OCCURRENCE OF *Amblyomma integrum* FROM WILD ASIAN ELEPHANT (*Elephas maximus*) IN TAMIL NADU (INDIA) - A REPORT

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ABSTRACT

Ticks and tick-borne diseases affect animal and human health worldwide and are the cause of significant economic losses. During necropsy of a free ranging wild Asian elephant unusually large, engorged ticks attached to the ear and dewlap was noticed. On the basis of morphological study, the ticks were identified as Amblyomma integrum. This is the first report on the occurrence of A. integrum ticks on Asian elephant of Tamil Nadu, India. The detailed morphology of the sexes and the medical and veterinary significance of the tick are discussed in the light of available literature.

Key words: Amblyomma integrum, Asian elephant, Morphology

INTRODUCTION

Ticks are one of the most harmful blood sucking ectoparasites of terrestrial vertebrates throughout the world. The medical and economic importance of ticks has long been recognized due to their ability to transmit diseases to humans and animals (de la Fuente *et al*., 2008). The genus *Amblyomma* with more than 100 species is the third largest group of ticks under the family Ixodiidae and is most importantly known for parasitizing extremely wide range of hosts belonging to amphibians, reptiles, birds and mammals (Kolonin, 2009). Some species of *Amblyomma* are wide spread among domesticated livestock and wild animals which play an important role in spread and maintenance of economically important diseases including zoonosis (Goddard and Varela-Stokes, 2008). There are four *Amblyomma* species recorded in Southern India and Sri Lanka: *A. clypeolatum*, *A. integrum*, *A. javanense* and *A. testudinarium* (Apanaskevich *et al.,* 2016).

Adults and immature stages of both *A. testudinarium* and *A. integrum* parasitize various large and medium sized mammals, such as various ungulates and carnivores as hosts. Adults of *A. clypeolatum* mostly parasitize tortoises, whereas all stages of *A. javanense* mostly feed on pangolins. *Amblyomma integrum* has been reported in

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the human ear canal causing otoacariasis in Sri Lanka (Bandaranayake *et al.,* 2014). The pachyderms including elephants, rhinoceroses and hippopotamuses are infested by various species of ticks that are known to be competent vectors of many blood-borne pathogens (Kingori *et al*., 2019). The present communication reports the occurrence and morphological features of *A. integrum* in a free ranging Asian elephant from Coimbatore district of Tamil Nadu, India.

MATERIALS AND METHODS

During the month of August 2020, carcass of a wild female elephant (approximately 15 years of age) was found in Coimbatore forest division of Tamil Nadu. Physical examination of the animal during post mortem revealed infestation with unusually large ticks on the skin of the ear and dewlap. These ticks, 15 in number, were carefully collected in specimen vials and sent to the department of Veterinary Parasitology, Madras Veterinary College for identification. Two semi-engorged ticks were first examined under stereo zoom microscope and thereafter processed in 10 per cent sodium hydroxide solution and then dehydrated in ascending grades of alcohol and cleared in carbolic acid as per the standard protocol to study the morphological features for identification with the help of available keys (Apanaskevich *et al.,* 2016).

RESULTS AND DISCUSSION

Morphology of female tick

Gross morphological examination of the ticks showed that it had long mouth parts and the body shape was broadly oval, narrower in front and broadest in the area of spiracle. The scutum was triangular with cone shaped narrow posterior angle and presence of diffuse brilliant golden brown colored ornamentation as stripes on pale ground tinge (Fig.1a). The alloscutum was covered with long, white and numerous setae. The posterior border of the engorged ticks was furrowed with 11 distinct festoons (Fig.1b).

Microscopic examination revealed presence of long mouth parts with palpal article 2 being longest and more than double the length of article 3 (Fig. 2a and b); hypostome was long and club-shaped with 3/3 columns of teeth or dental articles (Fig. 3a); basis capitulum was rectangular dorsally with the presence of two oval shaped large porose areas (Fig. 3b). The scutum was triangular in shape with numerous punctuations, circular in shape (Fig.3c); four pairs of legs were reddish brown in colour (Fig. 4a), coxa I with two sub equal spurs the external being larger (Fig. 4b) and coxa-IV with single broad rounded spur; genital aperture was located at the level of posterior margin of coxa II which appeared U-shaped (Fig. 4a): The spiracular plates were triangular in shape with very small and numerous perforations (Fig. 4c) and found behind the IV coxa. The anal groove was present posterior to the anus and in the posterior margin 11distinct festoons were seen (Fig. 4d).

