excreted by *Lontra longicaudis* individuals, as well as description of reproduction phases. This

work represents the beginning of a research program on parasites of neotropical otters in Brazil.

The tick specimens were examined at the Laboratory of Animal Parasitology of the Center for Agricultural Sciences at the Federal University of Santa Catarina (UFSC). Based on taxonomic keys, the ticks were identified as belonging to the species *A. ovale*. According to the taxonomic key created by Barros-Battesti et al. (2006), the analyzed specimens of *A. ovale* show hypostome 3/3; distinct marginal groove, subsequently limiting all festoons; a coppery brown shield with greenish spots (Figure 1a, c); leg I with two contiguous spines, acute, and the long length of the thigh, with the outer leg slightly bent out and slightly longer than the internal one (Figure 1b,d).



**Figure 1.** a) male dorsal. b) male ventral. c) female dorsal. d) female ventral. Specimens showing taxonomic characteristics of *Amblyomma ovale*, as described in the taxonomic key of Barros-Battesti et al. (2006). a and c show the coppery brown shield with greenish spots. b and d show legs with two long spines, the outer slightly curved outward and slightly longer than the internal.

One adult male and 3 adult females were identified. The ticks were examined under 40X magnification with 0.37x lenses (Opticam Microscopy Technology®, Opzt Standart Model) and photographed at a resolution of with 1.25x1.25 pixels (µm) (Opticam Microscopy Technology®, Camera OPT 14MP Model).

There are currently 896 tick species cataloged in the world, divided into three families: Argasidae and Ixodidae, which are distributed on all the continents, and Nuttalliellidae, which is restricted to Africa. The family Ixodidae comprises 702 species of hard-bodied ticks (Guglielmone et al., 2010). The tick fauna of Brazil currently comprise 61 species: 9 species of *Ornithodoros*, 3 species of *Antricola*, 1 species of *Argas*, 33 species of *Amblyomma*, 9 species of *Ixodes*, 3 species of *Haemaphysalis*, 2 species of *Rhipicephalus* and 1 species of *Dermacentor* (Barros-Battesti et al., 2006). They are obligate haematophagous ectoparasitic arthropods that can infest various species of vertebrates (Luz et al., 2014).

The genus *Amblyomma* consists of 106 species, from which 45 are found only in the Neotropics. This genus includes the largest ticks with ornate shields. Their main hosts are amphibians, reptiles, birds and mammals (Guimarães et al., 2001). *A. ovale* is a three-host tick species and the primary hosts in the adult stage are wild carnivores

(Labruna et al., 2005b; Barros-Battesti et al., 2006), while birds and small rodents act as its hosts in its immature stages (Labruna et al., 2005b; Szabó et al., 2013b).

*Amblyomma ovale* is widely distributed, especially in the South American countries, particularly Argentina, Brazil and Paraguay. In Brazil, *A. ovale* adults have been found parasitizing carnivores in different biomes such as the Amazon Forest (Labruna et al., 2005a), Pantanal (Pereira et al., 2000), Atlantic Rainforest (Labruna et al., 2005b; Szabó et al., 2009; Sabatini et al., 2010) and Cerrado (Szabó et al., 2007). In a study performed in the south of Brasil, Santa Catarina state, between 2006-2008, a total of 260 adult ticks from domestic and wild animals were collected.

Of the 260 adult ticks collected from domestic dogs, 217 belonged to genus *Amblyomma* and 82 to *A. ovale* (Medeiros et al., 2011). Adults of *A. aureolatum* and *A. ovale* were collected in relatively large amounts, both on the vegetation and on dogs during the study in Serra do Mar State Park, state of São Paulo, Brazil. According to the study authors, these two species were not found sympatrically: while free-living *A. aureolatum* were found only in high altitude trails (700 m above sea level), free-living *A. ovale* were found only in low altitude trails (100 m above sea level) (Sabatini et al., 2010).

Adults of *A. ovale* have a preference for carnivores, particularly wild cats (Guglielmone et al., 2003; Martins et al., 2015), but it is not rare to find them parasitizing humans, especially in the state of São Paulo (Guglielmone et al., 2006), western Amazon (Labruna et al., 2005a) and Southeastern of Brazil (Szabó et al., 2006). According to Labruna et al. (2005a), *A. ovale* and *A. oblongoguttatum* are the main species that infest the order Carnivora in the Amazon. In Brazil, Labruna et al. (2005b) found *A. ovale* in *Puma concolor*, *Panthera onca*, *Leopardus pardalis*, *Leopardus wiedii*, *Cerdocyon thous*, *Chrysocyon brachyurus*, *Speothos venaticus*, *Procyon cancrivorus*, *Nasua nasua*, *Galictis vittata*, *Galictis cuja*, *Eira barbara* and *Lontra longicaudis*.

