

CO-INFESTATION OF DEER KED *Lipoptena cervi* (Linnaeus, 1758) AND *Haemaphysalis bispinosa* TICK IN A SPOTTED DEER (*Axis axis*)

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Abstract: An adult male spotted deer carcass was presented for post-mortem examination, during which ectoparasites were collected and identified. Morphological examination revealed the presence of *Lipoptena cervi* (deer ked) and *Haemaphysalis bispinosa* ticks. *L. cervi* was identified by its flattened, wingless body, broader abdomen, curved aedeagus and halteres. *Haemaphysalis bispinosa* ticks were characterized by their oval, dorsoventrally flattened bodies, rectangular basis capituli, pedipalp with lateral projections and absence of ventral plates. These findings confirm combined infestation of *L. cervi* and *H. bispinosa* in a spotted deer.

Keywords: *Lipoptena*, deer ked, *Haemaphysalis*, tick, spotted deer.

INTRODUCTION

The spotted deer (*Axis axis*), also known as the Asiatic deer or chital, belongs to the family Cervidae and the order Artiodactyla. Native to the Asian continent, its range includes India, Sri Lanka, Bangladesh, Bhutan and small populations in Pakistan. Due to its abundance in the wild, the species is classified as least Concern on the IUCN Red List (Duckworth and Kumar, 2016). Among herbivores, spotted deer is considered the most populous cervid species in Indian zoological parks (Arora, 1982). Cervids are susceptible to a variety of infectious agents including viruses, bacteria, fungi and parasites. However, parasitic infestations pose a significant threat to free-ranging wild cervids, with the potential to spill over into domestic animals in shared habitats. Spotted deer are particularly vulnerable to both ectoparasites and endoparasites which can spread quickly due to their free-ranging behaviour. Commonly reported endoparasites include Amphiostomes, *Fasciola gigantica*, *Dicrocoelium* sp., and *Haemonchus* sp., while ectoparasites such as *Lipoptena* sp. (deer ked), *Haemaphysalis* sp., *Amblyomma testudinarium* and *Rhipicephalus* sp. are frequently observed (Soulsby, 1982; Chhabra and Pathak, 2013). Ectoparasites not only cause stress, body weight loss and irritation but also act as vectors for hemoprotozoan diseases in deer. Among these, *Lipoptena* sp., a type

of Hippoboscid fly commonly known as the deer ked and *Haemaphysalis* sp. a hard tick species is notable for their pathogenic potential. Despite their significance, reports on ectoparasitic co-infections in cervids are limited. This study highlights a case of co-infestation involving deer *Lipoptena cervi* and *Haemaphysalis bispinosa* ticks in a spotted deer.

MATERIALS AND METHODS

An adult male spotted deer carcass was presented to the Cattle Breeding and Fodder Development of Animal Husbandry Department, Udhagamandalam by the forest officials for necropsy examination. Physical examination of the carcass revealed the presence of ectoparasites over the body surface (Fig. 1a), which were collected in 70 % ethanol. The collected sample were submitted to the Department of Veterinary Parasitology, Veterinary College and Research Institute, Orathanadu for morphological identification. The ectoparasites were processed in 10% potassium hydroxide, followed by dehydration in ascending grades of alcohols and cleared in xylene and mounted in DPX for further identification (Soulsby, 1982).

