

Article

Identification of *Amblyomma ovale* Koch, 1844 (Acari: Ixodidae) in a Bloodhound Dog from Oaxaca, Mexico

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Abstract: An adult engorged female of the hard tick *Amblyomma ovale* was found during a routine examination of a bloodhound dog in a private clinic from a small community in the state of Oaxaca, in Southern Mexico. Previously, this tick species had been identified in dogs from four states in the country, where it has been involved as a carrier of *Rickettsia* spp. To our knowledge, this is the first time that *A. ovale* has been detected in Oaxaca. Public and animal health authorities should be aware of this and other tick species that may be acting as vectors of tick-borne pathogens (TBP) to both humans and animals.

Keywords: *Amblyomma ovale*; dogs; *Rickettsia*; Oaxaca; Mexico



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1. Introduction

Ixodid ticks are the most important ectoparasites affecting domestic and wild animals as well as humans [1]. At least 130 species included in the genus *Amblyomma* (Koch, 1844) have been reported parasitizing amphibians, birds, mammals, and reptiles [1,2]. In several countries in the American continent, *Amblyomma* ticks are the main vectors of spotted fever group rickettsioses [3,4]. In Mexico, 26 species of *Amblyomma* have been recorded [5]. *A. ovale* (Koch, 1844) is distributed throughout the American continents from Mexico to Argentina [6]. Although reports of *A. ovale* in Mexico exist, its geographical distribution in the country is unknown. Previous reports indicate that it may be established in the southern region, where it has been identified parasitizing wildlife such as wild boar, *Sus scrofa*, tapir, *Tapirus bairdii*, gray fox, *Urocyon cinereoargenteus*, and jaguarundi, *Puma yaguaroundi* [5,7]. It has also been found on domestic animals such as cattle, horses, and dogs [5,7] (Table 1). *A. ovale* is a three-host tick species. The immature phases feed on rodents and birds [6,7], while the adults feed on several mammals including felines and canids [6,7]. As noted by Rodríguez-Vivas et al. [7], *A. ovale* has been reported parasitizing dogs in the states of Chiapas, Tabasco, Veracruz, and Yucatan. It is important to highlight that this tick is involved in the transmission of *Rickettsia parkeri*, the causal agent of human spotted fever [4], in South America and Mexico [7]. Herein, we report the first identification of *A. ovale* parasitizing a dog from a community located in the state of Oaxaca, Mexico.

Table 1. Reports of *Amblyomma ovale* identified on domestic and wild animals in Mexico.

Common Name	Scientific Name	State	Tick Stage	Reference
Wild boar	<i>Sus scrofa</i>	Campeche	3 M	[8]
White-tailed deer	<i>Odocoileus virginianus</i>		2 F, 1 M	[9]
Bovine	<i>Bos taurus</i>	Chiapas	*	[5]
Dog	<i>Canis familiaris</i>		11 *	[10]
Horse	<i>Equus caballus</i>		*	[5]
Tapir	<i>Tapirus bairdii</i>		*	[5]
Gray fox	<i>Urocyon cinereoargenteus</i>		4 M, 3 N	[5]
Opossum	<i>Didelphis virginiana</i>	Jalisco	1 N	[11]
Badger	<i>Nasua narica</i>		5 F	
Raccoon	<i>Procyon lotor</i>		2 F, 3 M	
Dog	<i>C. familiaris</i>	Oaxaca *	1 F	This report
Jaguarundi	<i>Puma yaguaroundi</i>	Puebla	1 M	[5]
Bovine	<i>B. taurus</i>	Tabasco	*	[5]
Dog	<i>C. familiaris</i>		*	[5]
Horse	<i>E. caballus</i>		*	[5]
Bovine	<i>B. taurus</i>	Veracruz	*	[5]
Dog	<i>C. familiaris</i>		3 M; 16 F, 6 M	[5,12]
Horse	<i>E. caballus</i>		*	[5]
Human	<i>Homo sapiens</i>		1 M	[5,7,12]
Dog	<i>C. familiaris</i>	Yucatán	1 M	[13]
Dog	<i>C. familiaris</i>		2 **	[14]

F: female; M: male; N: nymph. * Tick records from the National Collection of Mites (CNAC), published in [5]. The genus and species are mentioned, but not the developmental phases. ** Tick samples were pooled. Although the authors claim that adult ticks were identified, tick sex is not mentioned.

