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Short communication

Seasonal distribution of larvae and nymphs of *Amblyomma tigrinum* Koch, 1844 (Acari: Ixodidae)

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ABSTRACT

The seasonality of immature stages of *Amblyomma tigrinum* was studied in an area of the Chaco phytogeographical province in Córdoba, Argentina by monthly collection of larvae from ground feeding birds and Sigmodontinae rodents, and nymphs from Caviidae rodents from May 2005 to April 2007. An apparent peak of abundance was found from December to May but differences with other months of the year were not significant ($P > 0.05$). These and previous results suggest that the parasitic stages of *A. trigrinum* are active throughout the year and has more than one generation per year at the study site. Its life cycle appears to be regulated by temperature with no occurrence of diapause.

1. Introduction

Amblyomma tigrinum Koch, 1844 is a tick of veterinary importance because the adult stages are usually found on wild and domestic Canidae (Guglielmone et al., 2000). In South America, this species was largely confused with *Amblyomma maculatum* Koch, 1844 until Kohls (1956) resurrected *A. tigrinum* along with *Amblyomma triste* Koch, 1844. *A. tigrinum* is peculiar for its ability to colonize areas with contrasting climatic conditions from lowlands in central Chile (González Acuña and Guglielmone, 2005) to Peruvian Andes (Mendoza Uribe and Chávez Chorocco, 2004) and all phytogeographic domains in continental Argentina (Guglielmone et al., 2000).

Nava et al. (2006) found that the most important natural hosts for larvae of *A. tigrinum* are small rodents (Cricetidae: Sigmodontinae) and ground feeding birds, while the principal host for nymphs is the rodent *Galea musteloides* (Caviidae: Caviinae). The seasonal distribution of adults of *A. tigrinum* was described by Guglielmone et al. (2000) but seasonality of subadult ticks is unknown. Therefore, a study was conducted to know the abundance of larvae and nymphs of *A. tigrinum* on their natural hosts to further understand its life cycle.

2. Materials and methods

The study was carried out trapping rodents and ground feeding birds every month from May 2005 to April 2007, in an area located between 30°26′S 64°16′W and 30°12′S 64°32′W in north-western of Córdoba Province, Argentina. This area belongs to the Chaco phytogeographical province of the Chaco domain as described by Cabrera (1994). Rodents were trapped using 100 Sherman live-trap-types (baited with food pellets and seeds) and 50 Tomahawk live-trap-types (baited with carrot). Birds were captured with trap cages baited with seeds and carrots, taxonomically identified, examined for ticks and released.

Previous work in this area by Nava et al. (2006) demonstrated that larvae of *A. tigrinum* were common on Sigmodontinae rodents and on the ground feeding birds *Saltator aurantiirostris* (Cardinalidae), *Coryphospingus cucullatus*, *Lophospingus pusillus*, *Saltatricula multicolor* (Emberizidae) and *Pseudoseisura lophotes* (Furnariidae), while nymphs were almost exclusively found on *G. musteloides*. Therefore, these types of hosts were the target to collect

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Table 1
Percentage of prevalence (P), mean, and median (*M*) with first and third quartiles (1Q–3Q) of larvae (collected on birds and Sigmodontinae rodents) and nymphs (collected on the Caviidae rodent *Galea musteloides*) of *Amblyomma tigrinum*. The monthly number of hosts examined for ticks (*n*) is also indicated.

Month	Larvae				Nymphs			
	n	P (%)	Mean*	*M* (1Q–3Q)	*n*	P (%)	Mean*	*M* (1Q–3Q)
May 2005	12	76.2	8.1^{b}	4 (0.5–15)	6	100	22.2^{d}	20 (8–23)
June 2005	21	76.5	2.9^{b}	1 (0.5–3)	8	100	8.4^{cd}	7 (6.5–9)
July 2005	34	64.7	1.2^{ab}	1 (0–2)	12	100	9.7^{cd}	10.5 (8–11.5)
August 2005	25	48.0	1.5^{ab}	0 (0–1)	15	86.6	6.3^{bcd}	6 (3–8)
September 2005	26	46.2	1.4^{ab}	0 (0–1)	7	100	6.9^{cd}	8 (5–10)
October 2005	26	15.4	0.6^{ab}	0	17	94.1	4.8^{abcd}	4 (1–8.5)
November 2005	16	25.0	0.7^{a}	0 (0–0.5)	9	88.8	13.4^{cd}	5 (1.5–8)
December 2005	8	12.5	0.7^{ab}	0	5	60.0	7.2^{abcd}	2 (0–17)
January 2006	11	81.8	4.1^{b}	2 (1–8)	5	100	18.4^{d}	20 (7–29)
February 2006	8	75.0	2.7^{ab}	1.5 (0.5–4)	4	100	6.5^{bcd}	5 (4.5–8.5)
March 2006	12	75.0	4.7^{ab}	1 (0.5–5.5)	11	90.9	5.4^{abcd}	5 (3–5.5)
April 2006	12	83.3	1.6^{ab}	1 (1–1.5)	7	85.7	15.8^{d}	20 (2–29)
May 2006	21	76.9	5.0^{b}	1 (0.5–5)	16	100	10.1^{cd}	7 (5–13)
June 2006	21	31.8	1.6^{ab}	0 (0–1)	20	85.0	3.6^{abcd}	3.5 (1.5–5.5)
July 2006	38	65.8	3.5^{b}	1 (0–5)	13	100	6.7^{bcd}	6 (4–9)
August 2006	24	50.0	1.9^{ab}	0.5 (0–2)	21	90.5	6.3^{bcd}	4 (3–7)
September 2006	20	45.0	1.1^{ab}	0 (0–1.5)	8	100	5.1^{abcd}	4.5 (3.5–5.5)
October 2006	22	34.8	1.1^{ab}	0 (0–1)	13	61.5	0.8^{a}	1 (0–1.5)
November 2006	14	28.6	8.7^{ab}	0 (0–1)	11	45.4	1.0^{ab}	0 (0–2)
December 2006	16	43.8	3.2^{ab}	0 (0–2.5)	3	100	2.3^{abcd}	2 (2–3)
January 2007	0	0.0	0.0	0	6	66.6	1.7^{abc}	1 (0–2)
February 2007	11	54.5	1.4^{ab}	1 (0–1)	9	66.6	3.0^{abcd}	2 (0–4)
March 2007	7	12.5	3.5^{ab}	0	2	100	2.5^{abcd}	2.5 (1–4)
April 2007	2	50.0	1.0^{ab}	1 (0–2)	3	100	9.7^{cd}	9 (8–12)

