

## The presence of *Argas keiransi* Estrada-Peña, Venzal & González-Acuña, 2003 (Acari: Argasidae) in Argentina

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### Abstract

Forty-two larvae of *Argas keiransi* (Acari: Argasidae) were collected from the Chimango Caracara, *Milvago chimango* (Falconiformes: Falconidae), at three localities in La Pampa Province, Argentina. Ticks were determined by a combination of palpal segment IV as long as or longer than the other palpal segments, absence of a trumpet-shaped sensillum extending from the capsule of Haller's organ into the lumen of the tarsus, length of dorsal plate between 180 and 240 µm, length of hypostome between 180 and 205 µm, dental formula 2/2 in the basal third, 2/2 or 3/3 apically, and length of posterolateral setae between 45 and 50 µm. Morphological determination was confirmed by analysis of sequences of the mitochondrial 16S rRNA gene. The results of this work constitute the first Argentinean record of *A. keiransi*, which has previously been reported only from Chile.

**Key words:** *Argas keiransi*, Argentina, *Milvago chimango*, 16S rDNA sequences

### Introduction

The tick fauna of Argentina is represented by 47 species (Guglielmone & Nava 2005, 2006; Nava *et al.* 2009; Venzal *et al.* 2012; Nava *et al.* 2014), nine of which belong to the family Argasidae, namely, *Argas monachus* Keirans, Radovsky and Clifford, 1973, *Argas neghmei* Kohls and Hoogstraal, 1961, *Argas persicus* (Oken, 1818), *Ornithodoros hasei* (Schulze, 1935), *Ornithodoros mimon* Kohls, Clifford and Jones, 1969, *Ornithodoros quilinensis* Venzal, Nava & Mangold, 2012, *Ornithodoros rioplatensis* Venzal, Estrada-Peña and Mangold, 2008, *Ornithodoros rostratus* Aragão, 1911, and *Otobius megnini* (Dugès, 1883).

*Argas keiransi* Estrada-Peña, Venzal & González-Acuña, 2003 was described from larvae collected on the Chimango Caracara, *Milvago chimango* (Vieillot, 1816) (Falconiformes: Falconidae), in Chile by Estrada-Peña *et al.* (2003). Later, Estrada-Peña *et al.* (2006) described the female of *A. keiransi* from additional Chilean specimens. Because all prior records of this tick are from Chile, the aim of this work is to present the first record of *A. keiransi* in Argentina through a diagnosis based on morphological characters and DNA sequences.

## Materials and methods

Larvae of argasid ticks were collected from *M. chimango* at three localities in La Pampa Province, Argentina: Cuesta del Sur (36°43'20"S, 64°17'1.86"W), Club de Caza (36°39'24"S, 64°20'44"W), and Establecimiento "La Armonía" (36°34'11"S, 64°8'12"W). These sites belong to the Pampeana Biogeographic Province as described by Cabrera and Willink (1973). Ticks were cleared in 20% aqueous solution of potassium hydroxide and mounted in Hoyer's medium to create semi-permanent slides for light microscopy, and were examined and measured using a Nikon Eclipse E200 microscope.

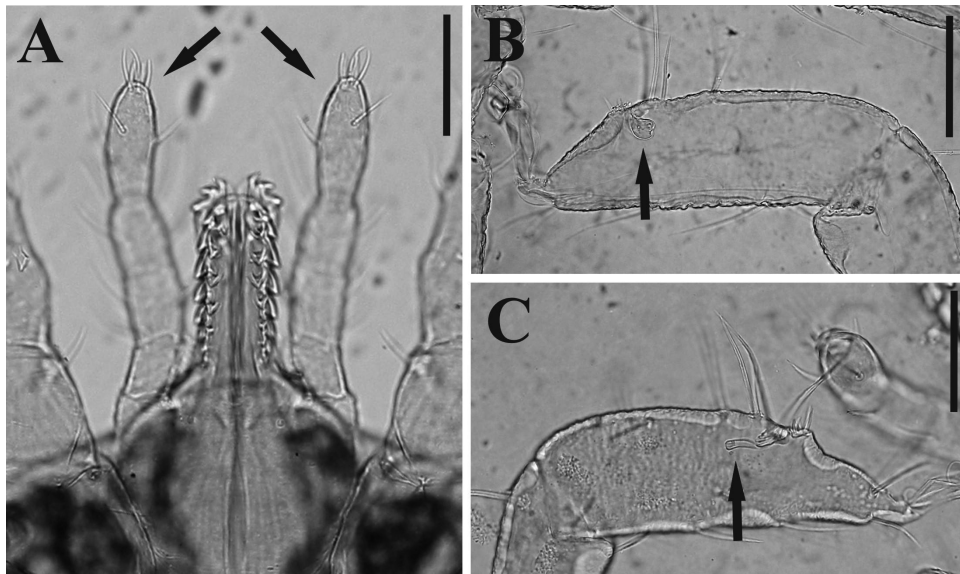
Taxonomic determination based on morphology was made following Fairchild *et al.* (1966), Kohls *et al.* (1970) and Estrada-Peña *et al.* (2003, 2006). Additionally, DNA was extracted from four larvae collected in Cuesta del Sur and processed using polymerase chain reaction (PCR) following the methodology of Mangold *et al.* (1998a, b). The DNA was then used to amplify a 420-bp fragment of the mitochondrial 16S rRNA gene using primers designed by Mangold *et al.* (1998b). The sequences were edited and aligned using the BioEdit Sequence Alignment Editor (Hall, 1999) with the CLUSTAL W program (Thompson *et al.* 1994), and they were compared to each other and with those of Neotropical species of Argasidae deposited in GenBank. A pairwise estimate of percent sequence divergence was determined using Mega version 4.0 (Tamura *et al.* 2007). A neighbour-joining (NJ) tree was generated from the Kimura two-parameter distance. Gaps were excluded in the pairwise comparisons and support for the topology was tested by bootstrapping over 1,000 replications.