2. Results and Discussion

The morphological features of the identified specimen corresponded with a female engorged *A. ovale* tick (Figure 1) and are in line with the main characteristics of the *Amblyomma* genus: palps are longer than wide, presenting a very long second segment. The basis capituli is variable in the dorsal outline (being subtriangular or subrectangular dorsally). The scutum is ornate (in many species), with bright, multicolored iridescent patterns or dark spots and stripes on a pale background. The eyes are distinguishable in the scutum. Fестоons are present in males and females, but they may not be seen in engorged females. The first coxae present unequal paired spurs. The anal groove is situated posterior to the anus. The spiracles are subtriangular or comma-shaped [15,16]. At a species level, *A. ovale* is characterized by a hypostome with a 3/3 dentition. The shield is coppery brown with greenish spots. Eyes are marginal and large. The basis capituli is small, shallow, and punctuated. The porose areas are narrow, oval, and deeply depressed. The coxa I presents two very long spurs, with the external one being slightly longer than the internal one. The genital aperture is "V"-shaped (Figure 1) [2,6].

Our hypothesis is that the dog was infested with the tick in a property located 400 km from the border of the state of Guerrero, where the owner regularly walks the dog. Oaxaca State is surrounded by tropical vegetation, ranking first nationally in the number of mammal species, and the place inhabited by the dog has a rich variety of mammalian wildlife [17]. *A. ovale* has been previously reported in Guerrero State [5]. It is possible that the tick has extended its geographical range of distribution due to deforestation, close contact with new hosts such as pets, host diversification, urbanization, increased wild populations, and/or the presence of nymphs carried by infested wild hosts. However, more studies are required to determine the geographical distribution of *A. ovale* and other tick species, as well as the role of wild animals in the spread of immature stages.

