

SHORT COMMUNICATION

## ***Ornithodoros (Alectorobius) puertoricensis* (Ixodidae: Argasidae) parasitizing exotic reptiles in Panama**

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Received 17 March 2015. Accepted 22 April 2015. Available online 22 December 2015.

Editors: P. Beldomenico & R. Sobrero.

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**SUMMARY.** In this paper we report and discuss the finding of all the stages of *Ornithodoros puertoricensis* (Argasidae) parasitizing the exotic reptiles *Varanus dumerilii*, *Python regius* and *P. bivittatus*, and its presence in the reptile terrariums in Panama city.

**RESUMEN.** *Ornithodoros (Alectorobius) puertoricensis* (Ixodida: Argasidae) parasitando reptiles exóticos utilizados como mascotas en Panamá. En este trabajo se reporta y discute el hallazgo de todos los estadios *Ornithodoros puertoricensis* (Argasidae) parasitando los reptiles *Varanus dumerilii*, *Python regius* y *P. bivittatus*, y su presencia en los terrarios de reptiles en ciudad de Panamá.

**Key words:** *Ornithodoros puertoricensis*, exotic reptiles, Panamá.

**Palabras clave:** *Ornithodoros puertoricensis*, reptiles exóticos, Panamá.

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### **Introduction**

Exotic pets represent a very lucrative trade in many countries; however, the presence of parasites on these pets can result in problems for these animals, other domestic animals with which they are sharing space, and even the humans handling them (Corn, 2001; BurrIDGE et al., 2000; Pietsch et al., 2006; Brianti et al., 2010). In the case of exotic reptiles, one of the main concerns is the transport of non-native ticks out of their natural ranges, with the accompanying possibility of establishing in new areas and parasitizing native fauna (BurrIDGE, 2001; Venzal et al., 2007). Established populations of African and Neotropical ticks have been reported in facilities that keep and hold exotic pets in subtropical areas in the United States (BurrIDGE et al., 2000; BurrIDGE, 2011). In Latin America, the presence of the African tick *Amblyomma latum* - Koch, 1844 (Ixodida: Ixodidae) was reported on *Python regius* Shaw, 1802 (Serpentes: Pythonidae) in Chile, and Argentina (González-Acuña et al., 2005) and

in Uruguay (Venzal et al., 2007); the Argentinean tortoise tick *A. argentinae* Neumann, 1905 (Ixodida: Ixodidae) was found in Uruguay (González-Acuña et al., 2005), and a close species to *A. fl avomaculatum* Lucas, 1846 (Ixodida: Ixodidae) was reported on *Varanus exanthematicus* Bosc, 1792 "(Sauria: Varanidae)" in Panamá (Bermúdez and Miranda, 2011). To our knowledge there is no information about native ticks parasitizing exotic reptiles, which represents a potential problem for the health of these pets. We present the first record of the exotic reptiles *V. dumerilii* Schlegel 1839 (Sauria: Varanidae), *Python bivittatus* Kuhl, 1820 and *P. regius* as new hosts for the native Argasidae ticks *Ornithodoros (Alectorobius) Puertoricensis* Fox, 1947 (Ixodida: Argasidae) in the city of Panamá.

### **Materials and Methods**

Observations were made in a house where exotic animals such as *P. regius*, *P. bivittatus*, *V. exanthematicus*

