

## Short note

# First record of *Amblyomma tigrinum* (Acari: Ixodidae) on puma (*Puma concolor*) in Argentina and new associations for carnivores in San Juan province

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**ABSTRACT.** *Amblyomma tigrinum* is a tick species widely distributed in South America. In Argentina, it has been recorded to occur in nearly all phytogeographic regions, exhibiting its plasticity to different types of environments. This tick is of medical and veterinary importance because its adult stages have been recorded primarily in mammals, including humans. Specifically in San Juan province, records of *A. tigrinum* are almost non-existent, with only two mentions, but which have no indication of host or specific place of collection. For this reason, the goal of this study is to report the first case of *A. tigrinum* in Argentina, as well as two new parasite-host associations of the adult tick in other carnivores in San Juan. We analyzed two individuals, one puma and one fox, which arrived at the Wildlife Rehabilitation, Environmental Education and Responsible Recreation Center (Parque Faunístico). Moreover, we analyzed one canid specimen obtained during a field sampling event. Our results indicated new records for San Juan province of *A. tigrinum* parasitizing *Canis familiaris* and *Lycalopex gymnocercus*, in addition to the first record for Argentina of this tick parasitizing a *Puma concolor* individual. The present study affords novel information about natural associations for carnivore hosts in San Juan province, and the first record of this tick on a puma for Argentina. Thus, we are contributing to the knowledge of parasite-host relationships on the group of carnivores in Argentina.

**Keywords:** *Puma concolor*, *Canis familiaris*, *Lycalopex gymnocercus*, parasite-hosts, wildlife, San Juan

## Introduction

Hard ticks (Class Arachnida, Order Acari, Family Ixodidae) are obligate ectoparasites of terrestrial vertebrates [1]. These ectoparasites are important to public and animal health for their transmission of various infectious agents and for they are known to cause serious diseases in their hosts [2]. They cause great weakness in animals because of the abundant blood removal resulting from massive infestations [3]. Furthermore, they can both directly and indirectly harm their hosts,

toxins produced by ticks can bring about paralysis, and wounds from tick bites are prone to infection [1].

About 650 species of hard ticks have been described, most of them distributed among 10 genera [3]. Three of the major tick genera from a medical viewpoint are *Dermacentor*, *Ixodes* and *Amblyomma* [1]. The genus *Amblyomma* encompasses large-sized, ornamented ticks, and is constituted by cosmopolitan species, many of which occur in South America [4]. There are approximately 137 species of *Amblyomma* (family Ixodidae), represented in South America's