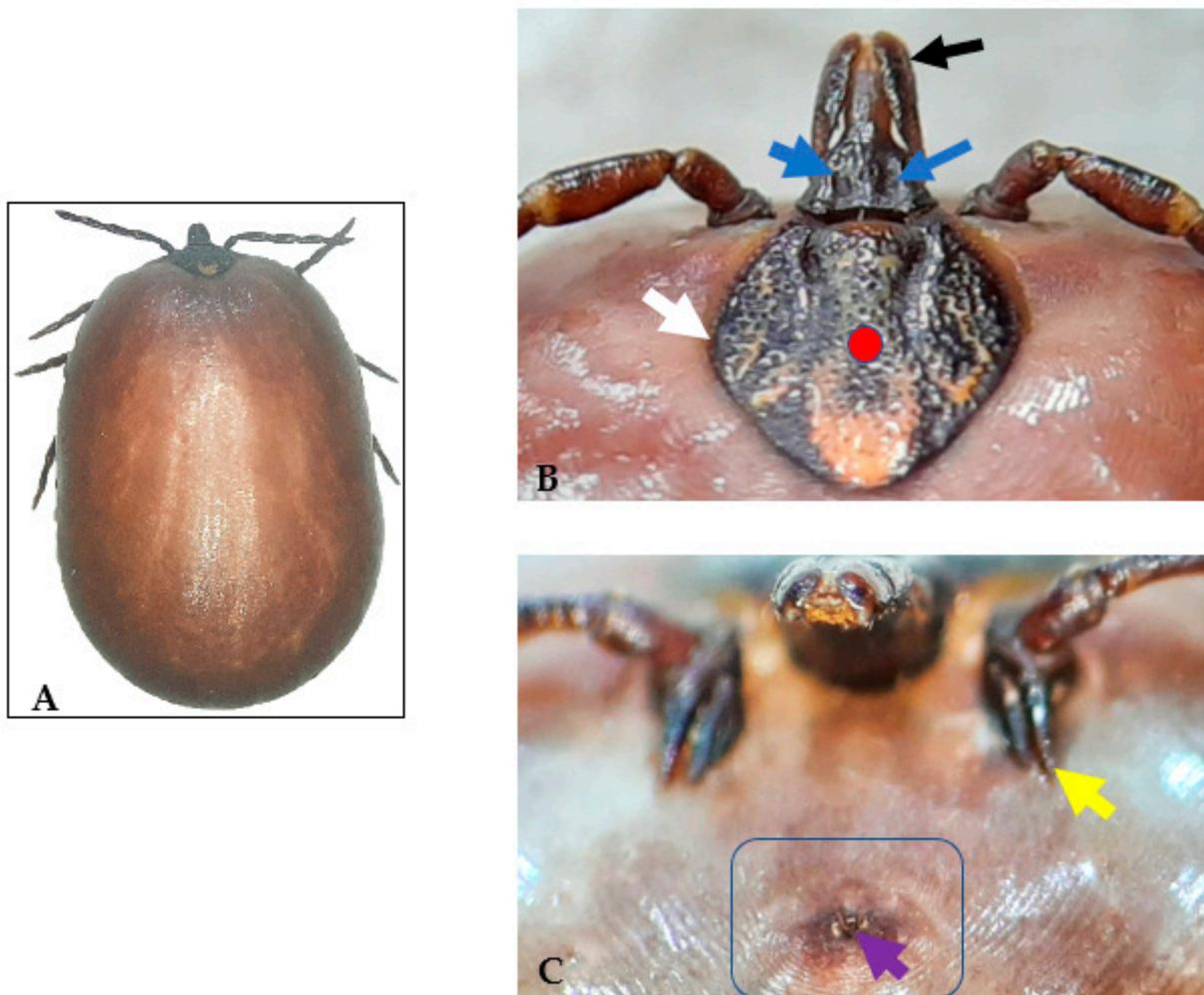


Figure 1. *Amblyomma ovale* engorged female. (A) Dorsal view; (B) enlargement of gnathosome showing large palps (black arrow); a small, shallow, and punctuated basis capituli (red spot); narrow, oval, and deeply depressed porose areas (blue arrows), and marginal and flat large eyes (white arrow). (C) Ventral view; coxa I showing two long spurs, with the external one being slightly longer (yellow arrow). The “V”-shaped genital aperture is shown with a purple arrow. Images were obtained with a photographic camera (Sony DSC-W830/BC 20.1 MP[®]) adapted to a stereomicroscope (Labomed Luxeo 4Z[®]).

Amblyomma ticks play an important role in the epizootiology of tick-borne pathogens, maintaining their natural life cycle in wild reservoirs, and are then transmitted to domestic animals [18] and humans [1–3]. It has been suggested that *A. ovale* could be involved in the transmission of the causative agent of canine hepatozoonosis produced by *Hepatozoon canis* in dogs [19]. In addition, in several Latin American countries, *A. ovale* has been found to be infected by rickettsial organisms including *R. amblyommatis*, *R. bellii*, and *R. parkeri* (the latter is considered the only pathogenic organism) [20–23]. In Mexico, few studies on molecular detection of pathogens in *A. ovale* exist. Sanchez-Montes and coworkers identified *R. parkeri* in *A. ovale* collected on dogs from Veracruz [12]. In another study, rickettsial DNA was detected in blood samples obtained from two persons showing clinical signs of rickettsiosis in Yucatan [24]. In dogs, only one case of active rickettsemia has been detected and confirmed by qPCR and nested PCR [25].

Although ticks are important vectors for the zoonotic transmission of rickettsia, several gaps on the role of the tick species involved and the vectorial transmission of rickettsial diseases exist [26]. Many of the *Rickettsia* spp. are common in ticks that bite humans; thus, it is important to determine the risk that ticks pose to public health [27].

Snellgrove et al. [28], investigating *Rickettsia* infection in *Amblyomma* ticks collected throughout the United States, found out that the prevalence of *R. belli* ranges from <1% to 80%, and the rate of infection of *R. amblyommatis* (formerly *Candidatus R. amblyommii*) in *A. ovale* ranked between 20% and 80% [28]. Since *A. ovale* has been found to be infected with rickettsiae, and rickettsiosis affects human populations in Mexico, more research on this tick and its role in the transmission of TBP is required.

3. Materials and Methods

The engorged tick identified herein was found attached to the inguinal region of a 3-year-old male bloodhound dog that presented for routine consultation on 27 February to a private veterinary clinic located in Putla Villa de Guerrero, a small community in the state of Oaxaca, Mexico (Figure 2). The dog had never traveled outside this town since it was acquired as a puppy in 2019. The area is located between parallels $16^{\circ}54'58''$ and $16^{\circ}55'13''$ north latitude, meridians $97^{\circ}56'08''$ – $98^{\circ}07'49''$ west longitude, and an altitude of 928 meters. The climate is semiwarm, subhumid, with rains during summer and temperature ranging from 12 and 26 °C [29].