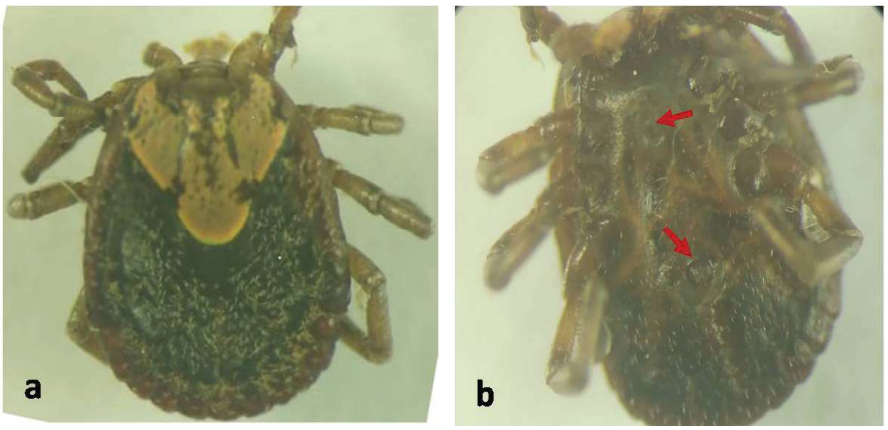

Fig. 1. *Amblyomma integrum* female tick: (a) Dorsal view; (b) Ventral view (arrows indicate genital and anal aperture - under stereo zoom microscope)

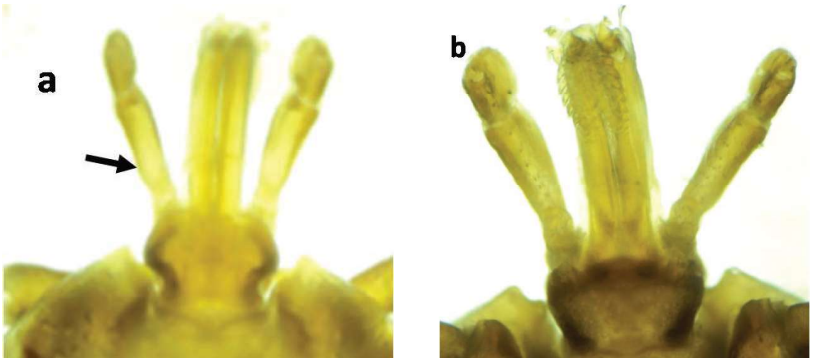

Fig. 2 (a) Dorsal view; (b) Ventral view of gnathostoma of female tick (arrows indicate longest 2nd article of the pedipalp)

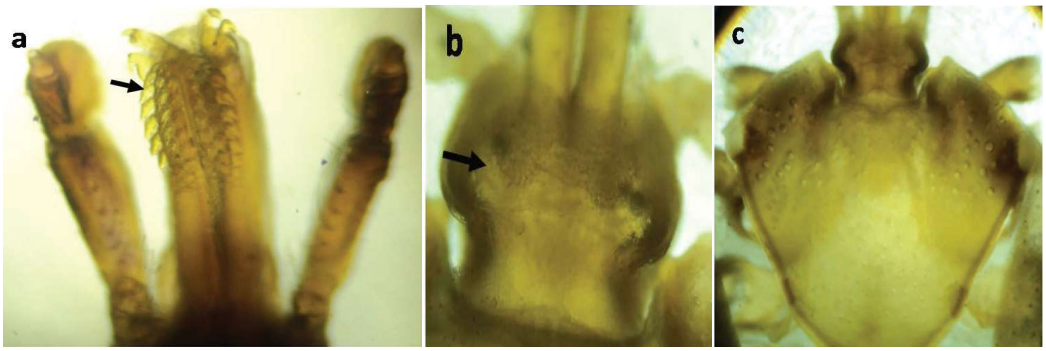

Fig. 3 (a) Arrow indicates hypostome with 3/3 dental formula; (b) Basis capitulum with oval shaped porose areas (brrow); (c) Triangular shaped scutum with numerous punctuations

Fig. 4 (a) Ventral view of the tick showing 4 Pairs of coxa - arrows indicates coxa I and genital aperture; (b) Coxa I showing two unequal spurs; (c) Spiracular plate; (d) Arrows indicates posterior margin showing festoons and presence of anal groove posterior to the anus