## Results and discussion

Forty-two larvae of the family Argasidae were collected from 17 specimens of *M. chimango* (Table 1). They were identified as belonging to the genus *Argas*, subgenus *Persicargas*, by a combination of palpal segment IV as long as or longer than the other palpal segments (Fig. 1a) and absence of a trumpet-shaped sensillum extending from the capsule of Haller's organ into the lumen of the tarsus (Fig. 1b), which is present in subgenus *Argas* (Fig. 1c). At the species level, all larvae were determined as *A. keiransi* by the presence of the following morphometric characters: length of dorsal plate between 180 and 240 µm, length of hypostome between 180 and 205 µm (from apex to posthypostomal setae), dental formula 2/2 in the basal third, 2/2 or 3/3 apically (row one with 8-10 denticles, row two with 7-9 denticles, row three with 0-2 denticles), and length of posterolateral setae between 45 and 50 µm. All tick specimens have been deposited in the tick collection of the Departamento de Parasitología Veterinaria, Facultad de Veterinaria, Universidad de la República, CENUR Noroeste, Salto, Uruguay (accession numbers DPVURU-859-870), and the tick collection of the Instituto Nacional de Tecnología Agropecuaria, Estación Experimental Agropecuaria Rafaela, Argentina (accession number INTA 2231).

Our morphological diagnosis was supported by an analysis of 16S rDNA sequences. The four haplotypes from Argentina form a clade closely related to the sequence of *A. keiransi* from Chile (Fig. 2). The genetic divergence between 16S rDNA sequences from Argentina and Chile varied from 1.9 to 2.2 %. However, population genetic analyses will be required to determine if this variation between Argentinean and Chilean populations of *A. keiransi* is geographically structured. This constitutes the first record of *A. keiransi* from Argentina. Following the biogeographic scheme of Cabrera and Willink (1973), the distribution of this tick comprises areas belonging to the Pampeana and Sub-Antarctic Biogeographic Provinces in Argentina and Chile, respectively. The only host recorded for *A. keiransi* is *M. chimango*. This bird inhabits forests in Brazil and Paraguay

