

Reptile trade and the risk of exotic tick introductions into southern South American countries

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Abstract. Ticks exotic for the Neotropical region were found on *Python regius* imported into Argentina and Chile. All ticks (7 males and 3 females) were classified as *Amblyomma latum* Koch, 1844 (= *Aponomma latum*). Additionally, four lots comprising 18 males of the Argentinean tortoise tick, *Amblyomma argentiniae* Neumann, 1904, were found on a terrestrial tortoise, *Chelonoidis chilensis*, and on three terrestrial tortoises (probably *C. chilensis*) imported to Uruguay presumably from Argentina). These findings alert us to the risk of expanding the distribution of reptile parasites and their diseases into regions previously free of these parasites.

Introduction

The introduction of exotic ticks into any country is of concern because of the risks associated with new vectors of tick-borne diseases becoming established, the potential for introducing new pathogenic agents and a negative ecological impact (BurrIDGE and Simmons 2003). Exotic tick species from 11 genera were identified as being imported into the USA during the last 50 years (Keirans and Durden 2001), and 29 tick species from three genera were found in the USA on introduced reptiles during the same period (BurrIDGE and Simmons 2003).

The international reptile trade has grown steadily during the last several years. More than 80% of the trade of live reptiles listed by the Convention on International Trade in Endangered Species of Wild Fauna and Flora involves shipment into or out the USA (Hoover 1998). The danger of introducing new parasites into naive hosts outside their natural habitat increases accordingly.

The finding of African reptile ticks that are experimental vectors of cowdriosis such as *Amblyomma sparsum* Neumann, 1899 and *Amblyomma*

marmoreum Koch 1844 in the USA are examples of the hazards faced with the expansion of reptile trade (BurrIDGE et al. 2000; BurrIDGE and Simmons 2003). Moreover, *A. marmoreum* has been found on tortoises, dogs and vegetation in Florida (USA) appearing to be now established in Nearctic environments (Allan et al. 1998).

Regarding southern South America, there are few references of introduced exotic reptile ticks. The Argentinian tortoise tick *Amblyomma argentiniae* Neumann, 1904 was found on terrestrial tortoises imported to Chile and Uruguay (González-Acuña et al. 2003; Venzal et al. 2003). *Amblyomma rotundatum* Koch 1844 (cited as *Amblyomma agamun* Aragão, 1912) was found on an undetermined host in the Zoological Garden of Montevideo, Uruguay (Vogelsang 1928). An unknown species of *Amblyomma* (formerly *Aponomma*) was found on *Python molurus* imported from Asia to Argentina (Mendy 1931). In this article we present data on exotic ticks introduced into Argentina and Chile on ball python snakes, *Python regius*, and additional information on *A. argentiniae* on terrestrial tortoises imported to Uruguay probably from Argentina. We believe that this importation problem may be increasingly relevant for this region.

Materials and methods

Four male *Amblyomma* ticks were found on April 21, 2003 on a *P. regius* imported from the USA just after arrival at the National Zoological Garden in Santiago, Chile. The snake was sent to the USA from Africa. Three female and 3 male *Amblyomma* ticks were found on December 1, 2003 on a second ball python acquired from Africa by the owner of a pet shop in Santa Fe City, Argentina. In Uruguay 3 *Amblyomma* males were collected by A. Perretta on October 7, 2002 on an Argentinian tortoise (*Chelonoidis chilensis*) in Montevideo. Three additional lots of 7, 5 and 3 male *Amblyomma* ticks from terrestrial tortoises (probably *C. chilensis*) were collected (dates undetermined) in the same city.

All ticks were preserved in 70% ethanol. The tick specimens were identified following the keys and figures presented by Kaufman (1972) for the former genus *Aponomma* and Boero (1957) for Argentinean ticks.

Results

All ticks collected from *P. regius* were *Amblyomma latum* Koch 1844 and all from *C. chilensis* were *A. argentiniae* according with the descriptions of Kaufman (1972) and Boero (1957), respectively.

Two of the ticks found in Chile were deposited in the Tick Collection of the Laboratory of Zoology of the Veterinary Faculty (Universidad de Concepción), Chillán; the other two specimens are in the U.S. National Tick

Collection, Georgia Southern University, Statesboro (accession No. RML 123590). The ticks found in Argentina were deposited in the Ixodoidea Collection of Universidad Nacional del Litoral, Santa Fe (2 males and 2 females) (accession No. Sf00055); the remaining male and female are in the Tick Collection of the Instituto Nacional de Tecnología Agropecuaria, Rafaela (accession No. 1841). The ticks found in Uruguay on presumably Argentinian tortoises are in the Tick Collection of the Department of Parasitology of the Veterinary Faculty, Universidad de La República, Montevideo.

Discussion

Amblyomma argentiniae is a parasite of land tortoises in Argentina and its second most frequent host are boas (*Boa constrictor occidentalis*) (Guglielmone et al. 2001). There are neither terrestrial tortoises nor boas established in Chile. Uruguay, has a single record of the family Boidae, *Eunectes notaeus* (Velo and Navarro 1988; Achaval and Olmos 1997). Therefore, the risk of the spread of *A. argentiniae* in these countries may be low. However, *C. chilensis* has also been found infested with the reptile and amphibian neotropical tick, *A. rotundatum* in Argentina (Boero 1954; Ivancovich 1973). This is a parthenogenetic tick species that is now established in the Nearctic region (Oliver et al. 1993). There are no records of *A. rotundatum* for Chile (Guglielmone et al. 2003; Gonzalez-Acuña et al. 2003) and a doubtful larval record exists for Uruguay (Venzal et al. 2003). In any event, if tortoises are infested with *A. rotundatum* an unnecessary risk for Chilean and Uruguayan amphibians and reptiles will arise.

