

New hosts for *Amblyomma argentinae* Neumann, 1905 (Acari: Ixodidae) in the Dry Chaco of Argentina

Nuevos hospedadores para *Amblyomma argentinae* Neumann, 1905 (Acari: Ixodidae) en el Chaco Seco de Argentina

Ruiz García José Augusto^{1*}, Debárbora Valeria Natalia², Zaracho Víctor Hugo¹, Tedesco María Esther¹

ABSTRACT: *Amblyomma argentinae* Neumann, 1905 (Acari: Ixodidae) is a hard tick that parasitizes mainly reptiles. During amphibians and reptiles samplings in Miraflores locality, Chaco Province, Argentina, we collected a total of 34 nymphs and one adult of *A. argentinae* from the colubrid snakes *Chironius maculoventris*, *Philodryas erlandi*, *P. psammophidea*, and the turtle *Acanthochelys pallidipectoris*. Additionally, we add other records of *A. argentinae* in lizards previously reported in the Semi-arid Chaco of Argentina, and provide information on the behavior of the snake *P. erlandi* infested with 19 nymphs. These findings represent the first records of parasite-host association for Argentina.

Keywords: snakes, turtle, ticks, parasite-host association, Chaco.

RESUMEN: *Amblyomma argentinae* Neumann, 1905 (Acari: Ixodidae) es una garrapata dura que parasita principalmente reptiles. Durante muestreos de anfibios y reptiles en la localidad de Miraflores, Provincia del Chaco, Argentina, recolectamos un total de 34 ninfas y un adulto de *A. argentinae* de las serpientes colúbridas *Chironius maculoventris*, *Philodryas erlandi*, *P. psammophidea* y de la tortuga *Acanthochelys pallidipectoris*. Adicionalmente, agregamos otros registros de *A. argentinae* en lagartijas previamente reportados en el Chaco semiárido de Argentina, y aportamos información sobre el comportamiento de la culebra *P. erlandi* infestada con 19 ninfas. Estos hallazgos representan los primeros registros de asociación parásito-hospedador para Argentina.

Palabras clave: serpiente, tortuga, asociación parásito-hospedador, Chaco.

Amblyomma is a genus of Neotropical and Afro-tropical ticks characterized by having a parasitic cycle of three hosts (Nava et al., 2017; Guglielmone et al., 2021). Currently, 136 species are recognized within the genus, 25 of which have been recorded in Argentina (Guglielmone et al., 2021). The ixodid tick *Amblyomma argentinae* Neumann, 1905 is a South American species that was found only in nine provinces of Argentinian territory (Nava et al., 2017; Guglielmone et al., 2021). The biogeographic distribution of *A. argentinae* in the Neotropical region includes Chaco and Monte of Argentina (Nava et al., 2017). The taxonomy of the species is complex (see Guglielmone et al., 2001) and little is known about its ecology (Nava et al., 2017). The principal host is the Class Reptilia (snakes, lizards and turtles). All stages of *A. argentinae* are usually found in its main host, the Chaco tortoise *Chelonoidis chilensis* Gray (Testudines: Testudinidae), with which shares its distribution range, although it has also been reported in a species of amphibian (Guglielmone et al.,

2021). Records of infestation by *A. argentinae* in snakes and turtles are scarce, there are only reports for the family Boidae: *Boa constrictor*, *Epicrates alvarezii* and *Eunectes notaeus*; the family Viperidae: *Bothrops neuwiedi* and *Crotalus durissus*, the family Testudinidae: *C. chilensis* and the family Chelidae: *Phrynops hilarii* (Guglielmone et al., 2021). Here, we report for the first time the ectoparasitism by *A. argentinae* on colubrid snakes *Chironius maculoventris* Dixon, Wiest and Cei, *Philodryas erlandi* Lönnberg, *P. psammophidea* Gunther, and the tortoise *Acanthochelys pallidipectoris* Freiberg, from the Dry Chaco of Argentina.

