



## Original article

# Taxonomic key to nymphs of the genus *Amblyomma* (Acari: Ixodidae) in Argentina, with description and redescription of the nymphal stage of four *Amblyomma* species



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## ABSTRACT

In the present study, we provide morphological descriptions of the nymph of *Amblyomma parvitarsum*, *A. tonelliae*, and redescrptions of *A. argentinae* and *A. sculptum*. A taxonomic key, with relevant morphological characters illustrated by scanning electron micrographs, is provided for nymphs of the 24 species of the genus *Amblyomma* occurring in Argentina. Species included are *A. argentinae*, *A. aureolatum*, *A. auricularium*, *A. boeroi*, *A. brasiliense*, *A. calcaratum*, *A. coelebs*, *A. dissimile*, *A. dubitatum*, *A. incisum*, *A. longirostre*, *A. neumanni*, *A. nodosum*, *A. ovale*, *A. parvitarsum*, *A. parvum*, *A. pseudoconcolor*, *A. pseudoparvum*, *A. rotundatum*, *A. sculptum*, *A. tigrinum*, *A. tonelliae*, *A. triste* and *A. varium*. Principal morphological characters used for discrimination among species are presence/absence of auriculae, cornua and festoons with tubercles, size and shape of spurs of coxa I, margin and punctations of scutum, shape of basis capituli and length of cervical grooves. The geographical distribution of each tick species included in this work is presented and the importance of an accurate determination to species level of the *Amblyomma* nymphs to make epidemiological inferences is also discussed.

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## Introduction

The genus *Amblyomma* (Acari: Ixodidae) is represented by about 135 species around the world (Guglielmone and Nava, 2014), and 24 of them are present in Argentina (Guglielmone and Nava, 2006; Nava et al., 2009b, 2014). Among the 24 *Amblyomma* species established in Argentina, only the nymphal stage of *Amblyomma parvitarsum* Neumann, 1901 and *Amblyomma tonelliae* Nava, Beati and Labruna, 2014 remain undescribed. However, taxonomic keys for specific determination of *Amblyomma* nymphs are lacking.

Taxonomic identification to species level of field-collected *Amblyomma* nymphs in Argentina is difficult because of the lack of appropriate descriptions or keys for most of the species. Keys available for nymphs of *Amblyomma* in the Americas are regional or for tick group (Keirans and Durden, 1998; Estrada-Peña et al., 2005; Martins et al., 2010, 2014). Therefore, in this work we present a

taxonomic identification key for the nymphs of the 24 *Amblyomma* species present in Argentina. Descriptions of the nymphs of *A. parvitarsum* and *A. tonelliae* and the redescription of the nymphs of *Amblyomma argentinae* Neumann (1904) and *Amblyomma sculptum* Berlese, 1888 are also included. Because most of the *Amblyomma* species included in the current descriptions, redescrptions and key are widely distributed in the Neotropics (see Table 1), this work could be useful for identification of *Amblyomma* nymphs in other countries of this Zoogeographical Region besides Argentina ( ).

## Materials and methods

Nymphs of *Amblyomma* species were prepared for scanning electron microscopy (SEM) following techniques described by Corwin et al. (1979). Micrographs of *A. argentinae*, *A. parvitarsum*, *A. sculptum*, *A. tonelliae*, *Amblyomma boeroi* Nava, Mangold, Mastropaolo, Venzal, Oscherov and Guglielmone, 2009, *Amblyomma neumanni* Ribaga, 1902 and *Amblyomma pseudoparvum* Guglielmone, Mangold and Keirans, 1990 were taken at the Servicio de Microscopía Electrónica, Museo de La Plata, Universidad Nacional

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**Table 1**  
Distribution of the *Amblyomma* species included in the current work.