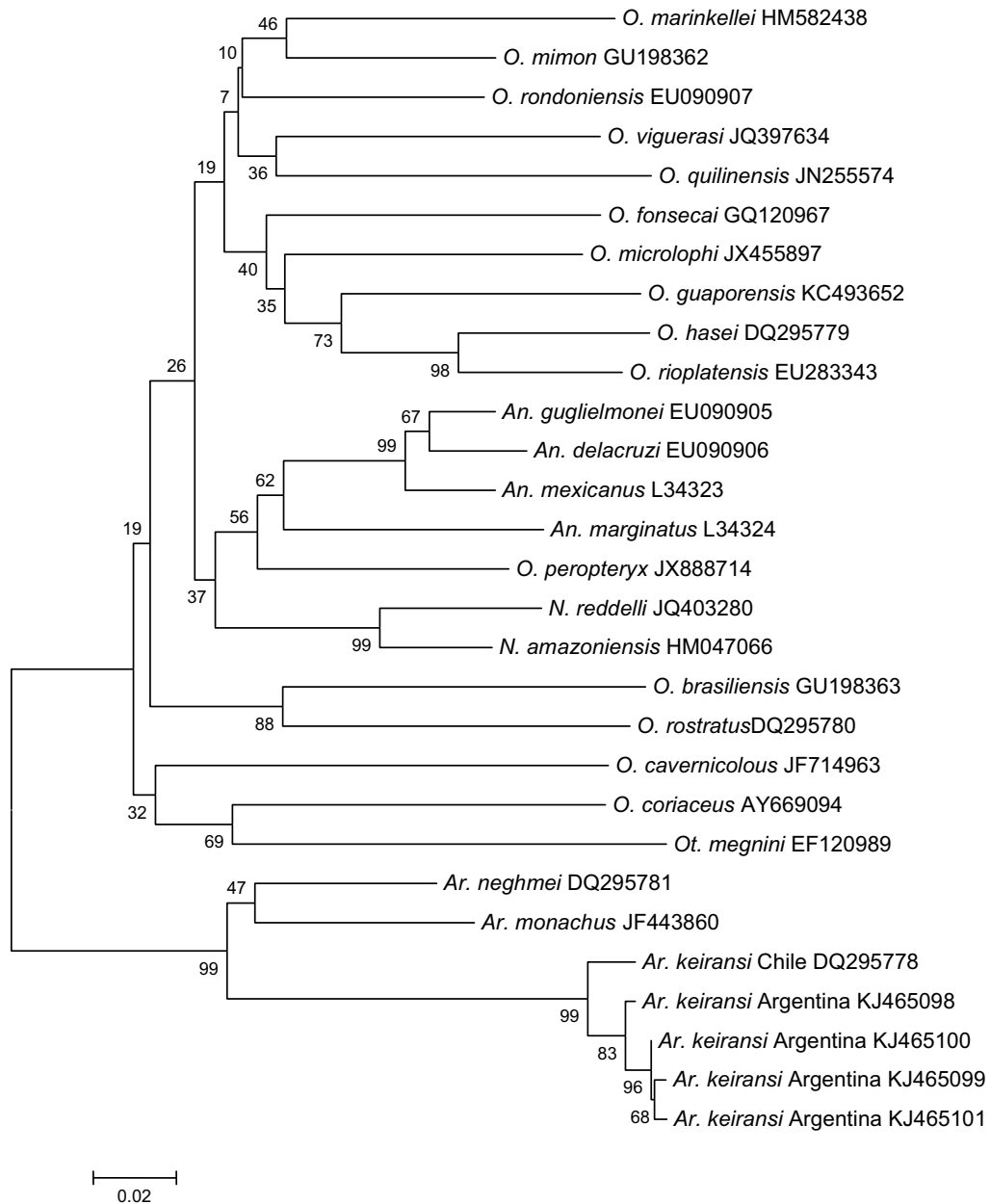
southward to southernmost Argentina and Chile (Clements 2007). Considering that the current known distribution of *A. keiransi* is less than that of *M. chimango*, it is obvious that further studies are needed to determine whether the distribution of *A. keiransi* is congruent with that of its host or is restricted by environmental conditions.



**FIGURE 1.** A) Palpal segment IV of *Argas keiransi*; B) Sensillum of *Argas keiransi* (subgenus *Persicargas*); C) Sensillum of the species belonging to the genus *Argas*, subgenus *Argas*.

**TABLE 1.** Collection data for specimens of *Milvago chimango* infested by larvae of *Argas keiransi* in La Pampa Province, Argentina.

Code	Locality	Collection date	No. larvae
T - 10846	Cuesta del Sur	10/10/2009	1
T - 11112	Cuesta del Sur	11/25/2009	3
T - 11115	Cuesta del Sur	11/25/2009	1
T - 11116	Cuesta del Sur	11/25/2009	3
T - 11086	Cuesta del Sur	12/14/2009	2
T - 11093	Cuesta del Sur	12/14/2009	1
T - 11095	Cuesta del Sur	12/14/2009	3
T - 11096	Cuesta del Sur	12/14/2009	1
T - 11231	Cuesta del Sur	10/20/2010	1
T - 10924	Cuesta del Sur	11/25/2010	1
T - 11987	Cuesta del Sur	11/25/2010	9
T - 11991	Cuesta del Sur	11/25/2010	2
T - 11294	Cuesta del Sur	12/02/2010	7
T - 11629	Cuesta del Sur	12/29/2010	1
T - 12199	La Armonía	10/24/2011	1
T - 12253	La Armonía	11/17/2011	1
T - 12259	Club de Caza	11/21/2011	4



**FIGURE 2.** Neighbour-joining tree constructed from 16S rDNA sequences. Numbers represent bootstrap support generated from 1,000 replications. Only bootstraps >50% are presented. Abbreviations: *An.*, *Antricola*; *Ar.*, *Argas*; *N.*, *Nothoaspis*; *O.*, *Ornithodoros*; *Ot.*, *Otobius*. GenBank accession numbers of each sequence are indicated.

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