During amphibian and reptile samplings on Miraflores locality, General Güemes Department, Chaco Province, Argentina, in February 2020, November 2021, and January 2022, we captured the colubrid snakes *C. maculoventris*, *P. erlandi*, *P. psammophidea* and the turtle *A. pallidipectoris* infected by ticks (Fig. 1 a-d). The study area is found in the Dry Western District (Semiarid Chaco Subregion), vegetation is xerophilous,

¹Laboratorio de Herpetología. Facultad de Ciencias Exactas y Naturales y Agrimensura (FaCENA). Universidad Nacional del Nordeste (UNNE). Campus Deodoro Roca. Av. Libertad 5470, Corrientes, Argentina. ²Laboratorio de Biología de los Parásitos. Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET). Facultad de Ciencias Exactas y Naturales y Agrimensura (FaCENA). Universidad Nacional del Nordeste (UNNE). Campus Deodoro Roca. Av. Libertad 5470, Corrientes, Argentina.

the climate is subtropical warm continental with annual precipitation varying between 500 and 550 mm and annual means temperature range from 21 to 22 °C (Morello *et al.*, 2012).

Each tick was removed from the host with tweezers, and identified using the keys and descriptions from Martins *et al.* (2014) and Nava *et al.* (2017). The ticks were preserved in 70% ethanol and deposited in the Parasites Collection of Facultad de Ciencias Exactas y Naturales y Agrimensura, Universidad Nacional del Nordeste, Corrientes, Argentina (UNNEP N° 167-172). The reptiles collected were housed in the Colección Herpetológica Blanca Beatriz Álvarez of the Universidad Nacional del Nordeste, Corrientes, Argentina (UNNEC). The turtle was released in the place of capture after taking morphological measures and photographed.

A total of 34 nymphs and one adult male of *A. argentinae* were identified in the hosts (Table 1, Fig. 2 a-b). The examined nymphs present large body size and body outline oval, chitinous tubercles at the posterior body margin absent, eyes flat located on lateral scutal angles at the level of scutal mid-length, cervical grooves reaching mid-level of the scutum, deeper in the scutal anterior third and basis capituli

dorsally subtriangular, without cornua. The hypostome is spatulate and dental formula 3/3 for most of the length and 2/2 at the base. The coxa I presents two pointed spurs, the external longer than the internal.

Morphologically *A. argentinae* is closely related to *A. dissimile* Koch, 1844, and *A. rotundatum* Koch, 1844 (Nava *et al.*, 2017). *Amblyomma argentinae* can be distinguished from *A. rotundatum* by having the coxa II-IV with only one spur; and differs from *A. dissimile* by having the scutum with deep punctations evenly distributed, larger and deeper laterally.

The ticks were concentrated in the dorsal and mid-lateral region of the host body. One adult host specimen of *P. erlandi* was infested with 19 nymph ticks (Fig. 1b, Table 1). The snake was captured by hand and made no attempt to escape during capture; the snake presented a skinny body and a reduction of mobility (Ruiz García, pers. obs.). Furthermore, we found *A. argentinae* infesting the lizards *Tropidurus etheridgei* Cei (UNNEC 13646, 25° 35' 11" S, 61° 00' 14" W, Fig. 2c) and *Teius teyou* (Daudin) (UNNEC 13645, 25° 39' 34.6" S, 61° 00' 55.7" W).