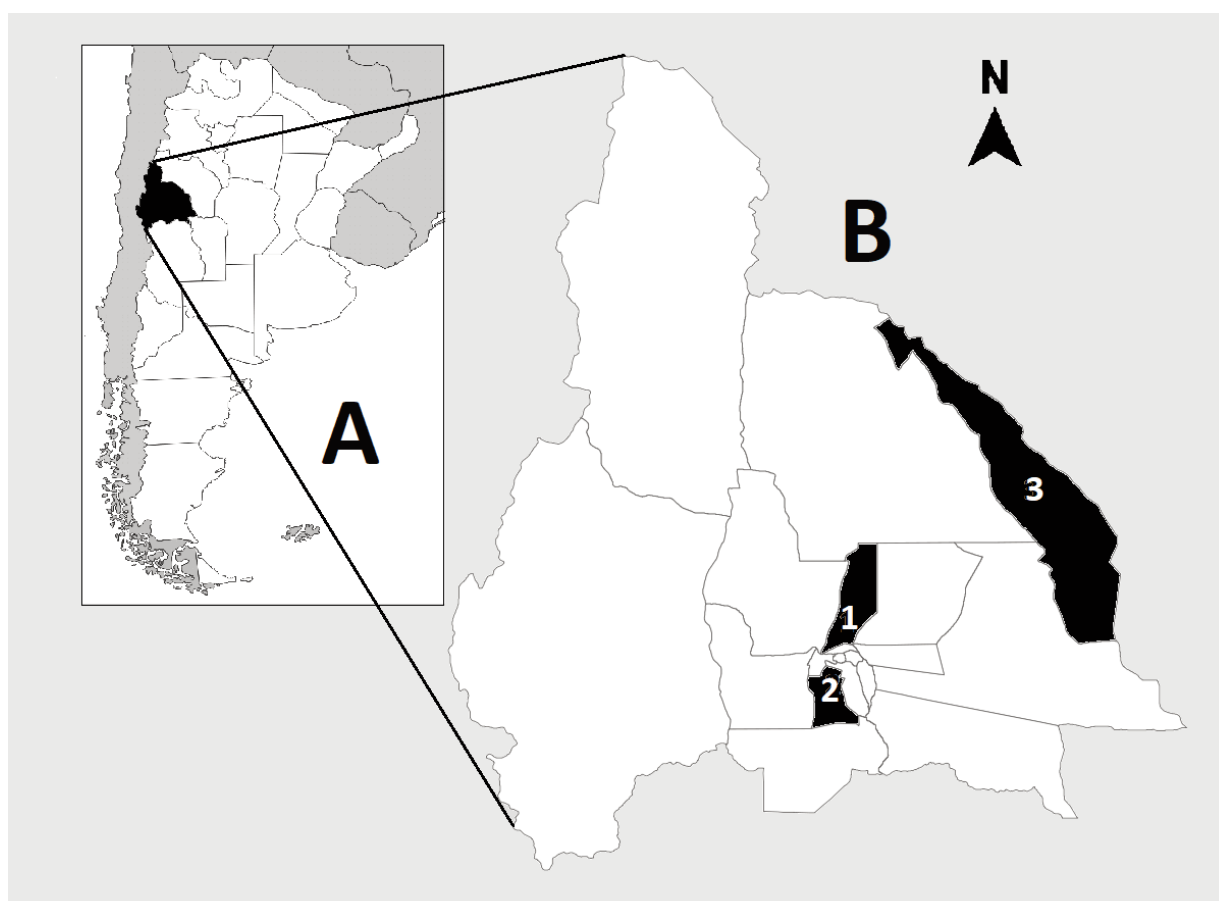


Figure 1. Localities of records of *Amblyomma tigrinum* in San Juan province, Argentina. A: Location in San Juan province, Argentina. B: Collection localities in San Juan. 1: Albardón, 2: Pocito and 3: Valle Fértil.

Southern Cone by around 25 taxa [5]. In Argentina, the genus *Amblyomma* is very well represented [2, 4–6], with approximately 25 species [5]. *Amblyomma tigrinum* is present in Bolivia, Brazil, Chile, Peru, Paraguay, Uruguay, Venezuela, French Guiana and Argentina [7]. In Argentina, its distribution ranges from the northern part of the country down to Santa Cruz [7]. In terms of ecological aspects, this tick has ecological plasticity, shown by its colonization of areas of contrasting climate conditions which can be observed in different phytogeographic regions [5,8]. Its evolutionary cycle consists of eggs and three mobile life stages: larvae, nymphs and adults (males and females) that require feeding on their hosts' blood and/or lymph [3]. Although ticks, particularly adults, are found on carnivores of the family Canidae [5], larvae and nymphs have been recorded on rodents from different genera [9,10]. Birds are deemed crucial for the life cycle of *A. tigrinum* [9]. Therefore, birds and rodents could sustain part of this tick's life cycle [8,10].

This tick holds medical and veterinary

importance because it has been recorded, in its adult stages, primarily in mammals, including humans [5]. Its importance to man lies in that, in absence of its usual hosts, it can circumstantially attach to humans for sucking blood [11]. This tick is involved in transmission as well, by serving as a vector of the human pathogen *Rickettsia parkeri* [5].

In San Juan province, records of ticks parasitizing carnivorous mammals are almost non-existent, there being only three previous records taken in 1971, 2000 and 2006 [6,8,12]. However, these records do not provide any information about their specific locality, host or life stage. Aiming to enhance the knowledge of ticks and their hosts, both in San Juan province and Argentina, we are reporting the presence of *A. tigrinum* in carnivore specimens. We mention data on hosts, collection locality, and recorded life stages of ticks.