Species	Zoogeographical region	Countries	Reference
<i>Amblyomma argentiniae</i>	Neotropical	Argentina	Guglielmone et al. (2003)
<i>Amblyomma aureolatum</i>	Neotropical	Argentina, Brazil, French Guiana, Paraguay, Surinam, Uruguay	Guglielmone et al. (2003)
<i>Amblyomma auricularium</i>	Neotropical/ Nearctic	Argentina, Belize, Bolivia, Brazil, Colombia, Costa Rica, Guatemala, French Guiana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Trinidad & Tobago, Uruguay, USA, Venezuela	Guglielmone et al. (2003), Lord and Day (2000)
<i>Amblyomma boeroi</i>	Neotropical	Argentina, Paraguay	Nava et al. (2009b), Mastropaolo et al. (2012)
<i>Amblyomma brasiliense</i>	Neotropical	Argentina, Brazil, Paraguay	Guglielmone et al. (2003)
<i>Amblyomma calcaratum</i>	Neotropical	Argentina, Belize, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, French Guiana, Mexico, Panamá, Paraguay, Trinidad y Tobago y Venezuela	Guglielmone et al. (2003), Guzmán-Cornejo et al. (2006)
<i>Amblyomma coelebs</i>	Neotropical/ Nearctic	Argentina, Belize, Bolivia, Brazil, Colombia, Costa Rica, Guatemala, Guyana, French Guiana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Surinam, Venezuela	Guglielmone et al. (2003)
<i>Amblyomma dissimile</i>	Neotropical/ Nearctic	Antigua & Barbuda, Argentina, Bahamas, Barbados, Belize, Brazil, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Grenada, Guadeloupe, Guatemala, Guyana, French Guiana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Dominican Republic, St. Lucia, Surinam, Trinidad & Tobago, USA, Venezuela	Guglielmone et al. (2003), Guglielmone and Nava (2010)
<i>Amblyomma dubitatum</i>	Neotropical	Argentina, Brazil, Paraguay, Uruguay	Nava et al. (2010b)
<i>Amblyomma incisum</i>	Neotropical	Argentina, Bolivia, Brazil, Paraguay, Peru	Labruna et al. (2005)
<i>Amblyomma longirostre</i>	Neotropical	Argentina, Bolivia, Brazil, Colombia, French Guiana, Mexico, Panama, Paraguay, Peru, Trinidad & Tobago, Uruguay, Venezuela	Nava et al. (2010a)
<i>Amblyomma neumanni</i>	Neotropical	Argentina, Colombia	Nava et al. (2009a)
<i>Amblyomma nodosum</i>	Neotropical	Argentina, Bolivia, Brazil, Colombia, Costa Rica, Guatemala, Mexico, Nicaragua, Panama, Paraguay, Trinidad & Tobago, Venezuela	Guglielmone et al. (2003)
<i>Amblyomma ovale</i>	Neotropical/ Nearctic	Argentina, Belize, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, French Guiana, Guatemala, Guyana, Mexico, Nicaragua, Panama, Paraguay, Peru, Surinam, Trinidad & Tobago, USA, Venezuela	Guglielmone et al. (2003)
<i>Amblyomma parvitarsum</i>	Neotropical	Argentina, Bolivia, Chile, Peru	Guglielmone et al. (2003)
<i>Amblyomma parvum</i>	Neotropical/ Nearctic	Argentina, Bolivia, Brazil, Costa Rica, Guatemala, Mexico, Nicaragua, Panama, Paraguay, USA, Venezuela	Nava et al. (2008b), Corn et al. (2012)
<i>Amblyomma pseudoconcolor</i>	Neotropical	Argentina, Bolivia, Brazil, French Guiana, Paraguay, Surinam, Uruguay	Guglielmone et al. (2003)
<i>Amblyomma pseudoparvum</i>	Neotropical	Argentina	Guglielmone et al. (2003), Dantas-Torres et al. (2009)
<i>Amblyomma rotundatum</i>	Neotropical/ Nearctic	Argentina, Bolivia, Brazil, Colombia, Costa Rica, Grenada, Guadeloupe, Guatemala, French Guiana, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Surinam, Trinidad & Tobago, USA, Venezuela	Guglielmone et al. (2003), Guglielmone and Nava (2010)
<i>Amblyomma sculptum</i>	Neotropical	Argentina, Bolivia, Brazil, Paraguay	Nava et al. (2014)
<i>Amblyomma tigrinum</i>	Neotropical	Argentina, Bolivia, Brazil, Chile, French Guiana, Paraguay, Peru, Uruguay, Venezuela	Guglielmone et al. (2003)
<i>Amblyomma tonelliae</i>	Neotropical	Argentina, Bolivia, Paraguay	Nava et al. (2014)
<i>Amblyomma triste</i>	Neotropical/ Nearctic	Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, USA, Uruguay Venezuela	Guglielmone et al. (2003), Mertins et al. (2010), Abarca et al. (2012)
<i>Amblyomma varium</i>	Neotropical	Argentina, Brazil, Colombia, Costa Rica, Guatemala, French Guiana, Nicaragua, Panama, Peru, Venezuela	Guglielmone et al. (2003)