Many parts of the south of Santa Catarina Island still present primary Atlantic Rainforest. Lagoa do Peri, with its five square kilometers of surface water, is the largest freshwater lake along the coast of the state of Santa Catarina, and is considered as a hotspot for the neotropical otter (Carvalho-Junior, 2007). *Lontra longicaudis* is a semi-aquatic carnivorous mammal of nocturnal and crepuscular habits. It belongs to the family Mustelidae, which is widely distributed in South America and lives in environments such as coastal islands, rivers, lakes, sandy and rocky beaches, lagoons and bays (Carvalho-Junior et al., 2012). The need for constant movement forces this animal to use different environments in search of food and mates (Carvalho-Junior, 2007).

The Neotropical otter, which feeds mainly on fish and crustaceans, can make slight changes in some of the prey items of its diet, but the final composition does not change (Quadros et al., 2001; Carvalho-Junior, 2007; Carvalho-Junior et al., 2010a; Carvalho-Junior et al., 2010b). Molluscs, small mammals, birds and reptiles complete the diet of this species, but in a smaller proportion (Alarcon et al., 2004; Carvalho-Junior et al., 2010b; Quintela et al., 2008).

Ticks are widespread and the proximity between urban and forest areas facilitates the movement of parasites between these two environments. Because they are obligate haematophagous arthropods, they are reported as vectors of pathogenic bioagents between animals and humans, which may pose serious public and animal health problems (Szabó et al., 2001; Szabó et al., 2006). Among the major diseases is Brazilian Spotted Fever (BSF), the main disease passed on by arthropods to humans in Brazil, which is transmitted by tick bites in wild and urban environments and is caused by the bacterium *Rickettsia rickettsii* (Guedes et al., 2011).

*Amblyomma* ticks are primarily responsible for the spread of BSF in humans. The low host specificity encourages the adaptation and diffusion of species of this genus to different hosts and environments (Perez et al., 2008). In Brazil, a novel strain of *R. parkeri* (strain Atlantic rainforest) was recently reported to cause human disease (Spolidorio et al., 2010).

*Rickettsia* was shown to be strongly associated with *A. ovale* ticks in the Atlantic rainforest and seems to have a wide range, at least in the south–southeastern Atlantic coast of Brazil (Szabó et al., 2013a). Adults of this species of ticks easily stick to dogs and are often reported in dogs living in rural areas near natural areas (Szabó et al., 2001; Szabó, 2013b; Medeiros et al., 2011). The dog is considered the main transport for ticks between urban and natural environments. Among the species of *Amblyomma* infesting dogs is *A. Ovale*, and the proximity between man and the dog favors parasite sharing (Szabó et al., 2001). The island of Santa Catarina has many rural and wild environments shared by domestic animals, especially dogs, such as where the otter was found in this study. Humans can be *Rickettsia* infected if bitten by ticks during incursions into the forest or by ticks detached from dogs (Sabatini et al., 2010).

In Blumenau municipality, state of Santa Catarina, southern Brazil, in which tick-borne spotted fever illness has been endemic since 2003, a total of 53 dogs were examined for ticks from 25 households surrounded by Atlantic rainforest areas in 2011. A total of 153 adult ticks were collected from dogs. *A. ovale* was the most prevalent species (34% occurrence) and *A. aureolatum* was the second most prevalent (18.9%), followed in a much lesser extent by *R. sanguineus* (3.8%). A total of 6 (7.8%) *A. Ovale* and 4 (9.3%) *A. aureolatum* were infected by the *Rickettsia* sp. Atlantic rainforest strain (Barbieri et al., 2014). The importance of dogs in the epidemiology of the Atlantic rainforest rickettsiosis goes beyond possible *Rickettsia* reactivation in *A. ovale* ticks (Szabó et al., 2013a).

Limiting the access of dogs to wildlife areas can be a viable initiative but it relies on education of owners and government control of free-roaming ownerless dog populations in local environmental conservation areas. The urbanization of environments near lakes and rivers on the island of Santa Catarina resulted in serious changes in the ecosystem with consequent changes in the relationship between ticks and hosts, creating new scenarios for tick-borne diseases. Proper determination of tick species and their distribution in different geographical regions is essential for the understanding of the epidemiology of Rickettsiosis.