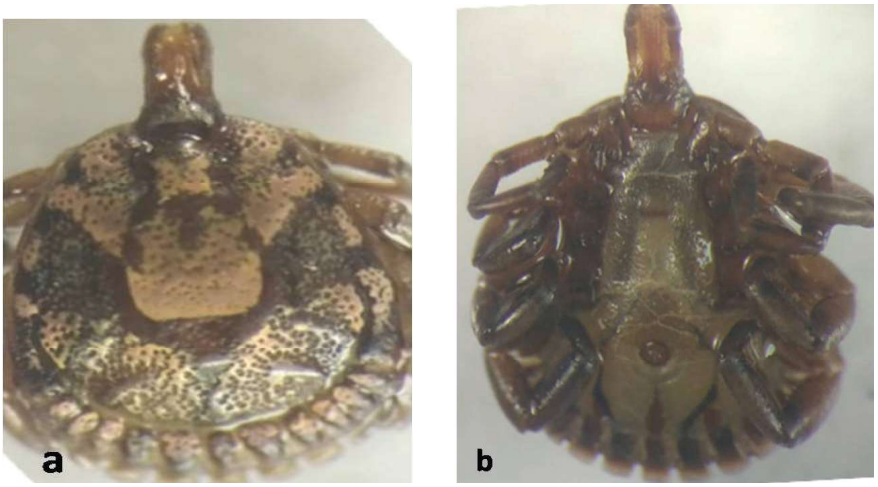

Fig. 5. *Amblyomma integrum* male tick, (a) Dorsal view showing presence of brown patches and golden enamelling on the conscutum; (b) Ventral view showing genital and anal opening (under stereo zoom microscope)

Morphology of male tick

The scutum of male ticks had brilliant golden colored ornamentation with characteristically light to dark-brown patches with uneven margins on the pale brown background. The dorsal surface of ticks indicated enormous and profound, thick dark brown markings of minute spots distributed over whole conscutum. Setae were short and invisible (Fig.5a). Ventral plates were absent in the male ticks (Fig. 5b).

Microscopically the male ticks had long mouth parts with palpal article 2 being longest and more than double the length of article 3; hypostome was long and club-shaped with 3/3 dental articles (Fig. 6a). The dorsal surface of the ticks showed large

and deep punctations distributed over whole scutum (Fig. 6b); coxa I with generally short triangular internal spur and relatively long external spur; external spur was twice the length of internal spur. Coxae II and III each with single short triangular spur; coxa IV with single long narrow triangular spur (Fig.7a). Anal groove was present posterior to the anus; festoons 11 in numbers were located in the posterior margin of the tick. Absence of ventral plates was observed but chitinous plaques/sclerites were present close to the festoons (Fig.7b).

The current paper reports the presence of ticks on elephant which was identified as *Amblyomma integrum* based on the morphological features. This tick was differentiated from *A. testudinarium* by the presence of brown coloured patches and golden enamelling on the conscutum of male, 3/3 columns of teeth on hypostome and external spur (long and narrow) and internal spur (short) in the coxa- I (Apanaskevich *et al*., 2016). The adult stage of *A. integrum* was recorded mostly on domestic cattle and buffaloes and also on sloth beer, leopard,

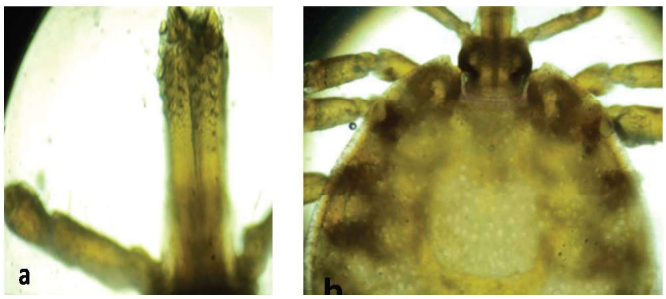

Fig. 6. (a) Long mouth parts with hypostome and pedipalp; (b) Dorsal aspect of male tick showing numerous round shaped punctations