## Materials and Methods

The information put forward in this study was based on recognition of ticks obtained by the

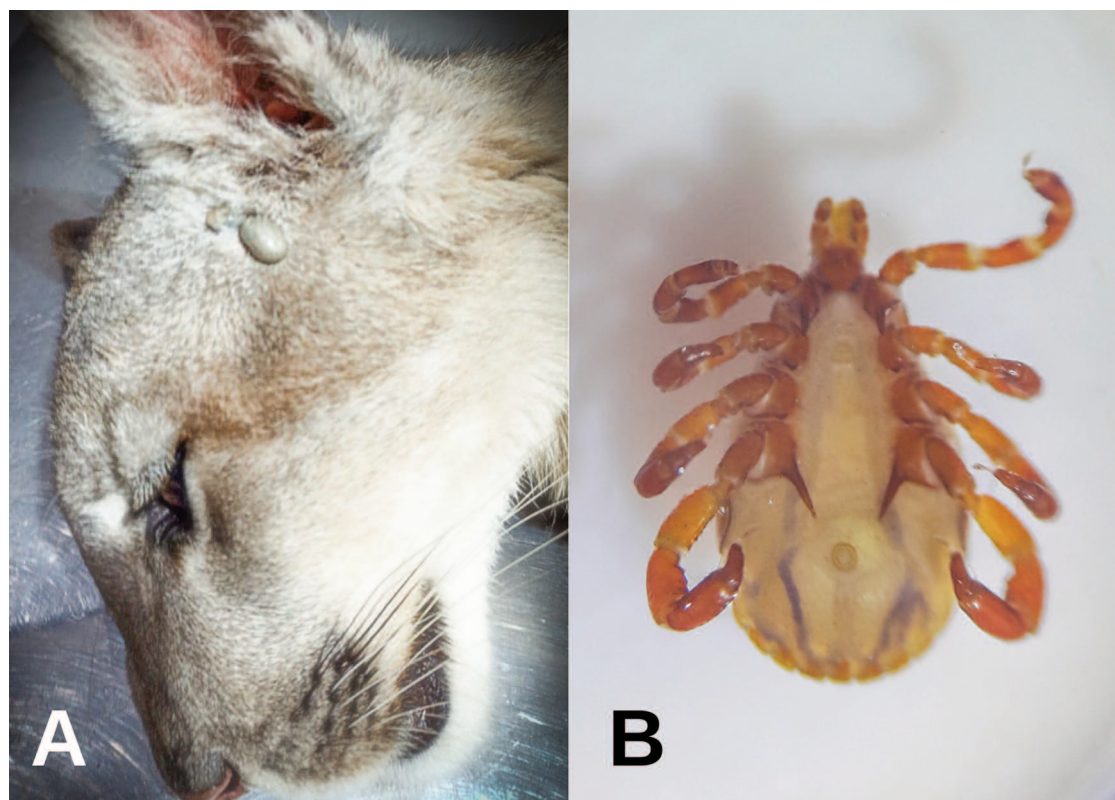


Figure 2. *Amblyomma tigrinum* on puma. A: Tick on host; B: Male, ventral view

authors between January 2019 and November 2020. They were collected and examined on different carnivores as novel records for different localities in San Juan province, Argentina. All records of parasite-host associations correspond to localities that lie within the Monte phytogeographic region. This region comprises vast arid areas, under an average annual rainfall of less than 100 mm, with years with no records at all. It extends over an area of approximately 40,499 km<sup>2</sup>, representing 45% of the province's total area. Xerophiles, adapted to hot and dry climate with scarce summer rains, are the predominant plants. The vegetation responds to wet and dry cycles and is characterized by the presence of shrub steppes that exceed 3m in height and branch out from the base [13].

In January 2019, during a field trip, we collected ticks from a juvenile male domestic canid (*Canis familiaris*) in a rural environment in San Agustín de Valle Fértil locality, Valle Fértil district, San Juan province.

Between August and November 2020, tick specimens were collected from a juvenile female fox (*Lycalopex gymnocercus*), and from a juvenile male puma (*Puma concolor*). These specimens were kept at the Wildlife Rehabilitation, Environmental Education and Responsible Recreation Center

(Faunístico), Rivadavia district, San Juan province, Argentina. The fox specimen was captured in the district of Pocito, as result of a notice of its entering a house in the rural area. During an external examination, a tick was visualized in the nape area, which was removed for later examination.