These associations have already been reported by Debárbora *et al.* (2015) at ca. 108 km northwest in

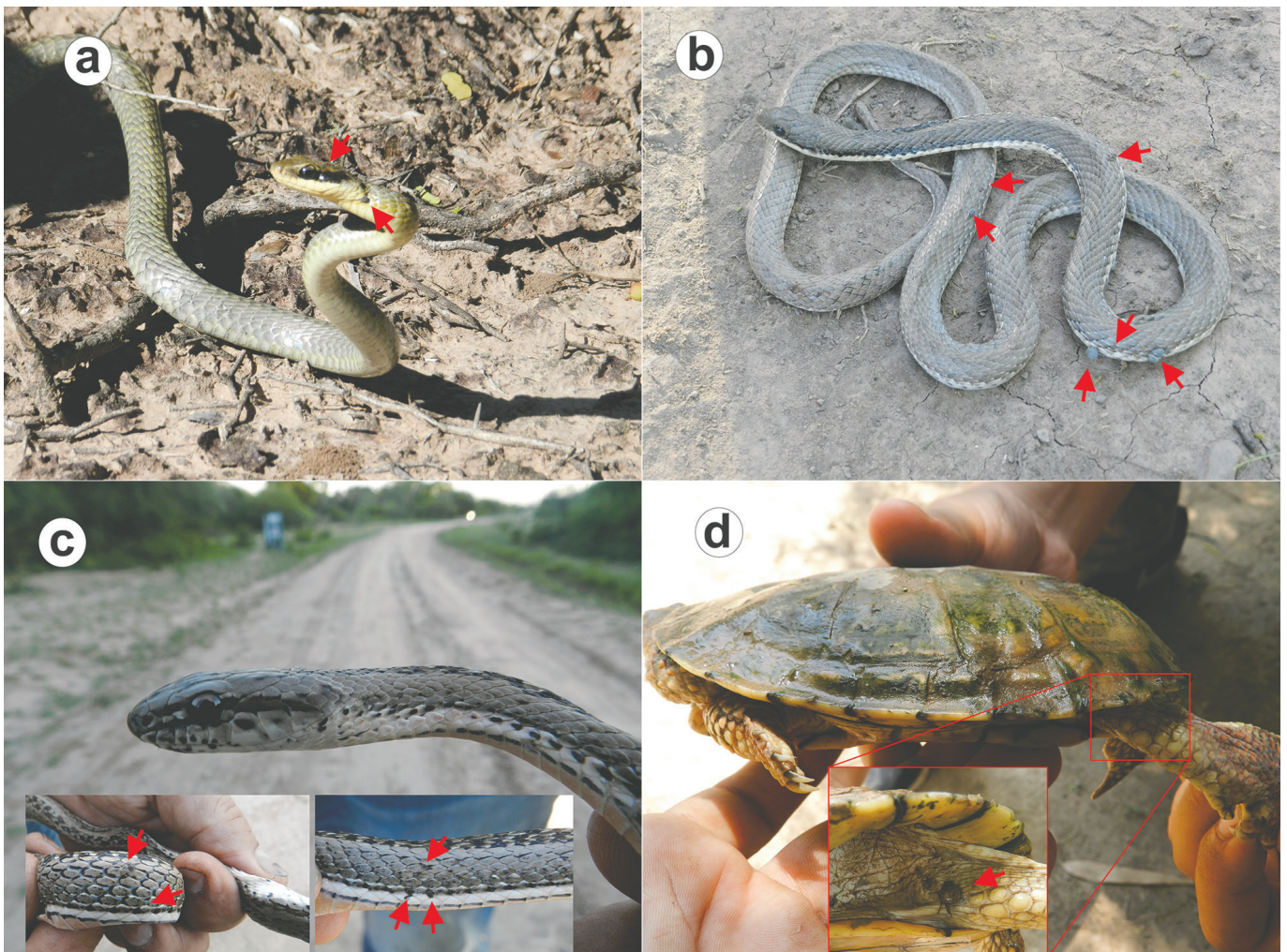


Figure 1. New tick-host associations of *Amblyomma argentinae* (red arrow) from Argentina. a) *Chironius maculoventris*, b) *Phylodryas erlandi*, c) *P. psammophidea* and d) *Acanthochelys pallidipectoris*.