*maticus*, *V. dumerillii*, and native reptiles, namely *Boa constrictor* Linnaeus, 1758 (Serpentes: Boidae), *Epicrates maurus* Gray, 1849 (Serpentes: Boidae) and *Iguana iguana* Linnaeus, 1758 (Squamata: Iguanidae) were kept in captivity. Each reptile species was kept in its own terrarium, which was constructed with a wooden frame and a glass window. These terrariums had an average dimension of 200 cm in length, 70 cm in width and 70 cm in height, in length, width and height respectively. The temperature was controlled and stabilized at 30° C and 80% relative humidity. In July 2014 a single Argasidae adult was collected directly off a monitor lizard *V. dumerillii*. Days after, larvae were found feeding around the eyes and mouth of the same specimen (Fig. 1); and subsequently, unfed larvae, nymphs and adults, were found in its terrarium (Fig. 2 and 3). The *V. dumerillii* had been acquired legally in May 2014, and was not found to have any ticks when it arrived at the quarantine facilities. Later, in November 2014, Argasidae ticks were also found in other terraria containing three *P. regius*, and dozens of larvae were extracted off the pythons. In December 2014, nymphs and adults were also found feeding on a *P. bivittatus*. Although both species of pythons had been kept for more than six years, this was the first time tick parasitism could be observed. Figure 4 shows the injuries on the *P. regius* and *P. bivittatus* as a result of the parasitism, respectively. The reptile's owner reported that the same substrate (wood, bark and commercial litter) had been employed in all the terraria infected. In order to estimate the density of ticks in the infested substrate, we took 3 samples of 155.8, 173.5 and 175.1 g, and cooled to -20°C for 1 day. Dead ticks were removed manually under a stereomicroscope. The other terrariums in the same room were checked for the presence of ticks, and found to be free of Argasidae. These additional terrariums did not contain the same mix of substrate. The owner applied an acaricide (Frontline®) in all the infested terrariums and on the affected reptiles. Since the nymphs and adults of *O. puertoricensis* are not distinguishable from the ones of *Alectorobius*, only the larvae were considered for morphological identification. The larvae were cleared and mounted in Hoyer's medium in slides. For a preliminary identification, we used the taxonomic key of Fairchild et al. (1966), and species identifications were confirmed using the characteristics of Neotropical *Ornithodoros (Alectorobius)* described by Endris et al. (1989), Venzal et al. (2008) and Nava et al. (2013). In addition, we compared *O. puertoricensis* which were deposited in the "Dr. Eustorgio Méndez" Zoological Collection of the Gorgas Memorial Institute for Health

Studies "Dr. Eustorgio Méndez" and with larvae of the colony of *O. puertoricensis* from the Summit Municipal Park (city of Panama), which were morphologically described by Nava et al. (2013).



**Figure 1.** *Varanus dumerillii* parasitized by *O. Puertoricensis*. White arrows and circles = tick larvae.



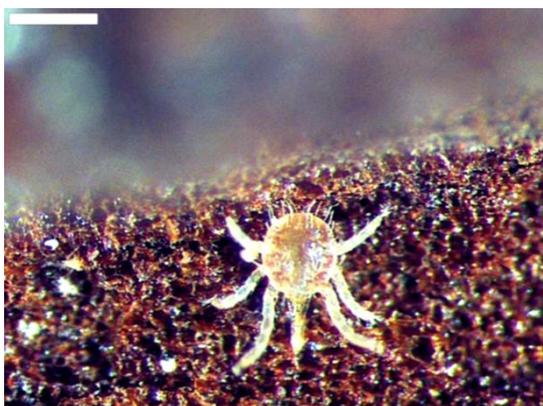
**Figure 2.** Nymphs and adults of *O. puertoricensis* on *V. dumerillii* terrarium substrate.

## Results and Discussion

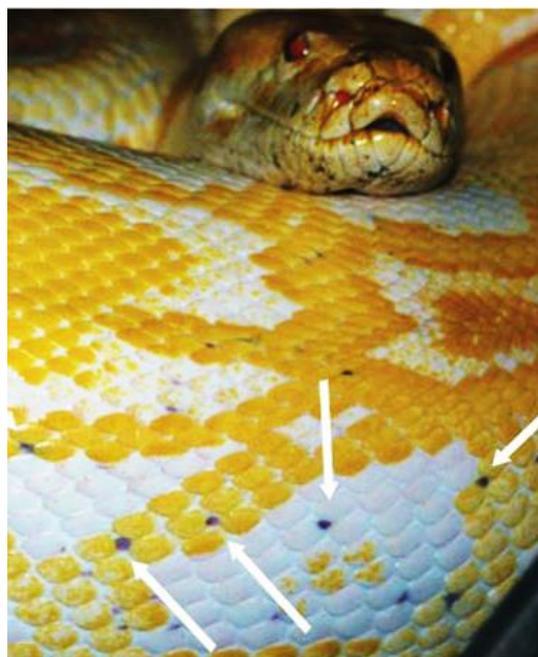
The morphological characteristics of the larvae were consistent with those of *O. puertoricensis*. There were 18 pairs of setae on the dorsum (14 dorsolateral and 4 central), 7 pairs on the venter, 1 pair on the anal valves, and a posteromedian seta (Fig. 5). The dorsal plate was pyriform and it was 0.225 mm in length and 0.170 mm in width. The capitulum was long, with a length of 0.120 mm from the posterior margin of the basis capituli to the posthypostomal setae 1 (Ph1). The hypostome was pointed apically, with a length of 0.260 mm (from Ph1 to apex), and dental formula 3/3 to half and 2/2 to base. Larvae of *O. puertoricensis* are morphologically similar to *O. talaje*, but differ by the number of pairs of dorsal setae (18 in *O. puertoricensis* and 17 in *O. talaje*) and mainly by the length of the hypostome, which is 0.232 - 0.266 mm in *O. puerto-*