* Kruskal–Wallis test. Numbers not sharing superscripts are significantly different ($P < 0.01$).

larvae and nymphs of *A. tigrinum*. The taxonomic determination of the ticks was carried out following Estrada-Peña et al. (2005).

Tick prevalence, mean, median and first and third quartiles (1Q–3Q) were obtained for each group of hosts. Chi-square distribution was used to compare prevalence, and differences in tick distributions on hosts were tested using *U* Mann–Whitney and Kruskal–Wallis tests.

3. Results and discussion

A total of 253 Sigmodontinae rodents [*Graomys centralis* (n: 98), *Akodon dolores* (n: 91), *Necromys benefactus* (n: 8) and *Calomys* spp. (n: 56)], 231 *G. musteloides* and 154 birds [*S. aurantiirostris* (n: 10), *C. cucullatus* (n: 27), *L. pusillus* (n: 47), *S. multicolor* (n: 56) and *P. lophotes* (n: 14)] were captured and examined for ticks. Larvae on Sigmodontinae

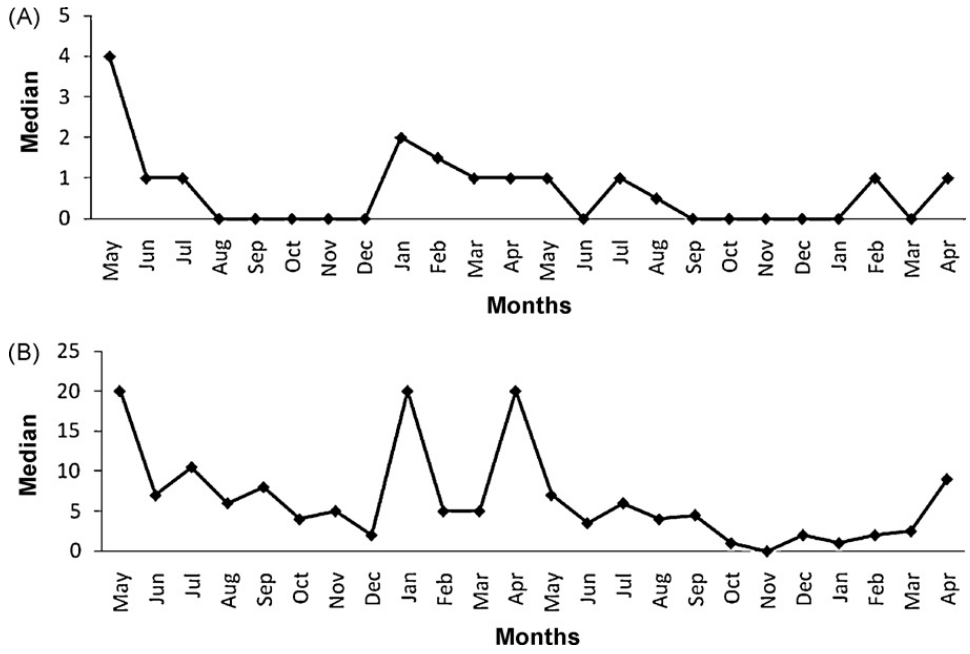

Fig. 1. Seasonal distribution of larvae (A) and nymphs (B) of *Amblyomma tigrinum* in the north-western of Córdoba Province, Argentina.

rodents showed a prevalence of 53.1%, a mean of 2.82, and a median of 1 (0–2.5), while on birds the prevalence was 48.7%, the mean 2.16 and the median 1 (0–2.5). The differences of larval infestation in rodents and birds were not significant (Chi-square, $P = 0.157$; U Mann–Whitney, $P = 0.176$); therefore, data from both types of hosts were merged to depict the seasonal distribution of larvae of *A. tigrinum*. The parasitism of nymphs on *G. musteloides* was characterized by a prevalence of 87.4%, a mean of 6.83 and a median of 5 (2–8). The monthly level of infestation of immature stages of *A. tigrinum* on their hosts is presented in Table 1.

Although there is a major peak of abundance from late spring to middle autumn (December to May), larvae and nymphs of *A. tigrinum* were found during the whole year (Fig. 1), and the comparison with values from other months and seasons failed to demonstrate statistically significant differences (Table 1). The seasonal distribution of adult stages of *A. tigrinum* is also characterized by ticks present all year round with a peak of abundance in summer (Guglielmone et al., 2000). These results indicate that all parasitic stages of *A. trigrinum* are active throughout the year and, probably, more than one generation per year is produced at the study site. The plasticity of *A. tigrinum* to adapt to different environment has been mentioned above. Probably, the most important factor that regulates the life cycle of *A. tigrinum* is temperature with no occurrence of diapause. This strategy would permit periods of quiescence and activity modulated by temperature, which may explain its distribution in habitats with contrasting climatic conditions.

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