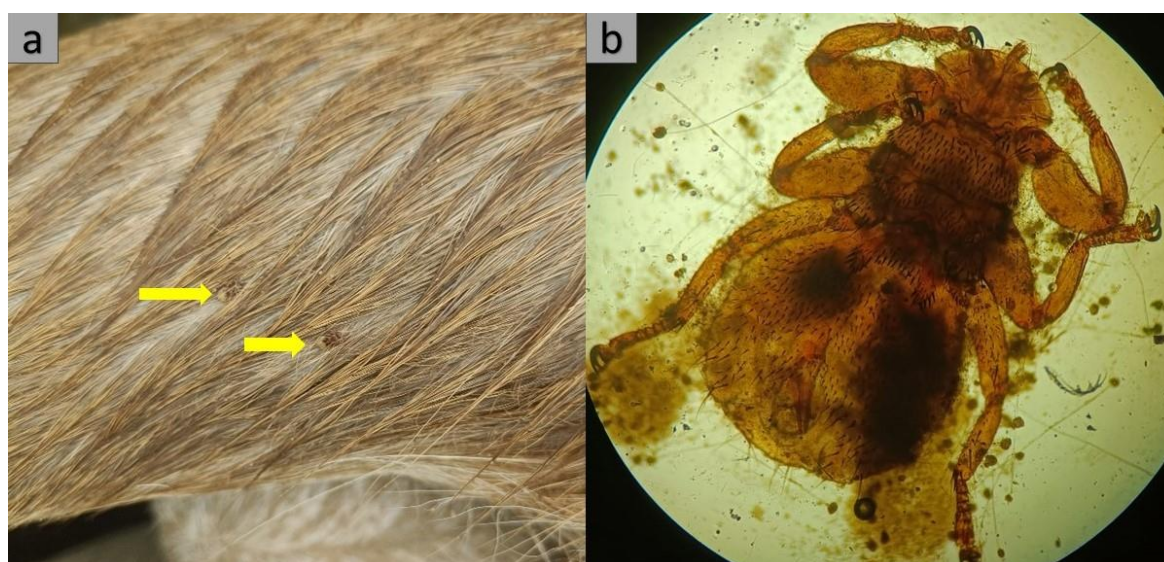


Fig.1. Presence of ectoparasites over the body surface (arrow) (a) and cleared *Lipoptena cervi* – Gross (x40) (b)

RESULT

Upon clearing for morphological examination, the ectoparasites were identified as adult *Lipoptena cervi* (deer ked). The specimen exhibited a dorsoventrally flattened body, measuring approximately 6 mm in length. Morphology revealed distinctive characteristics including a broader abdomen compared to the thorax and the absence of wings (Fig. 1b), which was a common adaptation for ectoparasitism. The head structure displayed distinct simple eyes (ocelli) and well-developed maxillary palps with mouthparts projecting anteriorly (Fig. 2a)

indicative of their haematophagous feeding habits. The aedeagus was observed to be curved and sclerotized (Fig. 2c). Each leg terminated in a pair of curved claws accompanied with pulvilli (Fig. 2d), facilitating attachment to the host. Key morphological features were further analyzed to differentiate *L. cervi* from closely related species such as *Melophagus ovinus* (sheep ked). Notably, the presence of laterally positioned halteres (Fig. 2b), a defining characteristic of *L. cervi*, was observed and confirmed.