Amblyomma latum was the most frequently imported exotic tick found on reptiles in Florida (BurrIDGE et al. 2000). As reviewed by BurrIDGE and Simmons (2003), it has been also found on reptiles imported to another 18 USA states. *Amblyomma latum* is primarily an African tick (with isolated reports from Asia), which feeds mainly on snakes, eventually on lizards and sporadically on another types of hosts including humans (BurrIDGE 2001). Its geographical distributions, hosts and biology were recently reviewed by BurrIDGE (2001) and BurrIDGE and Simmons (2003). The most troubling information from these reviews is the fact that neotropical reptiles such as *Boa constrictor* and *Geochelone denticulata* have been found infested with *A. latum*, surely being exposed to them while in captivity.

It appears that *A. latum* has the potential to become established well beyond its natural habitats. The reptile fauna of southern South American countries may be suitable for its life cycle in the event that this tick species found its way into the natural environment. As reptile trade increases throughout the world, the current findings in Argentina and Chile of imported ball pythons infested with *A. latum* is a warning that strict measures are necessary to avoid introducing exotic parasites.

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References

- Achaval F. and Olmos A. 1997. Anfibios y Reptiles del Uruguay. Barreiro & Ramos, S.A., Montevideo, 128pp.
- Allan S.A., Simmons, L.A., and Burrige M.J. 1998. Establishment of the tortoise tick *Amblyomma marmoratum* (Acari: Ixodidae) on a reptile-breeding facility in Florida. *J. Med. Entomol.* 35: 621–624.
- Boero J.J. 1954. Los ixodideos de la República Argentina y sus huéspedes. *Rev. Fac. Agric. Vet.* 13: 505–514.
- Boero J.J. 1957. Las garrapatas de la República Argentina (Acarina: Ixodoidea). Departamento Editorial, Universidad de Buenos Aires, Buenos Aires, 113pp.
- Burrige M.J. 2001. Ticks (Acari: Ixodidae) spread by the international trade in reptiles and their potential roles in dissemination of diseases. *Bull. Entomol. Res.* 91: 3–23.
- Burrige M.J. and Simmons L.A. 2003. Exotic ticks introduced into the United States on imported reptiles from 1962 to 2001 and their potential roles in international dissemination of diseases. *Vet. Parasitol.* 113: 289–320.
- Burrige M.J., Simmons L.A. and Allan S.A. 2000. Introduction of potential hearwater vectors and other exotic ticks into Florida on imported reptiles. *J. Parasitol.* 86: 700–704.
- González-Acuña D., Venzal J.M., Keirans J.E. and Guglielmone A.A. 2003. The genus *Amblyomma* Koch 1844. (Acari: Ixodidae) in Chile, with new records of *A. argentinae* Neumann, 1904 and *A. tigrinum* Koch, 1844. *Syst. Appl. Acarol.* 8: 85–88.
- 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). *Syst. Appl. Acarol. Spe. Publ.* (8): 1–12.
- Guglielmone A.A., Estrada-Peña A., Keirans J.E. and Robbins R.G. 2003. Ticks (Acari: Ixodida) of the Neotropical Zoogeographic region. Special Publication of the International Consortium on Ticks and Tick-borne Diseases, Atlanta, Houten, The Netherlands, 173pp.
- Hoover C. 1998. The US role in the International Live Reptile Trade: Amazon Tree Boas to Zululand Dwarf Chamaleons. TRAFFIC North America, Washington, DC, 59pp.
- Ivancovich J.C. 1973. Las garrapatas del Chaco y Formosa. Primera comunicación. *Rev. Inv. Agropecu. Ser.* 4(10): 9–24.
- Kaufman T.S. 1972. A revision of the genus *Aponomma* Neumann, 1899 (Acarina: Ixodidae). Maryland, University of Maryland, PhD thesis, College Park, 390pp.
- Keirans J.E. and Durden L.A. 2001. Invasion: exotic ticks (Acari: Argasidae, Ixodidae) imported into the United States. A review and new records. *J. Med. Entomol.* 38: 851–861.
- Mendy J.B. 1931. Peligros de los zoológicos en la introducción y transmisión de enfermedades tropicales. II Parte. *Rev. Fac. Med. Vet. (La Plata)* 4: 539–617.
- Oliver J.H., Hayes M.P., Keirans J.E. and Lavender D.R. 1993. Establishment of the foreign parthenogenetic tick *Amblyomma rotundatum* (Acari: Ixodidae) in Florida. *J. Parasitol.* 79: 786–790.
- Veloso A. and Navarro J. 1988. Lista sistemática y distribución geográfica de anfibios y reptiles de Chile. *Boll. Mus. Reg. Sci. Nat. (Torino)* 6: 481–539.

- Venzal J.M., Castro O., Cabrera P.A., Souza C.G. and Guglielmo A.A. 2003. Las garrapatas del Uruguay: especies, hospedores, distribución e importancia sanitaria. *Veterinaria (Montevideo)* 38: 17–28.
- Vogelsang E.G. 1928. Garrapatas (Ixodidae) del Uruguay. *Bol. Inst. Clín. Quir.* 4: 668–670.