The puma specimen was from the district of Albardón. It was trapped as result of a communication of its entering a rural property. During the external examination, ticks were visualized in the head and neck area, and were removed.

In all cases, the specimens were studied in the laboratory of the Wildlife Rehabilitation Center. The ticks were collected, preserved in 96% alcohol, and observed through optical microscopy. For identifying species, sex and development stage of the parasite individuals found, we used morphological characters based on keys by [14] and [15].

After being examined, the carnivores were released at their corresponding sites of origin. The ticks are housed in the collection of the Wildlife Rehabilitation, Environmental Education and Responsible Recreation Center and in the collection of the Department of Exact, Physical and Natural Sciences, National University of San Juan.

### Animals welfare

All specimens were reviewed and returned to their natural environment. All applicable national, and/or institutional guidelines for the care and use of animals were followed.

### Results

All ticks from the examined specimens were identified as *Amblyomma tigrinum*. Figure 1 shows the records obtained so far in San Juan province.

#### Order Carnivora

##### Family Felidae

*Puma concolor* (Linnaeus, 1771) (Fig. 2 A,B)

Intensity: 5 adult male and 7 adult female *A. tigrinum*

Site of infection: right auricular region of head and neck on the right side

Site of collection: Las Lomitas (Albardón district), coordinates 31°23'59.499"S 68°28'4.834"W

Material deposited: CRFSJ-P-N° 12

Observations: host code 20201124-01

#### Order Carnivora

##### Family Canidae

*Lycalopex gymnocercus* (Fischer, 1814) (Fig. 3 A,B)

Intensity: one adult male *A. tigrinum*

Site of infection: nape area, on head

Site of collection: La Rinconada (Pocito district), coordinates 31°43'23.732"S 68°34'45.755"W

Material deposited: CRFSJ-P-N° 11

Observations: host code 20201011-01

*Canis familiaris* (Linnaeus, 1758) (Fig. 4 A,B)  
Intensity: one adult female and 5 adult male *A. tigrinum*

Site of infection: auricular region of head

Site of collection: San Agustín de Valle Fértil (Valle Fértil district), coordinates 30°57'14.11"S 67°18'20.98"W

Material deposited: UNSJPar 266

### Discussion

In Argentina, various findings of *A. tigrinum* have been reported since 1981 [8]. Different reports on the presence of this tick in Argentina can be found in studies conducted by [5,6,9,10,16–18].

Guglielmone et al. [8] indicate that adult stages of *A. tigrinum* are present in the phytogeographic regions of Argentina corresponding to the Andean Patagonian Domain, Amazonian Domain and Chaco Domain (Chaco province, Monte, Espinal and Pampas). Subsequently, Guglielmone and Nava [6] mention records of *A. tigrinum* for different