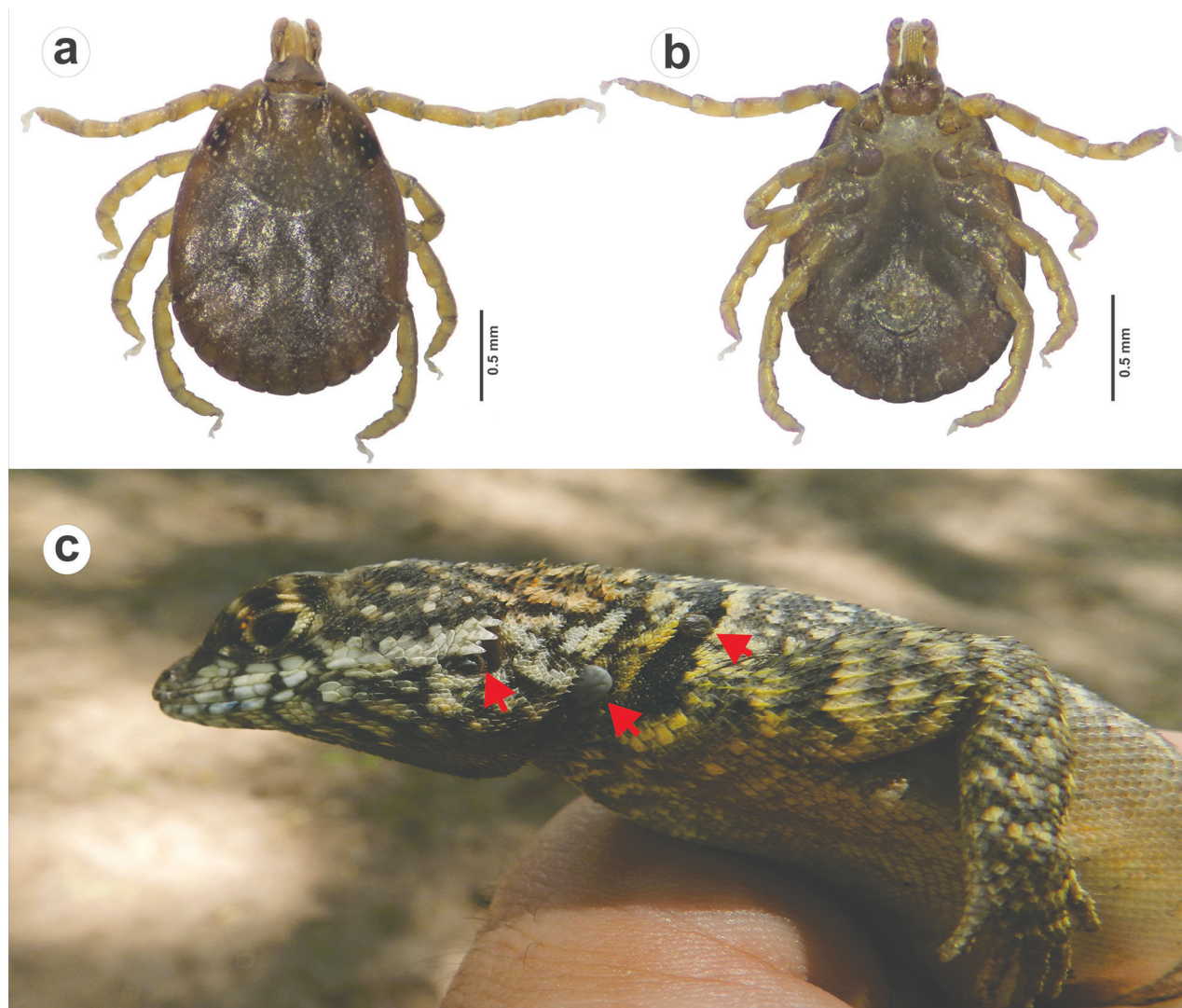


Figure 2. *Amblyomma argentiniae* nymph. a) Dorsal view. b) Ventral view. c) Parasitizing (red arrow) *Tropidurus etheridgei* from Argentina.

