

A collection of ticks (Ixodidae) from wild birds in Uruguay

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Abstract. Thirty nine wild birds from seven families (Alcedinidae, Emberizidae, Furnariidae, Parulidae, Trochilidae, Turdidae and Tyrannidae) were caught from 4 to 7 of February, 2004 at Rincón da Vassoura (31°15' S 56°03' W) Department of Tacuarembó, Uruguay. Ninety one nymphs and forty one larvae of Ixodidae were recovered from them. The majority of ticks were conventionally identified but 16S mitochondrial rDNA sequences were obtained for larvae and nymphs of *Amblyomma* with uncertain specific status to be compared with sequences of species from this genus. The 16S rDNA of *Haemaphysalis juxtakochi* Cooley was also obtained. Most ticks, 1 nymph of *Amblyomma longirostre* (Koch), 5 larvae of *Amblyomma aureolatum* (Pallas) and 3 nymphs of *Amblyomma* spp., 10 nymphs and 71 larvae of *H. juxtakochi*, 23 nymphs and 12 larvae of *Ixodes pararicinus* Keirans and Clifford, were found on the 5 *Turdus albicollis* Vieillot and 6 *Turdus rufiventris* Vieillot (Turdidae) caught. One nymph of *A. longirostre* and 2 nymphs of *I. pararicinus* were collected from the only *Syndactyla rufosuperciliata* (Lafresnaye) (Furnariidae) captured; 1 larva of *I. pararicinus* was collected on one of two *Basileuterus leucoblepharus* (Vieillot) (Parulidae) trapped and 1 nymph of *A. longirostre* was found on one of nine *Elaenia parvirostris* Pelzeln (Tyrannidae) captured. All these findings constitute new host records with the exception of *I. pararicinus* on *S. rufosuperciliata*, and stress the importance of *Turdus* as hosts for *I. pararicinus*, *H. juxtakochi* and *A. aureolatum*. Nymphs of *H. juxtakochi* and *Amblyomma* spp. were also found on man and vegetation.

Introduction

Wild birds are known to be important hosts for preimaginal stages of some Neotropical Ixodidae and for adult ticks of seven species of *Ixodes* established in this region (Guglielmone et al. 2003). The information about these hosts for ticks in southern Neotropics is scanty. The importance of birds as hosts for all stages of *Ixodes auritulus* Neumann and *Ixodes paranaensis* Barros-Battesti, Arzua, Pichorim and Keirans, have been demonstrated by Arzua and Barros-Battesti (1999) and Barros-Battesti et al. (2003) in southern Brazil. Beldoménico et al. (2003) and Venzal et al. (2003b) found larvae and nymphs of *Ixodes pararicinus* Keirans and Clifford, on wild Argentinean and

Uruguayan birds, respectively. Beldoménico et al. (2003) also found larvae of *Haemaphysalis leporispalustris* (Packard) and larvae and nymphs of *Haemaphysalis juxtakochi* Cooley (1946) on Argentinean birds. Recently, Arzua et al. (2003) demonstrated the importance of wild birds as a food source for larvae and nymphs of *Amblyomma aureolatum* (Pallas) in southern Brazil. In Chile, González-Acuña et al. (2004) confirmed the long time suspected importance of birds as hosts for immature stages of *Amblyomma tigrinum* Koch, and Rojas et al. (1999) found 28 species of Aves infested with immature stages of *Amblyomma cajennense* (Fabricius). The role of birds as hosts for preimagos of *Amblyomma longirostre* (Koch) has been known since the pioneer work of Aragão (1918) in Brazil.

Recently, we were able to survey ticks on wild birds in northeastern Uruguay. We collected more than 100 larvae and nymphs of Ixodidae from 14 individual birds. Herein we report the results of this study that may contribute to increase our knowledge of the role of wild birds to support the life cycle of Neotropical Ixodidae.

