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RESEARCH NOTE

# Abnormal morphology in *Amblyomma coelebs* and *Amblyomma* cf. *oblongoguttatum* (Acari: Ixodidae) collected on free-roaming Central American Tapir (*Tapirus bairdii*) from Nicaragua

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**ABSTRACT:** In this work we describe abnormalities in *Amblyomma coelebs* and *Amblyomma* cf. *oblongoguttatum* adults collected from *Tapirus bairdii*. The observed anomalies in adults corresponded to general (asymmetry of scutum and idiosoma), and local malformation (atrophy and ectromely). This is the first record of morphological anomalies in *A. coelebs* and also it increases the observations of malformations in ticks from Nicaragua and Central America.

**Keywords:** Ixodidae, *Amblyomma*, abnormalities, Nicaragua.
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Ixodidae comprise 760 species of hard ticks, which are studied for their relevance in public health (Guglielmone and Robbins, 2018; Guglielmone et al., 2021). However, other aspects related to its biology may go unnoticed or be less well known. One of these aspects is the malformations or abnormalities in its morphology, phenomena that have been reported in the genera *Amblyomma*, *Dermacentor*, *Haemaphysalis*, *Hyalomma*, *Ixodes* and *Rhipicephalus* (Kar et al., 2015). Abnormalities in the idiosoma are considering as rare and can be observed in any stage (Nuttal, 1914; Guglielmone et al., 1999; Keskin, 2018). In recent years, these phenomena have been reported increasingly, and effort has been made to understand the origin of these malformations, or to assess whether they affect the ability of these ticks to feed and transmit pathogens (Nuttal, 1914; Kar et al., 2015; Keskin et al., 2016).

In Neotropical region, 137 species are known (Guglielmone et al., 2021), in 27 of which abnormalities have been reported (Domínguez et al., 2021). To the best of our knowledge in the genus *Amblyomma* close to 345 cases of malformations have been found in 20 species, specifically in *A. auricularium*, *A. calcaratum*, *A. cajennense* complex, *A. dissimile*, *A. fuscum*, *A. mixtum*, *A. naponense*, *A. neumannii*, *A. oblongoguttatum*, *A.* cf. *oblongoguttatum*, *A. ovale*, *A. parkeri*, *A. parvitarsum*, *A. parvum*, *A. rotundatum*, *A. sabanerae*, *A. tapirellum*, *A. testudinis*, *A. tigrinum*, and *A. varium* (Beaurepaire-Aragao, 1912; Joan, 1919; Brumpt, 1934; Fonseca, 1935; Aguirre et al., 1999; Guglielmone et al., 1999; Labruna et al., 2000, 2002, 2009; Muñoz-Leal et al., 2017; Rivera-Páez et al., 2017; Dantas-Torres et al., 2019; Domínguez and Bermúdez, 2020; Domínguez et al., 2020, 2021). In Central America, abnormalities in Ixodidae were reported from Panama, Costa Rica, and Nicaragua (Domínguez and Bermúdez, 2020; Domínguez et al., 2020, 2021).

**Figure 1.** Dorsal view of festoon malformation in a *Amblyomma coelebs* male.

**Figure 2.** Ventral view of festoon malformation in a *Amblyomma coelebs* male.


**Figure 3.** Dorsal view of *Amblyomma* cf. *oblongoguttatum* female with atrophy on the left 3 (arrow).


**Figure 4.** Ventral view of *Amblyomma* cf. *oblongoguttatum* female with atrophy on the left 3 (arrow).

In this study we report the abnormalities in two species of *Amblyomma* from Nicaragua collected from wild tapirs. Earlier, Arana et al. (2021) collected 91 ticks from seven tapirs (36 *Amblyomma coelebs*, 38 *A.* cf. *oblongoguttatum*, and 17 *A. ovale*). Abnormalities were observed in one *A. coelebs* male and three *A*. cf. *oblongoguttatum* females, and were classified according to Campana-Rouget (1959a,b). The photographs were taken using an Amscope SE306-A stereomicroscope and Amscope 2 mp MD200 USB digital camera (Figs 1 and 2), and a stereomicroscope (Leica M205 A) with digital camera (Leica MC170 HD) (Figs 3-8). The ticks were deposited in the Institute of Natural Resources Environment and Sustainable Development of the University of the Autonomous Regions of the Nicaraguan Caribbean Coast, Nicaragua, and in the Ectoparasites Collection of the "Dr. Eustorgio Méndez" Zoological Collection of the Gorgas Memorial Institute for Health Studies.

A male of *A. coelebs* had festoons abnormalities (Figs 1 and 2). This type of malformation is among the most common (Campana-Roget, 1959b). According to Campana-Roget (1959b) irregularities in the shape, and size of the festoons, and their reduction in their number by fusion and absence, may be due to the atrophy of the posterior part of the idiosoma. Irregular and fused festoons have been reported in *Amblyomma marmoreum*, bumps at the caudal tip in *Rhipicephalus longiceps*, partial absence of festoons in *Rhipicephalus sanguineus* s.l., and *Haemaphysalis leachi* (Campana-Roget, 1959a,b). In Neotropical ticks, these types of irregularities have been reported in species such as *A. mixtum*, *A*. cf. *oblongoguttatum,* and *A. tapirellum* (Nuttal, 1914; Domínguez et al., 2021).


**Figure 5.** Asymmetry of the scutum of *Amblyomma* cf. *oblongoguttatum* female.

Regarding *A*. cf. *oblongoguttatum*, one female presented atrophy of the left leg 3 (Figs 3-5); while that another female exhibited ectromely of the left leg 4 (Figs 6-8). Idiosoma asymmetry is one of the anomalies that occurs most frequently in ticks and is often associated with other anomalies such as ectromely (loss of legs or leg segment) (Robison, 1920; Campana-Rouget, 1959a,b). According to these authors the aforementioned anomalies appear to be caused by uneven distension during the act of engorgement or may be related to an injury during the previous developmental stages. Other explanations indicate that abnormalities are probably the result of abnormal embryonic development, unfavorable molting conditions, and development under high humidity, injury, and abnormal regeneration of tick legs (Beaurepaire-Aragao, 1912; Robinson, 1920; Dergousoff and Chilton, 2007; Keskin et al., 2016).

In conclusion this work presents the first observation of abnormalities in *A. coelebs* by increasing the information of malformations to 30 tick species from Neotropical Regions, 17 of which from Central America and new reports for Nicaragua (Domínguez and Bermúdez, 2020; Domínguez et al., 2020, 2021).

## Authors' contributions

**Lillian Domínguez:** Conceptualization (equal), data curation, visualization (equal), review and editing (lead). **Jeffrey Arana-Espinoza:** Methodology, resources, review and editing (supporting). **Sergio Bermúdez Castillero:** Conceptualization (equal), supervision, visualization (equal), writing - original draft.

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**Figure 6.** Dorsal view of *Amblyomma* cf. *oblongoguttatum* female with ectromely and asymmetry of idiosoma.


**Figure 7.** Ventral view of *Amblyomma* cf. *oblongoguttatum* female with ectromely (arrow) and asymmetry of idiosoma.


**Figure 8.** Asymmetry of the scutum of *Amblyomma* cf. *oblongoguttatum* female.

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Not applicable.


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## Conflict of interest

The authors declare that they have no conflict of interest regarding this paper.

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