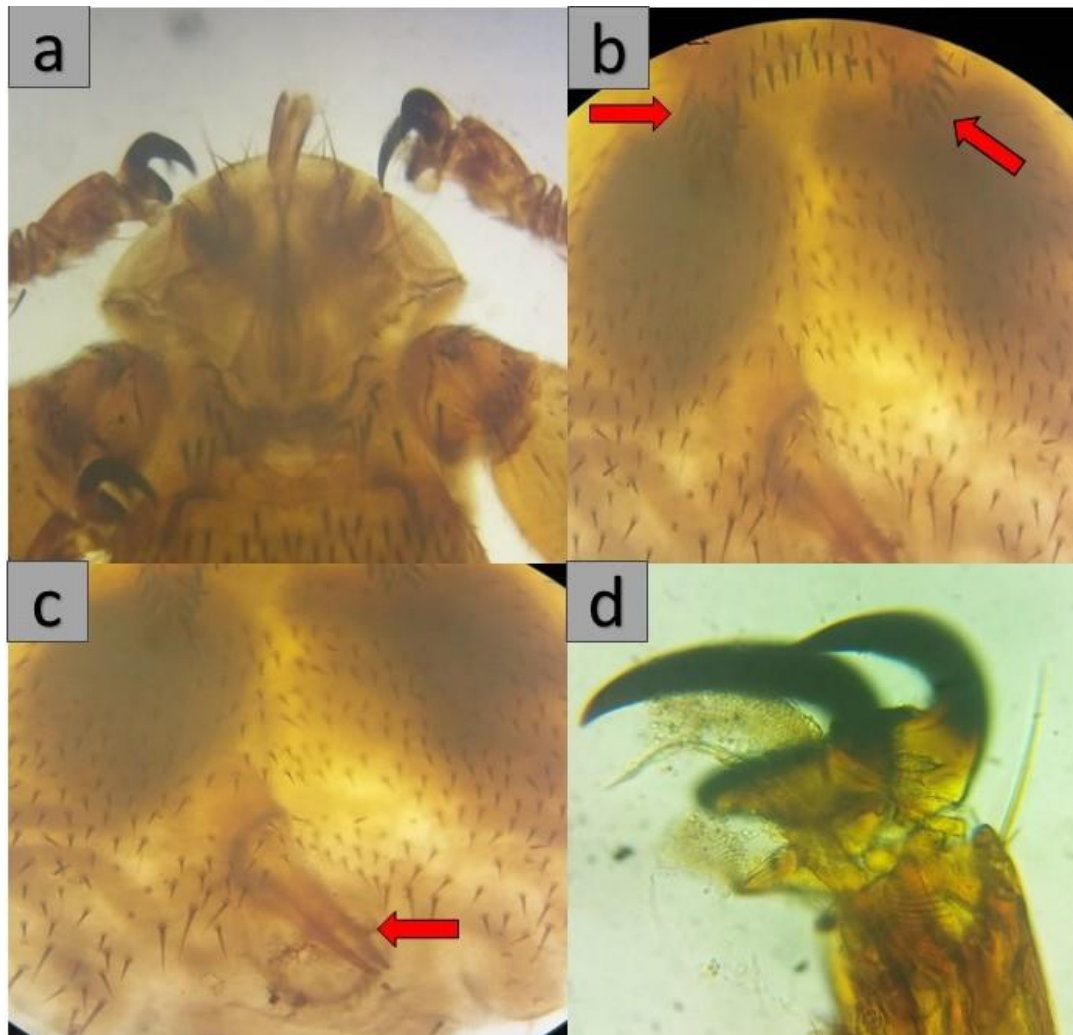


Fig.2. *Lipoptena cervi* - Mouth part (x100) (a); laterally positioned halteres (arrow) (b); curved and sclerotized aedeagus (arrow) (x400) (c); pair of curved claws accompanied with pulvilli (x400) (d)

Additionally, ticks were also identified as *Haemaphysalis bispinosa* (Fig. 3) based on the morphological features such as oval, dorsoventrally flattened body, measuring 2–4 mm in length with a rectangular basis capituli and laterally projected 3 segmented palpi with four infra internal setae in the pedipalp. The hypostome showed rows of recurved teeth with 3: 3

hypostomal dentition and the posterior margin featured 11 festoons. The legs posed spur on 1st coxae ending in claws and pulvilli.



Fig. 3. *Haemaphysalis bispinosa* (x40)

DISCUSSION

Lipoptena cervi (Hippoboscidae, Diptera) is a blood-feeding louse fly commonly found on deer in tropical and subtropical continents (Soulsby, 1982; Velusamy and Ponnudurai, 2017). Adult flies are usually permanent ectoparasites or stay on their host for most of their life. While primarily affecting deer, there have been reports of deer keds attacking other animals and eventually have zoonotic implications. In these cases, they can cause persistent itching and the formation of itchy bumps or papules (Wall and Shearer, 2001; Härkönen *et al.*, 2009). *Lipoptena cervi* has been implicated in transmitting *Anaplasma phagocytophilum*, a Gram-negative obligate intracellular bacterium responsible for causing anaplasmosis. Additionally, it has been associated with the transmission of *Borrelia burgdorferi*, the causative agent of Lyme disease (Buss *et al.*, 2016; Velusamy and Ponnudurai, 2017). The morphological features observed in this study align closely with descriptions provided by Velusamy and Ponnudurai (2017) and Andreani *et al.* (2018).

Haemaphysalis sp. parasitizes a wide range of mammals and birds in most regions of the world. *Haemaphysalis* (Acari: Ixodidae) is the second-largest genus of hard ticks, comprising approximately 176 species. These ticks are primarily found in the Oriental, Afrotropical and Palearctic regions (Guglielmone *et al.*, 2019), infest a wide variety of free-ranging wild and domestic animals (Soulsby, 1982). Morphology identified in our study were

in accordance with previous studies (Geevarghese and Mishra, 2011; Senbill *et al.*, 2022). Among those, *H. longicornis* (Asian long horned tick) found commonly in Indian subcontinent followed by *H. juxtakochi*, reported at USA in a white-tailed deer. Other species of significance include; *H. bispinosa*, *H. punctata* (red sheep tick), *H. concinna*, found in Europe and Asia were known to infest cervids (Geevarghese and Mishra, 2011). Ticks of the genus *Haemaphysalis* serve as vectors for a range of pathogens in deer contributing to the transmission of several vector-borne diseases. Key diseases include babesiosis (*Babesia* sp.), anaplasmosis (*Anaplasma* sp.) and theileriosis (*Theileria* sp.), Lyme disease (*Borrelia burgdorferi*) and rickettsial infections (Geevarghese and Mishra, 2011). The ability of *Haemaphysalis* ticks to feed on multiple hosts enhances their role in pathogen transmission within deer populations, with potential spill over to domestic animals and humans. The present study reports the concurrent infestation of *Lipoptena cervi* and *Haemaphysalis bispinosa* infestation in a spotted deer.

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