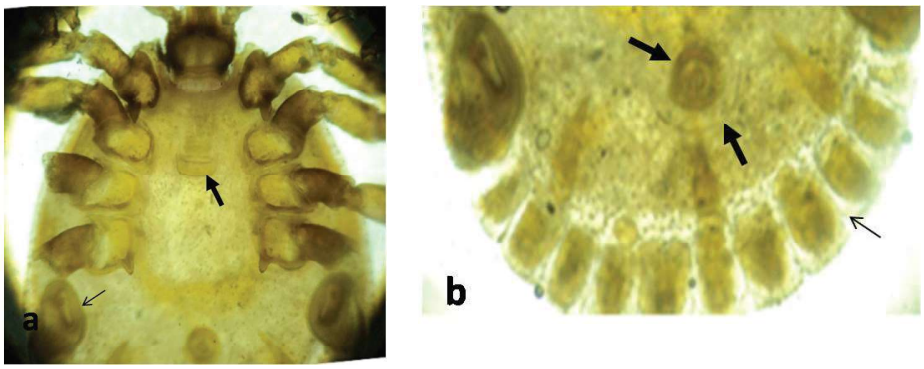

Fig.7 (a) Ventral aspect of male tick showing 4 pairs of coxa, arrows indicates genital aperture and spiracular plate; (b). Posterior part of the male tick showing festoons at the margin, anus and anal groove posterior to the anus.

wild water buffaloes, wild boars and Asian elephants (Apanaskevich *et al*., 2016). In this study the detailed morphology of both gross and microscopic appearance of ticks has been described for the first time whereas Apanaskevich *et al*. (2016) described the morphology based on Scanning Electron microscopic images. The same tick was also reported from Guar by Soundararajan *et al.* (2017) in Tamil Nadu. Rao *et al*. (1964) also noticed *A. integrum* on cattle and buffaloes in Bombay, Orissa, Assam, and Bengal. Kumar *et al*. (2008) revealed 2.07 per cent *A. integrum* from dog in Shimoga district of Karnataka state. Similarly this tick has been recorded in Sambar deer and wild boar in Kerala by Kumar *et al.* (2018). Additionally, other Indian *Amblyomma* like *A. testudinarium* were accounted for on cattle, buffalo, sheep, and goats in India (Latha *et al*., 2004; and Ghosh *et al*., 2006), yak in Arunachal Pradesh and Sikkim (Saravanan *et al*., 2008) and mithuns in Mizoram (Chamuah *et al*., 2015).

In the present study, *A. integrum* adult ticks were collected during the month of August at Boluvampatti, Coimbatore, Tamil Nadu (India) which is at an altitude of 315 m mean sea level. This area is surrounded by the Western Ghats mountain range on the West and North, with reserve forests and the Nilgiri Biosphere Reserve on the northern side (Reginald *et al*., 2007). Soundararajan *et al.* (2017) had reported the presence of *A. integrum* ticks in Indian Guar at high altitude region of 1,100 m above mean sea level in Gudalur, The Nilgiris, Tamil Nadu. Kumar *et al*. (2014) reported *A. integrum* in domestic animals in Kallar and Burliar at an altitude of 350–450 and 1000–1700 m MSL, respectively, in the eastern slopes of the Nilgiris hills of Tamil Nadu (India). The highest number of *Amblyomma* reported in the neotropical region (Argentina, Brazil, Cuba and USA) may be attributed to climatic condition (10° to 25° S lat), vegetation, water bodies, and the presence of varied host range. In Mexico and the USA, the *Amblyomma* spp. was mostly found in areas where the mean temperature is around 13–16°C (Estrada-Pena *et al*. 2004). In this study also, the area was observed to have almost similar temperature (19.0°C to 26.6°C) and was found to be surrounded by lot of vegetation, rivers, trees and animal fauna as reported in other parts of the world.

Amblyomma spp. are three host ticks that feed on a number of domesticated and wild animals including human beings. Their long mouthparts make *Amblyomma* ticks especially difficult to be removed manually and hence the serious wounds that they cause may become secondarily infected by bacteria or screwworms and other myiasis producing flies (Merck, 2011). Several African *Amblyomma spp*. like *A. variegatum* and *A. hebraeum* infest livestock which are vectors of *Ehrlichia ruminantium*, the rickettsial agent that causes heart water (Walker, 1996), whereas American *Amblyomma spp*. carry agents of monocytic and granulocytic ehrlichioses as well as several *Rickettsia* spp., including *R. rickettsii*, the agent of Rocky Mountain spotted fever (Levin *et al*., 2017).
However, only a few reports are available about the vector capacity of *A. integrum*. The nymphal stage of *A. integrum* has been reported in the human ear canal causing otoacariasis in Sri Lanka (Dilrukshi *et al*., 2004). *Amblyomma integrum* is also known to act as a vector of infectious agents.

Questing ticks collected on vegetation were found carrying rickettsial infections in Thailand (Malaisri *et al.,* 2015). So far, *A. integrum* has been reported on cattle, buffaloes, Guar, Sambar deer and wild boar in different parts of India. This is the first report of the occurrence of *A. integrum* ticks on Asian elephant of Tamil Nadu, India.

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