Report of *Amblyomma testudinarium* in mithuns (*Bos frontalis*) from eastern Mizoram (India)

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Received: 20 September 2014 / Accepted: 24 January 2015 / Published online: 14 February 2015
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Abstract Physical examination of semi-domesticated, free ranging mithuns (*Bos frontalis*) during an animal health check-up and treatment camp organized at Khuw-angleng village in the Champhai district of Mizoram, India and adjacent to Myanmar Border revealed presence of unusually large blood engorged ticks attaching to the dewlap and inner aspects of thighs. On the basis of morphological study, the ticks were found indistinguishable from female *Amblyomma testudinarium*. Prevalence rate of the tick species in mithuns living in the forests was 9.09 % which was recorded as the highest of all reports made earlier from the North Eastern region of India. Medical and veterinary significance of the tick is discussed in the light of available literature.

Keywords *Amblyomma testudinarium* · Morphology · Mithun · Mizoram · India

Introduction

Ticks are obligate haematophagus ectoparasites of vertebrates. The genus *Amblyomma* with more than 100 species is

the third largest group of ticks under the family Ixodidae and is most importantly known for parasitizing extremely wide range of hosts belonging to Amphibia, Reptilia, Aves and Mammalia (Kolonin 2009). Some species of *Amblyomma*, wide spread among domesticated livestock and wild animals play an important role in spread and maintenance of economically important diseases including zoonosis (Goddard and Varela-Stokes 2008). *Amblyomma testudinarium* Koch, 1844 the predominant species of *Amblyomma* found in Asia (Volz and Keirans 2002) has been mostly reported from wild animals with occasional record of human bite cases. Several cases of human tick bite by *A. testudinarium* have been reported from the Asian countries namely Japan (Natsauki et al. 2013), Korea (Kim et al. 2010) and Malaysia (Yamauchi et al. 2012). However, no such case of human tick bite due to *A. testudinarium* has been documented so far from India. Although the role of American *Amblyomma* (*A. americanum*) and African *Amblyomma* (*A. variegatum*) in transmission of several disease agents of animals and man (Merck 2011) has been established, involvement of this Asian tick in transmission of animal disease remains to be investigated. However, *A. testudinarium* is presently known to transmit *Ehrlichia chaffeensis* and *Rickettsia taylori* to man in China (Cao et al. 2000) and Japan (Imaoka et al. 2011) respectively. The present communication reports the prevalence of *Amblyomma testudinarium* in semi-domesticated free ranging mithuns (*Bos frontalis*) from Champhai district of Mizoram, India.

Materials and methods

The present investigation formed a part of the animal health check-up and treatment at a camp organized in Khuwangleng village under Champhai district of Mizoram, India. The

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Fig. 1 Longirostrate with long palpal article 2

Fig. 2 Hypostomal dentition 4/4

Fig. 3 Rectangular basis capitulum and porose areas

hilly place is situated near the international border with Myanmar and is at a distance of more than 250 km towards east of Aizawl, the capital city of Mizoram. Among others, a

total of 33 adult free ranging mithuns of either sex and having frequent access to Myanmar were presented in the camp. During the health check-up, three animals were found to have infestation with unusually large ticks on the skin of the dewlap and underside of the thigh. These ticks, three in numbers (one in each animal) were carefully collected in specimen vial and brought alive to the laboratory. Two specimens engorged with blood were first examined under stereoscopic microscope and thereafter processed in 10 % potassium hydroxide solution to study the morphological features for taxonomic identification with the help of available keys (Robinson 1926; Sen and Fletcher 1962; Yamaguti et al. 1971; Soulsby 1982). The third fully engorged live tick was put in a tube and kept in a dark place at room temperature for egg laying.

Results

Grossly, the live engorged ticks were of shining golden yellow colour which subsequently turned to earthy brown in old and preserved specimen. The ticks with long mouthparts measured 20–25 mm in length and 18–22 mm in width and weighed between 2.5 and 3.0 g. Body contour was broadly oval, narrower in front and widest in the region of spiracle. Posterior border of the engorged ticks was ridged indicating presence of festoons. Microscopic findings were: long mouth parts with palpal article 2 being longest and more than twice the length of article 3 (Fig. 1); hypostomal dentition 4/4 with dental articles of the inner two files smaller than that of the outer files (Fig. 2); basis capitulum rectangular dorsally with presence of two oval shaped large porose areas (Fig. 3); scutum triangular with cone shaped narrow posterior angle, presence of diffuse golden brown ornamentation in the form of stripes on a pale ground coloration (Fig. 4) and dark brown numerous punctuations of variable size; eyes distinct, large, pale and flat and slightly bulging beyond the contour of the scutum; four pairs of legs reddish brown in colour with pale areas at the distal joints; tarsi abruptly attenuated, coxa I with two sub equal spurs (Fig. 5), the external being larger and coxa-IV with single broad rounded spur; spiracle plate triangular (Fig. 6) and the anal groove posterior to the anus. Based upon these morphological findings the specimens were found indistinguishable from female *Amblyomma testudinarium*. The female tick which was kept in a tube died after 25 days of observation without laying eggs.