Table 1. Reptile hosts of *Amblyomma argentiniae* in Chaco province.

Hosts	UNNEC	Status conservation	Locality / Province	Date / Geographical coordinates	<i>Amblyomma argentiniae</i>	
					Nymphs	Adult
Order Squamata Family Colubridae						
<i>Chironius maculoventris</i>	13652	Not threatened	Miraflores / Chaco	20/11/2021 25° 34'52''S 61° 1'4''W	5	0
Family Dipsadidae						
<i>Philodryas erlandi</i>	13733			5/2/2020 25° 34'48''S, 61° 1'11''W	3	0
<i>P. erlandi</i>	13653	Not threatened	Miraflores / Chaco	18/11/2021 25° 34'49''S, 61° 1'12''W	19	0
<i>P. erlandi</i>	13654			18/11/2021 25° 34'50''S, 61° 1'12''W	3	0
<i>P. psammophidea</i>	13658			22/11/2021 25° 39'39''S, 60° 54'59''W	4	0
Order Testudines Family Chelidae						
<i>Acanthochelys pallidipectoris</i>	00032-A Sighting Not collected	Threatened	Miraflores / Chaco	31/01/2022 25° 34'49''S 61° 00'59''W	0	1

the Parque Natural Provincial Fuerte Esperanza (Semi-arid Chaco), Chaco province, Argentina.

According to Guglielmone *et al.* (2001), the abundance and survival of *A. argentinae* strongly depend on *C. chilensis*, which is "Vulnerable" species in Argentina due to mascotism, habitat loss by the expansion of the agricultural frontier, and the effect of livestock in the Dry Chaco (Waller and Micucci, 1997; Prado *et al.*, 2012). The new hosts recorded are considered as "Not threatened" and "Threatened" species (Table 1), and live in sympatry with *C. chilensis* in Chaco, Formosa, Salta, Santa Fe, Santiago del Estero, and Tucumán provinces from Argentina (Arzamendia and Giraudo, 2012; Prado *et al.*, 2012; Scrocchi and Kretzschmar, 2012; Scrocchi *et al.*, 2012; Williams *et al.*, 2021). The new associations could behave as new alternative hosts and favor the survival of *A. argentinae* populations. Furthermore, it demonstrates the importance of snakes and lizards as hosts of *A. argentinae* and provides data for future studies related to the ecology of this species.

We thank Dirección de Áreas Protegidas y Biodiversidad of the Chaco province for research authorization and the collection permit (Disposición N° 985/21). We wish to express our gratitude to Godoy family for their assistance and research authorization in "Campo Doña Irma". We also acknowledge the two anonymous reviewers and the editorial committee of RAP that provided valuable suggestions and comments that improved the manuscript.

This study received financial support from Secretaría General de Ciencia y Técnica de la Universidad Nacional del Nordeste (Resolución 124/21-PI 20F003).