Materials and methods

Birds were caught with official permission in Rincón da Vassoura (31°15' S 56°03' W), Department of Tacuarembó, northeastern Uruguay, using 4 fog nets that were set-up for four consecutive days (4 to 7 February, 2004). Birds were identified following Narosky and Yzurieta (1987) and released after inspection for ticks. A few tick specimens from man and vegetation were also collected. The study site is located in a region that contains a rich subtropical forest vegetation and recognized mammalian hosts for adults of several tick species established in Uruguay are common, including *Mazama gouazoubira* (G. Fischer), *Sphiggurus spinosus* (F. Cuvier) and *Procyon cancrivorus* (G. Cuvier) (Evia and Gudynas 2000; Venzal et al. 2003b).

Tick specimens were preserved in 70% ethanol and deposited in the Departamento de Parasitología, Facultad de Veterinaria, Universidad Nacional de la República, Montevideo, Uruguay. All specimens were larvae and nymphs of Ixodidae from the genera *Amblyomma*, *Haemaphysalis* and *Ixodes*. There are considerable difficulties to determine larvae and nymphs of most species of Neotropical Ixodidae because there are no adequate holistic keys. Most ticks were identified following conventional keys and descriptions presented by Kohls (1960), Fairchild et al. (1966), Keirans and Durden (1998) and Venzal et al. (2005). However, five identical larvae and six identical nymphs of *Amblyomma* were not possible to be assigned to any species by using conventional techniques. Therefore, DNA was extracted to obtain the sequences of 16S mitochondrial rDNA according to Mangold et al. (1998) to the following specimens: 1 larva from *Turdus albicollis* Vieillot, Feb. 4, 2004; 1 nymph from vegetation, date as above, and 1 nymph from human, Feb. 7, 2004 (collectors for all specimens J.M. Venzal and M.L. Félix). The

sequences were compared with sequences of 16S rDNA deposited in GenBank. The 16S rDNA sequence for *H. juxtakochi* was obtained from a nymph and a larva ex-*Turdus rufiventris* Vieillot, 1818, Feb. 5, 2004 (collectors: J.M. Venzal and M.L. Félix).

Results

A total of 39 birds from seven families were caught as follows: Alcedinidae: 1 *Ceryle torquata* (Linnaeus), 1 *Chloroceryle americana* (Gmelin); Emberizidae: 3 *Poospiza lateralis* (Nordmann), 4 *Zonotrichia capensis* (Statius Müller); Furnariidae: 1 *Syndactyla rufosuperciliata* (Lafresnaye); Parulidae: 1 *Basileuterus culicivorus* (Deppe), 2 *Basileuterus leucoblepharus* (Vieillot); Trochilidae: 1 *Chlorostilbon aureoventris* (d'Orbigny and Lafresnaye), 1 *Hylocharis chrysura* (Shaw); Turdidae: 5 *Turdus albicollis* Vieillot, 6 *Turdus rufiventris* Tyrannidae: 9 *Elaenia parvirostris* Pelzeln, 3 *Myiarchus swainsoni* Cabanis and Heine, 1 *Phylloscartes ventralis* (Temminck).

No ticks were found on birds of the families Alcedinidae, Emberizidae and Trochilidae. The only Furnariidae caught was infested with 3 Ixodidae; one Parulidae was infested with 1 tick; all Turdidae were infested with a total of 127 ticks and one Tyrannidae was found infested with 1 ixodid. A detail of the genera and species of ticks collected on the different species of birds is presented in Table 1.

The 16S rDNA sequences of larva and nymph of *H. juxtakochi* have an overall agreement of 99% differing in only two transversion and two insertion-deletion for a total of 432 bp (data not shown). The sequences are deposited in the GenBank with accession number AY762323 for the nymph and AY762324 for the larva.

The 16S rDNA sequence of the *Amblyomma* larva has an agreement of 98.6% with the sequence of *A. aureolatum* already deposited in the GenBank (AF541254, data not shown). The sequenced mitochondrial 16S rDNA fragments of *Amblyomma* nymphs did not match any sequence for species from this genus deposited in the GenBank and their specific status remain undefined. Sequences from our specimens were not deposited in the GenBank but they are presented in Figure 1. The length of the sequences was 410 bp and they were almost identical differing by just two mutations (transition T → C), for an overall agreement of 99.5% between them. The morphologies of these undetermined nymphs are extremely similar and they most probably belong to the same species of *Amblyomma*.