*ricensis* and 0.187 - 0.200 mm in *O. talaje* (Nava et al., 2013).

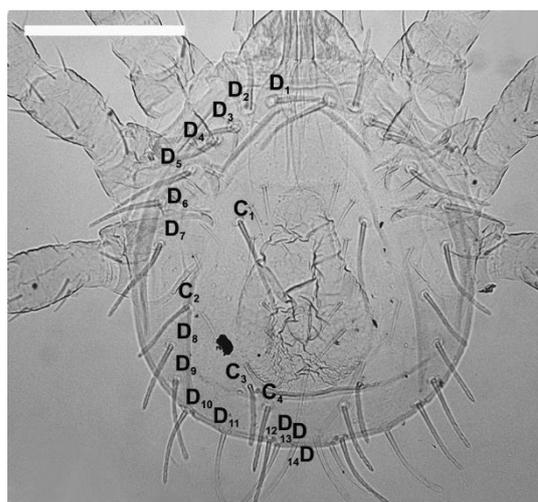
In the substrate samples, a density of 2517 ticks/Kg of substrate was found, corresponding to 17% larvae, 60% nymphs and 23% adults. The observations of all the tick life stages parasitizing the monitor lizard and two species of python, as well as the established presence of ticks in the terrariums, seem to indicate that these reptiles are adequate hosts for *O. puertoricensis*. This could represent an opportunistic tick-host relationship arising in artificial environments, explained by the eclectic behavior of *O. puertoricensis*. Until now, 29 species of hosts have been found parasitized by this species, corresponding to 23 mammals, one birds, two reptiles and one amphibian (Jones et al., 1972; Paternina et al., 2009; Bermúdez et al., 2013). Thus, our data complement the list of *O. puertoricensis* parasitizing cold blood vertebrates in natural environments. In the laboratory, Venzal and Estrada-Peña (2006) studied the development of larvae of *O. Puertoricensis* and *O. rostratus* on *Tarentola mauritanica* (Gekkonidae), finding greater acceptance and success of *O. puertoricensis* on this reptile, which suggests the potential importance of reptiles in its life cycle. Furthermore, the nidicolous behavior of *O. puertoricensis* may also explain its presence in the terrariums, as a consequence of the presence of ticks in the substrate. As this species has been previously reported parasitizing humans in Panama (Kohls et al., 1965), the presence of *O. puertoricensis* inside homes or pet shops represents a risk to public health that deserves to be considered by pet owners and health workers.



**Figure 3.** Larva of *O. puertoricensis* on substrate of *V. dumerilii* terrarium. Scale = 0.2 mm.



**Figure 4.** *Python regius* with lesions caused by of *O. puertoricensis* (arrows).



**Figure 5.** Microphotograph of *O. puertoricensis* larva. Dorsal setae: dorsolateral D1 to D14 and central setae C1 to C4. Scale = 0.2 mm.

## Acknowledgments

We thank Angélica Castro (ICGES) for making the slides and Robyn Nadolny (Old Dominion University, Vi, USA) for her comments on the manuscript and the English revision.