LITERATURA CITADA

- Arzamendia, V. and Giraudo, A. R. (2012). *Chironius maculoventris*. In: Categorización del estado de conservación de las Serpientes de la República Argentina. Cuadernos de Herpetología, 26 (S.1), 312.
- Debárbora, V. N., Acosta, J. L. and Mangold, A. J. (2015). Primer asociación parásito hospedador de *Amblyomma argentinae* Neumann, 1904 (Acari: Ixodidae) con tres especies de saurios del Chaco Semiárido de Argentina. Revista Argentina de Parasitología, 3, 6-7.
- Guglielmone, A. A., Luciani, C. A. and Mangold, A. J. (2001). Aspects of the ecology of *Amblyomma argentinae* Neumann, 1904 [= *Amblyomma testudinis* (Conil, 1877)] (Acari: Ixodidae). Systematic and Applied Acarology Special Publications, 8 (1), 1-12.
- Guglielmone, A. A., Nava, S. and Robbins, R. G. (2021). Neotropical Hard Ticks (Acari: Ixodida: Ixodidae). A Critical Analysis of Their Taxonomy, Distribution, and Host Relationships. Springer Nature Switzerland.
- Martins, T. F., Labruna, M. B., Mangold, A. J., Cafrune, M. M., Guglielmone, A. A. and Nava, S. (2014). Taxonomic key to nymphs of the genus *Amblyomma* [Acari: Ixodidae] in Argentina, with description and redescription of the nymphal stage of four *Amblyomma* species. Ticks and tick-borne Diseases, 5, 753-770.
- Morello, J., Matteucci, S., Rodríguez, A., Silva, M. and de Haro, C. (2012). Ecorregiones y complejos ecosistémicos argentinos. Buenos Aires, Orientación Gráfica Editora.
- Nava, S., Venzal, J. M., González-Acuña, D., Martins, T. F. and Guglielmone, A. A. (2017). Ticks of the Southern Cone of America. Elsevier Academic, London.
- Neumann, L. G. (1905). Notes sur les ixodidés III. Archives de Parasitologie, 9, 225-241.
- Prado, W. S., Waller, T., Cabrera, M. R., Etchepare, E. and Richard, E. (2012). *Chelonoidis chilensis*. In W. S. Prado, Waller, T., D. A. Albareda, M. R. Cabrera, E. Etchepare, A. R. Giraudo, V. González Carman, L. Prosdocimi y E. Richard. Categorización del Estado de Conservación de las Tortugas de la República Argentina (396). Cuadernos de herpetología, 26 (supl.1), 375-388.
- Scrocchi, G. J. and Kretzschmar S. (2012). *Philodryas psammophidea*. In A. R. Giraudo, V. Arzamendia, G. P. Bellini, C. A. Bessa, C. C. Calamante, G. Cardozo, M. Chiaraviglio, Ma. B. Costanzo, E. G. Etchepare, V. Di Cola, D. O. Di Pietro, S. Kretzschmar, S. Palomas, S. J. Nenda, P. C. Rivera, M. E. Rodríguez, G. J. Scrocchi and J. D. Williams. Categorización del Estado de Conservación de las Serpientes de la República Argentina (314). Cuadernos de herpetología, 26 (Supl. 1), 303-326.
- Scrocchi, G. J., Kretzschmar S., Etchepare, E., Arzamendia, V., Giraudo, A. R. and Calamante, C. C. (2012). *Philodryas mattogrossensis*. En A. R. Giraudo, V. Arzamendia, G. P. Bellini, C. A. Bessa, C. C. Calamante, G. Cardozo, M. Chiaraviglio, Ma. B. Costanzo, E. G. Etchepare, V. Di Cola, D. O. Di Pietro, S. Kretzschmar, S. Palomas, S. J. Nenda, P. C. Rivera, Ma. E. Rodríguez, G. J. Scrocchi and J. D. Williams. Categorización del Estado de Conservación de las Serpientes de la República Argentina (314). Cuadernos de herpetología, 26 (Supl. 1), 303-326.
- Waller, T. and Micucci, P. A. (1997). Land use and grazing in relation to genus *Geochelone* in Argentina. In: Van Abbema, J. (ed.). Proceedings: Conservation, Restoration and Management of Tortoises and Turtles - An International Conference. New York Turtle and Tortoise Society, Nueva York.
- Williams, J. D., Vera, D. G. and Di Pietro, D. O. (2021). Lista comentada de las serpientes de la Argentina, con referencias a su sistemática, distribución geográfica, dieta, reproducción, potencial peligrosidad y etimologías. Revista del Museo de La Plata, 6 (1), 26-124.

Recibido: 16 de septiembre de 2022

Aceptado: 14 de diciembre de 2022