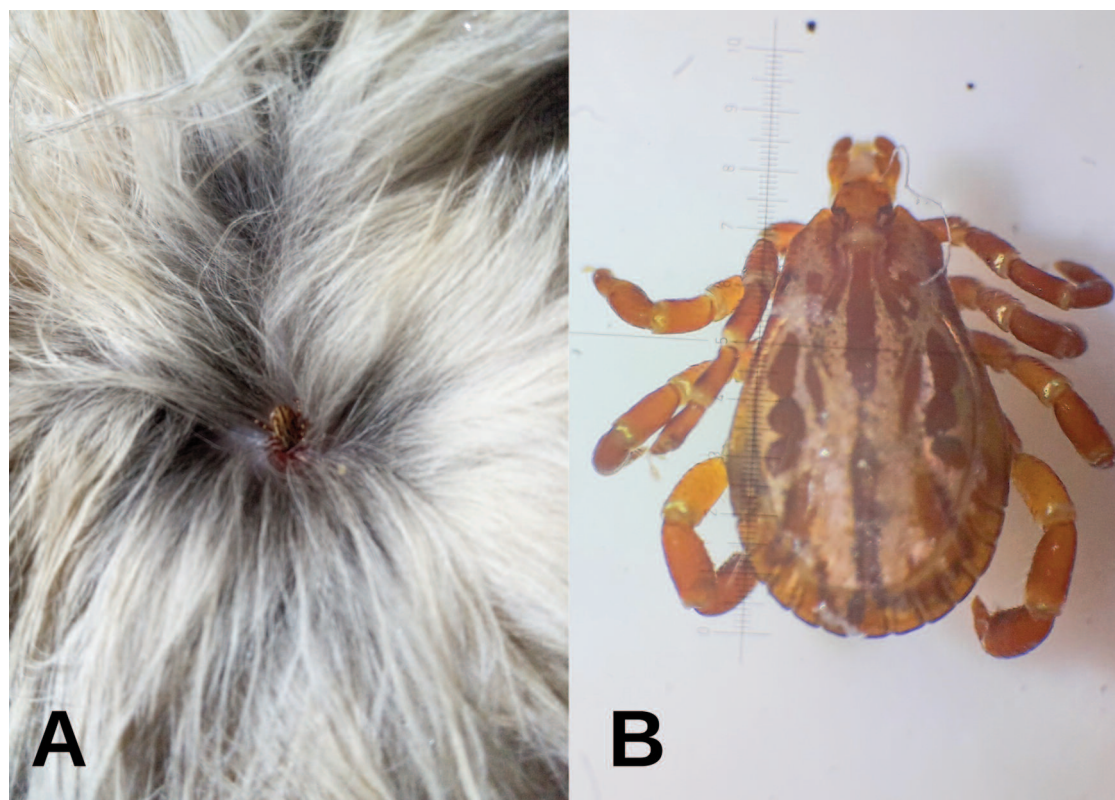


Figure 3. *Amblyomma tigrinum* on fox. A: Tick on host; B: Male, dorsal view

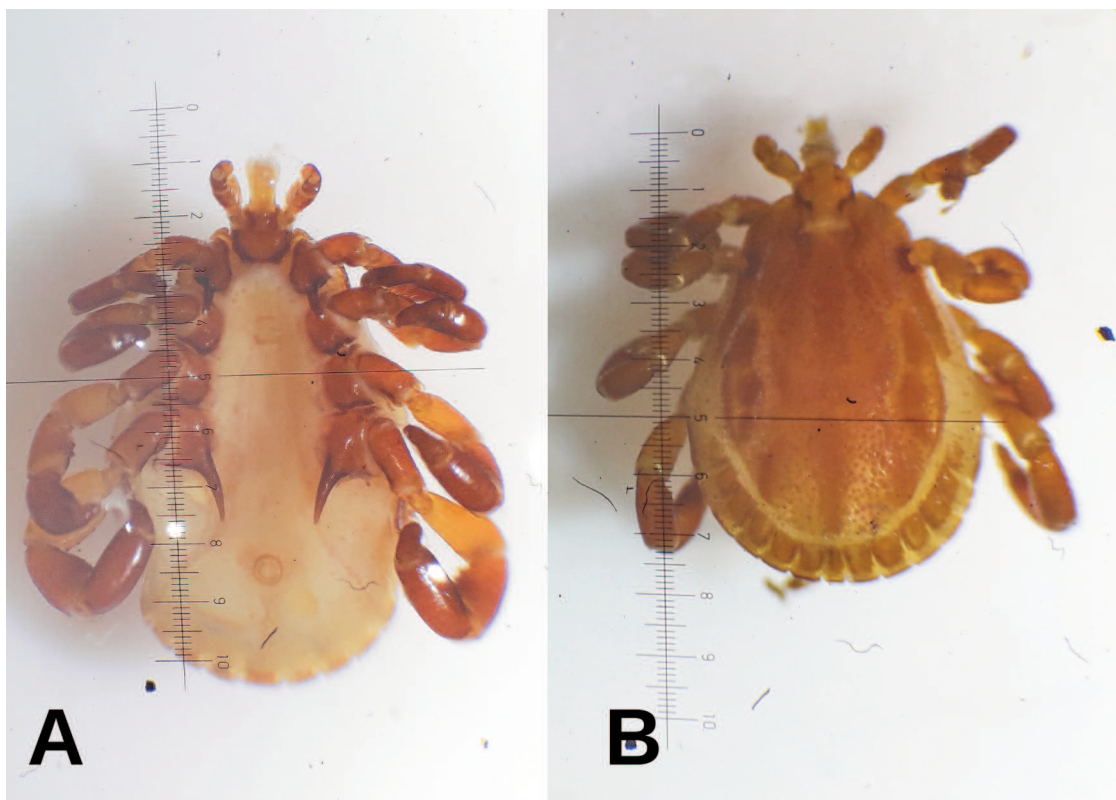


Figure 4. *Amblyomma tigrinum* on canid. A: Male, ventral view; B: Male, dorsal view