## References

- Bermúdez SE, Miranda RJ. 2011. De mascotas exóticas y turistas: nuevas oportunidades para la introducción de ectoparásitos en Panamá. *Bol. Soc. Ent. Arag.* 48: 491-492.
- Bermúdez SE, Miranda RJ, Kadoch N. 2013. Reporte de larvas de *Ornithodoros puertoricensis* Fox, 1947 (Ixodida: Argasidae) parasitando *Rhinella marina* (L. 1758) (Anura: Bufonidae) en David, Chiriquí, Panamá. *Puente Biológico* 5: 81-85.
- Brianti E, Dantas-Torres F, Giannetto S, Risitano A, Brucato G, Gaglio G, Otranto D. 2010. Risk for the introduction of exotic ticks and pathogens into Italy through illegal importation of tortoises, *Testudo graeca*. *Med. Vet. Entomol.* 24: 336-339.
- Burridge MJ. 2001. Ticks (Acari: Ixodidae) spread by the international trade in reptiles and their potential roles in dissemination of diseases. *B. Entomol. Res.* 91: 3-23.
- Burridge MJ, Simmons LA, Allan SA. 2000. Introduction of potential heartwater vectors and other exotic ticks into Florida on imported reptiles. *J. Parasitol.* 86: 700-704.
- Corn J. 2000. Exotic tortoise ticks in Florida. *SCWDS Briefs.* 15: 1-2.
- Endris R, Keirans J, Robbins R, Hess W. 1989. *Ornithodoros (Alectorobius) puertoricensis* (Acari: Argasidae): Redescription by scanning electron microscopy. *J. Med. Entomol.* 26: 146-154.
- Fairchild G, Kohls G, Tipton V. 1966. The ticks of Panama (pp. 167-219). En: Wenzel W, Tipton V (eds.). *Ectoparasites of Panama*. Field Museum of Natural History, Chicago, USA.
- González-Acuña D, Beldoménico PM; Venzal JM, Fabry M, Keirans JE, Guglielmone AA. 2005. Reptile trade and the risk of exotic tick introductions into southern South American countries. *Exp. Appl. Acarol.* 35: 335-339.
- Jones E, Clifford C, Keirans J, Kohls G. 1972. The ticks of Venezuela (Acarina: Ixodoidea) with a key to the species of *Amblyomma* in the Western Hemisphere. In: Tipton V (ed.). *Ectoparasites of Venezuela*. Brigham Young University Press.
- Kohls G, Sonenshine D, Clifford C. 1965. The Systematics of the Subfamily Ornithodorinae (Acarina: Argasidae). II. Identifications of the larvae of the Western Hemisphere. *Ann. Entomol. Soc. Am.* 58: 331-364.
- Nava S, Venzal J, Terassini F, Mangold A, Camargo I, Casás G, Labruna M. 2013. *Ornithodoros guaporensis* (Acari, Ixodida: Argasidae), a new tick species from the Guaporé River Basin in the Bolivian Amazon. *Zootaxa* 3666: 579-590.
- Paternina I, Díaz-Olmos Y, Paternina-Gómez M, Bejarano E. 2009. *Canis familiaris*, un nuevo hospedero de *Ornithodoros (A.) puertoricensis* Fox, 1947 (Acari: Ixodidae) en Colombia. *Acta Biol. Colomb.* 14: 153-160.
- Pietszch M, Quest R, Hillyard PD, Medlock JM, Leach S. 2006. Importation of exotic ticks into the United Kingdom via the international trade in reptiles. *Exp. Appl. Acarol.* 38: 59-65.
- Venzal JM, Estrada-Peña A. 2006. Larval feeding performance of two Neotropical *Ornithodoros* ticks (Acari: Argasidae) on reptiles. *Exp. Appl. Acarol.* 39: 315-320.
- Venzal JM, Nava S, Guglielmone AA. 2007. Garrapatas exóticas: hallazgo de *Amblyomma latum* Koch,

1844 (Acari: Ixodidae) parasitando *Python regius* (Serpentes: Boidae) en Uruguay. *Veterinaria (Montevideo)* 42: 15-17.

Venzal JM, Estrada-Peña A, Mangold AJ, González-Acuña D, Guglielmone AA. 2008. The *Ornithodoros* (*Alectotorbius*) talaje species group (Acari: Ixodida: Argasidae): description of *Ornithodoros* (*Alectorobius*) *rioplatensis* n. sp. from southern South America. *J. Med. Entomol.* 45: 832-840.

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