de La Plata, Buenos Aires, Argentina, using a JEOL/JSM 6360 LV® Digital Scanning Microscope. The images of the remaining species included in this work (Figs. 5–11, Figs. 14–16 and Figs. 18–24) correspond to the figures of the *Amblyomma* nymphs from Brazil published by Martins et al. (2010)<sup>1</sup>. Dichotomous identification keys to the nymphal stage of the 24 *Amblyomma* species established in Argentina were constructed considering the principal morphological characters used in previous descriptions of nymphs from the New World (Guglielmone et al., 1990; Keirans and Oliver, 1993; Estrada-Peña et al., 1993, 2002; Nava et al., 2009b; Martins et al., 2010) (Figs. 12, 13 and 17).

Descriptions of *A. parvitarsum* and *A. tonelliae* and redescriptions of *A. argentiniae* and *A. sculptum* were based on optical microscopy. For this purpose, 10 unfed specimens of each species were measured using a Nikon SMZ800 stereomicroscope. In the case of *A. parvitarsum* we only used a single unfed specimen. All measurements are given in millimetres, with the mean ( $\pm$ standard deviation) followed by the range in parentheses. These nymphs have been deposited in the tick collection of the Instituto Nacional de Tecnología Agropecuaria, Estación Experimental Agropecuaria, Rafaela, Santa Fe, Argentina (accession numbers: INTA 2244–2246) and in the tick collection “Coleção Nacional de Carrapatos” (CNC) of the Faculty of Veterinary Medicine of the University of São Paulo”, Brazil (accession numbers: CNC 2316–2318). Body length, body width and *capitulum* were measured from a dorsal view, while palpi length and hypostome were measured from a ventral view. Finally,

information about geographic distribution of each species included in this work was provided (Table 1).

## Results

### Descriptions

#### *Amblyomma parvitarsum* Neumann, 1901 (Fig. 1)

*Idiosoma*. Length from apices of scapulae to posterior body margin 2.09, maximum breadth 1.76, outline oval, with 11 festoons without tubercles. *Scutum*. Length 0.92, breadth 1.08, breadth/length ratio 1.17; inornate, surface slightly shagreened, few punctations. Eyes flat at lateral scutal angles at the level of scutal midlength. Cervical grooves long, reaching the scutal median third, deeper at the anterior third. Spiracular plate triangular with rounded angles; length 0.17, breadth 0.12. *Gnathosoma* (*capitulum*). Length from palpal apices to posterior margin 0.47, breadth 0.33. Basis capituli rectangular, without auriculae. Palpi length 0.32, article I with minute ventral prolongation; article II 0.17 long, article III 0.13 long, article IV apically projecting from article III. Hypostome rounded apically; length 0.27; length of toothed portion 0.20; dentition 2/2 with 7–8 teeth per row. *Legs*. Coxa I with 2 sub-equal triangular spurs, the external slightly stouter; coxae II–IV with a small triangular spur. Trochanters without spurs; tarsus I 0.37 long, 0.08 broad; tarsus IV 0.33 long, 0.08 broad.

#### *Amblyomma tonelliae* Nava, Beati and Labruna, 2014 (Fig. 2)

*Idiosoma*. Length from apices of scapulae to posterior body margin  $1.50 \pm 0.03$  (1.43–1.55); maximum breadth  $1.18 \pm 0.04$

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