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**RÉSUMÉ : PREMIER ENREGISTREMENT DE *Amblyomma ovale* (KOCH, 1844) (ACARI: IXODIDAE) PARASITANT *Lontra longicaudis* (OLFERS, 1818) (CARNIVORA: MUSTELIDAE) A FLORIANOPOLIS SUR L'ILE DE SANTA CATARINA ISLAND AU BRÉSIL**

Quatre tiques dures *Amblyomma ovale* (Acari: Ixodidae), trois femelles et un male, ont été trouvés entraînant de parasiter la Loutre à longue queue des néotropiques *Lontra longicaudis* (Carnivora: Mustelidae) dans la ville brésilienne Florianópolis. Ceci constitue le premier enregistrement de la présence de *A. ovale* sur l'île Santa Catarina et cet enregistrement est le second concernant cet ectoparasite chez les Mustélidés au Brésil. *A. ovale* a été observé sur les carnivores sauvages de plusieurs états brésiliens et est considéré comme l'une des espèces prédominantes des forêts tropicales atlantiques. Ces tiques du type *Amblyomma* sont les principaux responsables de la propagation de la fièvre pourprée du Brésil chez les humains. Parmi les espèces d'*Amblyomma* c'est *A. ovale* qui infeste les chiens, et leur proximité avec les Hommes favorise le passage de ce parasite du chien à l'hôte humain. L'île Santa Catarina présente beaucoup d'environnements ruraux et sauvages qui sont partagés avec des animaux domestiques qui sont essentiellement des chiens, et la Loutre parasitée de cette étude a été trouvée dans une de ces types d'environnement partagés. Une détermination poussée des espèces de tiques et de leur distribution au sein de différentes zones géographiques s'avère donc être essentielle dans l'étude épidémiologique de Rickettsiosis.

**RESUMEN : PRIMER REGISTRO DE *Amblyomma ovale* (KOCH, 1844) (ACARI:IXODIDAE) PARASITANDO A *Lontra longicaudis* (OLFERS, 1818) (CARNIVORA: MUSTELIDAE) EN LA ISLA DE SANTA SATARINA, FLORIANÓPOLIS, SC, BRASIL**

Encontramos tres hembras y un macho de *Amblyomma ovale* (Acari: Ixodidae) parasitando una nutria neotropical (*Lontra longicaudis*) (Carnivora: Mustelidae) en Florianópolis, SC, Brasil. Este es el primer registro de la ocurrencia de *A. ovale* en la Isla de Santa Catarina, y el segundo reporte de este ectoparásito en una especie de mustélido en Brasil. *A. ovale* ha sido informada en carnívoros silvestres en varios estados de Brasil, y es considerada una de las especies predominantes en la selva Atlántica. Las garrapatas *Amblyomma* son primariamente responsables de la dispersión de la Fiebre Manchada Brasileira en los humanos. Entre las especies de *Amblyomma* que infestan a perros, está *A. ovale*, y la

proximidad entre humanos y perros favorece que se compartan parásitos. La Isla de Santa Catarina tiene muchos ambientes rurales y silvestres compartidos por animales domésticos, especialmente perros, como el ambiente donde se encontró a la nutria en este estudio. La adecuada determinación de las especies de garrapatas y su distribución en diferentes regiones geográficas es esencial para la comprensión de la epidemiología de las Rickettsiosis.

**RESUMO: TRÊS FÊMEAS E UM MACHO DE *Amblyomma ovale* (ACARI: IXODIDAE) FORAM ENCONTRADOS PARASITANDO UMA LONTRA (*Lontra longicaudis*) (CARNIVORA: MUSTELIDAE) EM FLORIANÓPOLIS, SC, BRASIL.**

Este é o primeiro registro de encontro de *A. ovale* na ilha de Santa Catarina e o segundo relato deste ectoparasita parasitando espécies de mustelídeos no Brasil. O *A. ovale* tem sido relatado em carnívoros silvestres, distribuído em vários estados brasileiros e considerado umas das principais espécies predominantes da Mata Atlântica. Os carrapatos do gênero *Amblyomma* são os principais responsáveis pela propagação do BSF em seres humanos. O *A. ovale* está dentre as espécies que infestam cães, e a proximidade entre homem e cão favorece o compartilhamento do parasita. A ilha de Santa Catarina tem diversos ambientes rurais e silvestres compartilhados por animais domésticos, especialmente cães, como o ambiente onde a lontra foi encontrada neste estudo. A determinação adequada das espécies de carrapatos e sua distribuição nas diferentes regiões geográficas é essencial para compreensão da epidemiologia da Rickettsioses