provinces: Buenos Aires, Catamarca, Chaco, Chubut, Córdoba, Corrientes, Entre Ríos, Formosa, Jujuy, La Pampa, Mendoza, Misiones, Neuquén, Salta, San Luis, Santa Fe, Santiago del Estero, Tucumán and San Juan [6]. *Amblyomma tigrinum* is a species that can be found all year round, although it is more abundant in summer [8].

Thus far, San Juan province presents three mentions of *A. tigrinum*, although totally devoid of details. Guglielmone et al. [8] and Guglielmone and Nava [6] point out two records for San Juan province, with no information about specific locality, host or life stage. According to our personal observations, the mention by Guglielmone et al. [8] probably corresponds to the district of Iglesia, San Juan, and we speculate that the records are of adult stages found in domestic dogs. Later, Guglielmone and Nava [10] mention an observation made by Capri and Mauri [12] in the locality of Valle Fértil, San Juan. Capri and Mauri [12] report the presence of *Amblyomma maculatum*; however, years later Guglielmone and Nava [10] pointed out that it would be *A. tigrinum*.

The tick *A. tigrinum* belongs to a group known as “maculatum”, sharing very similar features with *A. maculatum* and *Amblyomma triste*. In Argentina, there had been many reports of *A. maculatum*, until

Ivancovich [19] and Guglielmone et al. [20] determined that the specimens identified as *A. maculatum* were actually *A. tigrinum* and *A. triste*. Morphologically, *A. tigrinum* departs from *A. maculatum* by the presence of a single spine on metatarsals II-IV, and differs from *A. triste* by the absence of chitinous tubercles on festoons [21]. Besides, *A. tigrinum* has been observed to have a preference for carnivores, unlike *A. maculatum* which can massively attack herbivores.

The majority of ticks in their adult stage were recorded on wild and domestic carnivores; more precisely on domestic dogs typical from peri-urban environments and on foxes from natural environments [5]. The most recent records for the grey fox correspond to Santa Cruz province [7,22]. Regarding the puma, there are records of *A. tigrinum* only for other countries of the Neotropics, such as Paraguay [23] and Brazil [24], but there are no records for Argentina. Only other species of *Amblyomma* like *Amblyomma aureolatum* and *Amblyomma ovale* have been recorded [25,26].

Overall, records of ticks on wild animals in San Juan province are extremely scarce [27]. To this day, San Juan province has only four confirmed records of ectoparasite-wild host associations; *Ornithodoros* sp. (Ixodida: Argasidae) parasitizing the rodent

*Graomys griseoflavus* (Rodentia: Muridae) [28]; *Ornithodoros montensis* parasitizing the amphibian *Rhinella arenarum* (Bufonidae) [29,30]; *Amblyomma parvitarsum* (Ixodida: Ixodidae) parasitizing the lizard *Liolaemus eleodori* (Liolaemidae) [27,31] and *A. parvitarsum* parasitizing *Vicugna vicugna* (Artiodactyla: Camelidae) [32].

The three new findings of *A. tigrinum* on carnivores for San Juan province imply new parasite-host associations; *A. tigrinum* parasitizing *Canis familiaris* and *Lycalopex gymnocercus*, and report the first record for Argentina of this tick parasitizing *Puma concolor*. This study affords novel information on natural associations for natural carnivore hosts in San Juan province, and the first record on puma for Argentina. Thus, we are contributing to the knowledge of parasite-host relationships in the carnivore group in Argentina.

We consider this record relevant for being the first report for the species on *Puma concolor* in Argentina. Furthermore, it contributes to a better knowledge of the distribution of this tick species, both geographic and on new hosts, and is of sanitary significance.

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