Turdus albicollis and *T. rufiventris* are new hosts for *H. juxtakochi*. These birds and *B. leucoblepharus* are new hosts for *Ixodes pararicinus*. All collections of nymphs of *Amblyomma longirostre* constitute new host records. Nymphs of *H. juxtakochi* and *Amblyomma* spp. were also found on vegetation or feeding on man.

Table 1. Numbers of tick larvae (LL) and nymphs (NN) of *Amblyomma* (*A.*), *Haemaphysalis* (*H.*) and *Ixodes* (*I.*) species collected from different families and species of wild birds in central Uruguay from 4 to 7 February, 2004.

Family and species of birds	Infested/total caught	Number and species of ticks*
Furnariidae		
<i>Syndactyla rufosuperciliata</i>	1/1	1 NN <i>A. longirostre</i>
	1/1	2 NN <i>I. pararicinus</i>
Parulidae		
<i>Basileuterus leucoblepharus</i>	1/2	1 LL <i>I. pararicinus</i>
Turdidae		
<i>Turdus albicollis</i>	1/5	1 NN <i>A. longirostre</i>
	2/5	2 NN <i>A. spp</i>
	2/5	2 LL <i>A. aureolatum</i>
	1/5	1 NN <i>H. juxtakochi</i>
	4/5	33 LL <i>H. juxtakochi</i>
	4/5	7 NN <i>I. pararicinus</i>
	2/5	2 LL <i>I. pararicinus</i>
<i>Turdus rufiventris</i>	4/6	5 LL <i>A. aureolatum</i>
	1/6	1 NN <i>A. spp.</i>
	5/6	9 NN <i>H. juxtakochi</i>
	5/6	38 LL <i>H. juxtakochi</i>
	6/6	16 NN <i>I. pararicinus</i>
	5/6	10 LL <i>I. pararicinus</i>
Tyrannidae		
<i>Elaenia parvirostris</i>	1/9	1 NN <i>A. longirostre</i>

* Collectors: J.M. Venzal, M.L. Félix and A. Olmos.

Discussion

More than 96% of the larvae and nymphs from this study were collected on two species of *Turdus* that represented 28% of the 39 birds caught. All *H. juxtakochi* and *A. aureolatum* as well as the great majority of larvae and nymphs of *I. pararicinus* were found on them (several birds were simultaneously infested with these and other tick species).

The role of Turdidae as relevant host for immature stages of *A. aureolatum* has been already reported by Arzua et al. (2003). *Haemaphysalis juxtakochi* is a Neotropical-Nearctic species (Guglielmone et al. 2003) whose adults feed mainly on Artiodactyla, especially on *Mazama* deer (Kohls 1960; Guglielmone et al. 1992). Kohls (1960) presumed that deer were the hosts for the immature stages. However, the present study confirms the finding of Beldoménico et al. (2003) showing that birds are important to feed larvae and nymphs of this tick species.

Ixodes pararicinus is a Neotropical species whose adult stages parasitize mostly Artiodactyla (Guglielmone et al. 1992; Venzal et al. 2003b). Beldoménico et al. (2003) showed the importance of Sigmodontinae rodents as hosts for larvae and nymphs, although there are also records of *I. pararicinus* on wild birds in Argentina and Uruguay as stated in the introduction of this article.

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                                                    I
1 1111111112 222222223 333333334 444444445 555555556
1234567890 1234567890 1234567890 1234567890 1234567890 1234567890
Nymph 1 TATTTTGACT ATACAAAGGT ATTGAAATAA GACTTTAATT GAGTGCCTAAG AGAATGGAAA
Nymph 2 .....

1 111111111 111111111
666666667 777777778 888888889 999999990 000000001 111111112
1234567890 1234567890 1234567890 1234567890 1234567890 1234567890
Nymph 1 TACAGAAAAA TTCTTTCTTA AATTCAAAAA TTAAAGTTAT TTTTATTTGT GAAGAAACAG
Nymph 2 .....C....