Discussion

Mithuns (*Bos frontalis*), the “cattle of mountains” are found in the tropical rain forests of North Eastern hilly states of Arunachal Pradesh, Nagaland, Mizoram and

Fig. 4 Triangular scutum showing ornamentation and punctuations

Fig. 5 Coxa-I showing subequal spurs

Manipur of India, Myanmar, China, Bangladesh and Bhutan. Reared mostly for meat purpose, these animals are completely let loose to browse on jungle forages, tree fodders and other natural vegetations found in the forests but are also habitually domesticated even under wild condition through supply of little bit of concentrate and salt for which they regularly come back after grazing to their owners (Mondal et al. 2014). Physical examination of these semi-domesticated forest animals revealed presences of blood engorged large ticks identified as female *A. testudinarius* described earlier in different literature (Robinson 1926; Sen and Fletcher 1962; Yamaguti et al. 1971).

This golden yellow coloured tick with long mouth parts, beautifully ornamented scutum and having dark brown punctuations on the dorsum measured up to 25×22 mm in size and weighed 3.0 g conforming to the previous

Fig. 6 Triangular spiracle

observation made by Yamaguti et al. (1971), who found unfed adult *Amblyomma* (*A. variegatum*) usually of 5×4 mm in size attaining a length of 23 and 21 mm in width when engorged. Several reports are available on this tick species prevalent in South East Asia including India, Sri Lanka, Myanmar, Thailand, Malaysia, Indonesia, Philippines, Taiwan, Bangladesh, Korea and Japan (Kohls 1957; Kang et al. 1981; Merck 2011). Abera et al. (2010) were encountered hard tick *A. cohaerens* (44.1 %), *A. variegatum* (13.8 %), *A. lepidum* (1.2 %), in domestic livestock of Southwestern Ethiopia. However, different species of *Amblyomma* ticks i.e. *A. cajennense*, *A. auricularium*, *A. rotundatum*, *A. maculatum*, *A. longirostre* and *A. pacae* were recorded in Colombia by Wells et al. (1981). The clinical significance of *A. variegatum* to transmit hard water disease in domestic animal was reviewed by Deem (1998) where as an intermediate host of tick borne virus transmitted by *A. gemma* (14 %) and *A. variegatum* (6 %) was confirm by studies of Sang et al. (2006).

Record of *A. testudinarius* in the present investigation from mithuns in Mizoram is in conformity with earlier records from the neighbouring North Eastern states namely, Assam, Meghalaya and Arunachal Pradesh (Miranpuri et al. 1976; Saravanan et al. 2008) of India in different host species such as cattle, mithuns, tiger, wild boar, barking deer, yak and elephant. It is evident from these reports and also from the present record that this tick species is predominantly found in animals living in and around forests of North East India which is geographically situated on the foothills of Himalayas. Reports of this tick species have also been made from the hilly areas of Bangladesh bordering North east India (Islam and Alim 2006; Mohanta et al. 2011).

Mithuns of Mizoram in the present investigation recorded 9.09 % prevalence of the tick species against previous records varying from isolated case reports (Dhanda and Rao 1964; Miranpuri et al. 1976) in different animals to

1.59 % record prevalence in yaks (Saravanan et al. 2008) from India. However Mohanta et al. (2011) recorded 21.6 % prevalence of the tick species in cattle from hilly areas of Bangladesh. Ecological and climatological factors evidenced by the dense forested hilly environment with average temperature ranging from 10 to 20 °C in winter to 15–30 °C during summer months and abundant rainfall might be the contributing factors for the prevalence of this tick species in this region.

Acknowledgments The authors are grateful to the Director, National Research Centre on Mithun (ICAR), Jharnapani for providing necessary facilities, suggestions and encouragement during the study period.

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