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Correspondence

A six-legged anomalous *Dermacentor niveus* (Acari: Ixodidae) female tick from a camel (*Camelus dromedarius*) in Uzbekistan

Noureddine Mechouk[1], Alisher Safarov[2], Baurjan Kunisov[3], Alireza Sazmand[4] and Georgiana Deak[1*]

1. *Department of Parasitology and Parasitic Diseases, University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Calea Mănăştur 3-5, 400372, Cluj-Napoca, Romania; E-mail: noureddine.mechouk@usamvcluj. ro, georgiana.deak@usamvcluj.ro*
2. *State Committee of Veterinary and Livestock Development of the Republic of Uzbekistan, Tashkent, Uzbekistan; E-mail: safarov-alisher@mail.ru*
3. *Nukus branch of Samarkand State University of Veterinary Medicine, Livestock and Biotechnology, Nukus, Karakalpakstan, Uzbekistan; E-mail: bkunisov@mail.ru*
4. *Department of Pathobiology, Faculty of Veterinary Medicine, Bu-Ali Sina University, Hamedan, Iran; E-mail: alireza.sazmand@basu.ac.ir*

[*] Corresponding author

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Ixodida fauna of Uzbekistan comprises 35 species including 28 Ixodidae and seven Argasidae distributed across nine genera, *i.e.*, *Hyalomma* (seven species), *Rhipicephalus* (seven species), *Haemaphysalis* (five species), *Ixodes* (five species), *Dermacentor* (three species), *Anomalohimalaya* (one species), *Argas* (three species), *Ornithodoros* (three species), and *Carios* (one species) (Rasulov 2007; Guglielmone *et al.* 2023). These ticks are associated with a wide range of mammals, birds, and reptiles. From Camelidae (*Camelus dromedarius*) in the country, nine tick species belonging to three genera have been reported. These include *Rhipicephalus annulatus* Say (reported as *Boophilus calcaratus*), *Hyalomma scupense* Schulze (reported as *Hyalomma detritum*), *H. anatolicum* Koch, *H. excavatum* Koch, *H. asiaticum* Schulze & Schlottke, *H. turanicum* Pomerantsev, Matikashvili & Lototsky, *H. dromedarii* Koch, *Rhipicephalus turanicus* Pomerantsev, and *D. niveus* Neumann (reported as *Dermacentor daghestanicus*) (Rasulov 2007; Guglielmone *et al.* 2023). The morphology of Acari is well-documented; they have a symmetrical body and three pairs of legs in the immature stages, and upon reaching adulthood, they possess four pairs of legs (Estrada-Peña *et al.* 2018). However, unusual morphological features have also been documented (Chitimia-Dobler *et al.* 2017; Laatamna *et al.* 2021).

Tick abnormalities were first reported by Neumann in 1899: one male *Hyalomma aegyptium* (L.) with 3 eyes (two eyes on the right side), one male *Amblyomma* sp. without the first left leg, and one female *Ixodes hexagonus* (Leach) with the absence of part (atrophy) of the fourth right leg. Since then, several studies have recognized and documented morphological abnormalities in various species of Ixodidae and Argasidae (Buczek *et al*. 2017; Balinandi *et al*. 2019; Domínguez and Bermúdez

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2020). Abnormal formations in ticks are considered a rare phenomenon within natural tick populations, with a prevalence of less than 2% (Kar *et al*. 2015; Keskin *et al*. 2016; Chitimia-Dobler *et al*. 2017; Shuaib *et al*. 2020).

The classification system (Campana-Rouget 1959) categorizes anomalies based on the affected structure and extent of the tick's body. It includes general anomalies, which involve alterations in overall body shape, such as gynandromorphism, gigantism, and dwarfism. Local anomalies, on the other hand, affect specific body parts and include deformities of the scutum, capitulum, and femur; changes in the shape of anal plates and grooves; the presence of missing or additional spiracles and porous areas; abnormal chitinous structures; and limb malformations. Limb malformations are further divided into polymely, symely, schizomely, heteromorphoses, ectopy, atrophy, and ectromely (Campana-Rouget 1959, Kar *et al*. 2015, Keskin *et al*. 2016; Chitimia-Dobler *et al*. 2017). This case report presents an example of a rare local anomaly, ectromely, in an adult female *Dermacentor niveus*, collected from a camel in Uzbekistan.

Between July and August 2024, ticks were randomly collected from one-humped camels (dromedary camel *Camelus dromedarius* L.) in three different locations in Uzbekistan: Jizzakh (42.000.00°N, 64.000.00°E), Karakalpakstan (43.0960.00°N, 58.4459.99°E), and Navoiy (42.000.00°N, 64.000.00°E) as part of an epidemiological survey on ticks and tick-borne pathogens. The study was approved by the Scientific and Technical Council under the Committee for the Development of Veterinary Medicine and Livestock (protocol: 05.12.2024 №17). Among the collected specimens, one tick showed atypical morphology and was submitted to the Department of Parasitology and Parasitic Diseases, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania, for further investigation in accordance with legal regulations for morphological identification. The tick was identified to the species level according to Guglielmone *et al*. (2023).

The tick was collected from a camel from the Karakalpakstan area and was morphologically identified as a female *Dermacentor niveus*. The tick exhibited a morphological malformation characterized by the complete absence of legs III and IV (ventral view). Additionally, coxa II of the left leg (ventral view) showed atrophy with a well-observed bifurcation (Fig.1). Furthermore, on the ventral view, the left leg II appeared significantly reduced compared to its homologous counterpart, the right leg II, with notable divergence in the various components of the leg. The median line was barely asymmetric, with no significant deviation. No signs of asymmetry were observed, and the body appeared normal from the dorsal view (Fig. 1).

Figure 1. *Dermacentor niveus* (female) – **A.** Ventral view showing an ectromely of leg III and IV with atrophy of the leg II and bifurcation of the coxa II; **B.** Dorsal view showing the symmetrical body of the tick beside the lack of the two legs.

This study presents the first report of a rare anomaly in a tick collected from a camel in Uzbekistan. The malformation observed in this tick, collected from a camel breeding farm, raises important questions regarding its etiology. Previous studies have suggested that such anomalies may arise due to elevated levels of anthropogenic activities, such as industrial pollution (Alekseev *et al*. 2000), or as a consequence of the tick's immune response to environmental stressors. Campana-Rouget (1959) proposed that similar anomalies could result from injuries sustained during larval or nymphal stages, leading to the complete loss of one or more legs.

Instances of comparable morphological anomalies have been documented across several tick species, including *Dermacentor andersoni* Stiles, *Dermacentor marginatus* (Sulzer), *Dermacentor reticulatus* Fabricius (reported as *Dermacentor pictus*), *Ixodes inopinatus* Estrada-Peña, Nava & Petney, *Ixodes ricinus* L., *Ixodes scapularis* Say, *Haemaphysalis punctata* Canestrini & Fanzago, *Haemaphysalis concinna* Koch, *Amblyomma lepidum* Dönitz, *Rhipicephalus decoloratus* Koch, and *Rhipicephalus evertsi* Neumann (Campana-Rouget 1959; Chitimia-Dobler *et al.* 2017; Balinandi *et al.* 2019; Molaei *et al.* 2020b; Koczwarska *et al.* 2024).

In conclusion, this study provides novel insights into tick morphology by documenting a rare anomaly in a tick collected from a camel in Uzbekistan. While the exact cause remains uncertain, both genetic and environmental factors may play a role. The potential implications for tick biology, host-seeking behavior, and pathogen transmission warrant further investigation.

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