111111111 111111111 111111111 111111111 111111111 111111111
222222223 333333334 444444445 555555556 666666667 777777778
1234567890 1234567890 1234567890 1234567890 1234567890 1234567890
Nymph 1 TAATATTAAT TAAGGACAAG AAGACCCTAA GAATTTCTTG AAAAATTAAT TTTTGTATG
Nymph 2 .....C....

111111111 111111112 222222222 222222222 222222222 222222222
888888889 999999990 000000001 111111112 222222223 333333334
1234567890 1234567890 1234567890 1234567890 1234567890 1234567890
Nymph 1 AAAATTTTCT TTAATTGGGG CGATTAATAA AAATTTAAAA CTTTATTTAA ATAACAAAA
Nymph 2 .....

222222222 222222222 222222222 222222222 222222222 222222223
444444445 555555556 666666667 777777778 888888889 999999990
1234567890 1234567890 1234567890 1234567890 1234567890 1234567890
Nymph 1 ATGAACCAAT ATTATTGGTC ATATGAAAAA AACTACTCTAG GGATAACAGC GTAATAATTT
Nymph 2 .....

333333333 333333333 333333333 333333333 333333333 333333333
000000001 111111112 222222223 333333334 444444445 555555556
1234567890 1234567890 1234567890 1234567890 1234567890 1234567890
Nymph 1 TTGATAGTTC TTATAGACAA AATAGTTTGC GACCTCGATG TTGGATTAGG ATACTTTTTT
Nymph 2 .....

333333333 333333333 333333333 333333334 444444444
666666667 777777778 888888889 999999990 000000001
1234567890 1234567890 1234567890 1234567890 1234567890
Nymph 1 AATGAAGAAG TTAATAAAG AAGTTTGTTC AACTTTTAAT TTCCTACTGA
Nymph 2 .....

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Figure 1. Alignment of nucleotide sequence (5'-3') of a segment of the 16S mitochondrial rDNA gene of two nymphs of *Amblyomma* found on man and birds in Uruguay, whose specific status is uncertain.

The feeding pattern of this tick species is characteristic of several species of the *Ixodes ricinus* (L.) complex to which *I. pararicinus* belongs (Keirans et al. 1999). This report increases the species of wild birds found infested with *I. pararicinus* and stresses that wild birds are also relevant to sustain its presence in nature.

Amblyomma longirostre is a tick species considered to be established only in the Neotropical region (Guglielmo et al. 2003) where adult ticks parasitize mostly Rodentia from the family Erethizontidae. Nymphs of *A. longirostre* are also found on birds that migrate from the Neotropics to the Nearctic region (Fairchild et al. 1966). The presence of nymphs of *A. longirostre* on Uruguayan wild birds has been already reported (Venzal et al. 2003a). The current additional records on three species of non-migratory birds established in Uruguay may indicate that these infestations are of value for the life cycle of

A. longirostre. Although adults *A. longirostre* ticks has not yet been recorded in Uruguay, the presence of a representative of Erethizontidae, *S. spinosus*, in the sites where nymphs of this tick species have been collected, could be an indicator of the presence of *A. longirostre* in the country.

These and other results from southern South America (Rojas et al. 1999; Arzua et al. 2003) indicate that birds of the genus *Turdus* are important for the life cycle of several species of Ixodidae. Birds from the genus *Turdus* are characterized by living in low forest stratum and commonly found on the ground (Narosky and Izurieta 1987), which may explain the higher infestation with larvae and nymphs of ixodids in comparison with birds from other families. The majority of Tyrannidae birds from the genera *Elaenia* and *Myiarchus*, as well as those birds from the family Alcedinidae and Trochilidae spend few if any time on the ground or low vegetation, where most ticks are questing. Conversely, there was expected a null or very low tick infestation on these birds. Nevertheless, the Emberizidae birds of the genera *Zonotrichia* and *Poospiza* captured during the study are common in low forest stratum and ground but no tick were found on them. This may indicate a preferential host specificity of the tick species found in this study towards *Turdus* with the exception of *A. longirostre*. Nevertheless, additional studies are needed to confirm this hypothesis. Parulidae and Furnariidae birds may be also important as hosts for immature tick stages but few of them were caught to confirm this presumption.

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