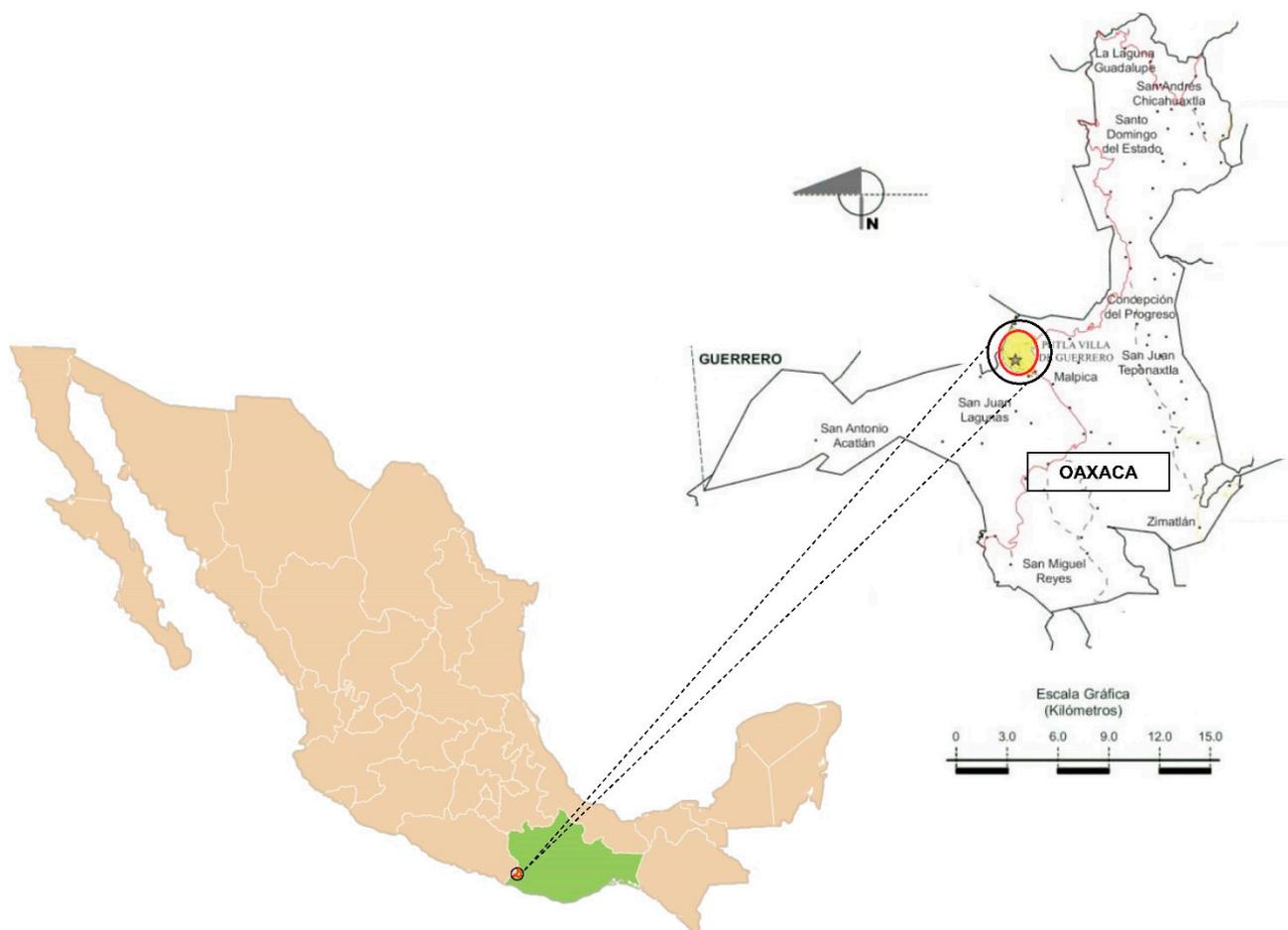


Figure 2. Location of the tick collection area. The map was obtained with Scribblemaps 2021-52 Stairs Studio Inc[©].

The specimen was removed manually, deposited in a labeled flask containing 70% ethanol, and transported to the Parasitology laboratory at the School of Veterinary Medicine of the Autonomous University of Guerrero for identification. The specimen was washed with distilled water and then identified under a stereoscopic microscope (Labomed Luxeo 4Z[®]) according to the taxonomic keys for genera [8,9] and species [2,5].

4. Conclusions

The first step of surveillance of tick-borne diseases is tick collection and identification. This is the first record of *A. ovale* in the state of Oaxaca, Mexico; however, further studies on the molecular identification of pathogens causing diseases in humans and animals are required. Ticks are in close contact with domestic animals and people and act as important vectors of numerous diseases. Therefore, it is imperative that public and animal health authorities are aware that this and other tick species are present and may act as vectors of TBP to both humans and animals.

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