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A NEW *Rhipicephalus* species (Family: Ixodidae) FROM CATTLE IN MANIPUR, INDIA

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AUTHORS' CONTRIBUTIONS

Both the authors' co-operate with each other and contributes maximum effort to complete this research work. Finally, the authors have read and approved the manuscript.

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ABSTRACT

The present paper deals with the occurrence of a species of tick belonging to the genus *Rhipicephalus.* The species under this genus have usual morphological features viz., having a hard sclerotized scutum which completely cover the dorsal surface of the body in males but present a small shield just behind the capitulum in female, basis capitulum is hexagonal in shape, mouth part anterior in position, eyes if present are located near the lateral margin of the scutum, presence of adanal plate in male, presence of festoons, etc. The present specimen, was encountered amongst a group of ticks that had been collected from cattle (*Bos indicus)* from Singda Kadangban (24°54'9" N, 93°53'2"E), Imphal West District, Manipur, India. On detail microscopic observation, under (CH20i) the present specimen was found to possess certain prominent variation differentiating from that of the known species, closest one being *Rhipicephalus bursa* on some distinct morphological characters like accessory adanal plate, adanal plate, sub-anal plate, spiracle, spiracle area, etc. These morphological variations are quite prominent and authentically support to the erection as a new species, to accommodate it under the genus *Rhipicephalus* giving the name of species as *R. kadangbandi,* taking the locality of occurence.

Keywords: Tick; *Rhipicephalus*; *Bos indicus*; Singda Kadangban; Manipur.

1. INTRODUCTION

The first rhipicephalid recognized was the cosmopolitan species *Rhipicephalus sanguineus* [1,2,3,4] collected in France and described by Pierre Andre Latreille (1806) [5,4]. He placed this tick under the genus *Ixodes* but Koch (1844) [5,4] reclassified it as a member of his newly erected genus *Rhipicephalus* and at the same time described three new species, *R. capensis, R. senegalensis* and *R. simus* [1,2,3,4]. The family Ixodidae composed of approximately 13 genera of which the genus *Rhipicephalus* is one of the largest. Members of the family Ixodidae, to which the genus *Rhipicephalus* belongs, are characterized by having a hard sclerotized scutum, which completely covers the

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dorsal surface of the body in the males but in female and immature stages it is present as a small shield just behind the capitulum. The mouthparts of all these ticks are anterior in position, the hypostome and palps are short and the basis capituli is hexagonal in shape, their eyes, when present, are near the lateral margin of the scutum and the spiracles are large located behind coxae IV [4]. The present specimen belonging to the genus *Rhipicephalus* were collected from cattle (*Bos indicus)* which are domesticated in Singda Kadangban, Imphal west District, Manipur (India) during the month of (June – Aug), 2019. The purpose of the present study is to explore the tick fauna from different parts of Manipur (India) that remain unknown for long so far and for proper cataloguing of the existing ticks, the main ecto-parasites of cattle from this region.

2. MATERIALS AND METHODS

The tick parasites were collected by hand manually or by large forceps according to the convenience from the body of the cow and kept inside collection bottle containing 70% alcohol and brought to the laboratory. The collected specimens were preserved in 70% ethyl alcohol containing few drops of glycerol. After removing from the preservative, the ticks were placed in water for one hour and were then transferred in a cavity block containing 10 % KOH solution and keep in this medium for at least 24 hours until it is suitably cleared. Then the ticks were washed thoroughly in water to remove KOH, and were placed in 5% aqueous solution of glacial acetic acid for 30minutes. Then, they were transferred to water and kept for 30 minutes to make them free from acid. Then, the specimens were dehydrated by employing the ascending grades of alcohol. They were cleared in cedar wood oil for a minimum of 24 hours and then placed in xylene for one minute before mounting. The ticks were mounted in DPX mountant on a one concavity micro slide [6]. Then, the slide was dried properly for further detail study and storage. Measurements were taken by using an ocular micrometer. Drawings were drawn by using camera lucida. All measurements were in mm (millimetres) unless stated.

3. RESULTS

A detail morphological analysis of the present Rhipicephalid tick lead to the identification of a species under the genus *Rhipicephalus.*

3.1 Description

Male: Body 4.37- 4.39 in length and 2.60 - 2.61 in width, ovoid in shape with narrow anterior portion, translucent, pale brown. Capitulum 0.88 - 0.90 in length and 0.75 - 0.76 in width, slightly longer than broad. Basis capitulum hexagonal shape, blunt lateral angle. Hypostome arranged in (3+3) column dentition. Conscutum 3.59 - 3.60 in length and 2.48 - 2.49 in width, pale brown in colour with narrow anterior portion, elevation, depression, lateral grooves indistinct, fine numerous punctation eventually distributed. Large punctation of not less than eight in number are scattered at pre-genital region. Genital aperture located at coxa-II level, shape quite different from other genera, opening transverse wide slit with semi-circular anterior lip and posterior prominent, stout lip. Coxa-I of first leg is triangular in shape, moderate in size, coxa-I spur pairing large and equal, length of tarsus-I is 2.25 – 2.26 and metatarsus-I is 0.41-0.42. Length of tarsus-IV is 0.39- 0.40 and metatarsus is 0.14 - 0.15 in length. Pulvilli present, all claws long and slender, hook present at downward portion of pre-tarsus area. Spiracular plate 0.62 - 0.63 in length and 0.30 - 0.31 in width, elongated ovate, plano-convex in shape with lower posterior end more pointed or conical. Spiracle goblets scattered around middle apparatus. Shape of the adanal plate is narrow trapezoid with pointed anterior portion, their inner margins slightly concave near basal region and posterior margin with curve blunt end. Accessory adanal plate is large, distinctly visible and triangular in shape. Sub-anal plate is distinctly visible as dark brown shaddy demarcation at both plates and having curve posterior region with pointed internal margin. Eleven (11) festoon with well demarcated squary outline are present at posterior broader region of body.

Female: Not found.

3.2 Taxonomic Summary

Genus	*Rhipicephalus* Koch (1844)
Species	*Rhipicephalus kadangbandi* n.sp
Host	*Bos indicus*
Place of collection	Singda Kadangban, Imphal west District, Manipur (India)
Holotype	S_1T_1PMU
No. of specimen collected	♂(7) , ♀ (0)
Etymology	Species name based on the name of locality from where the specimen were collected

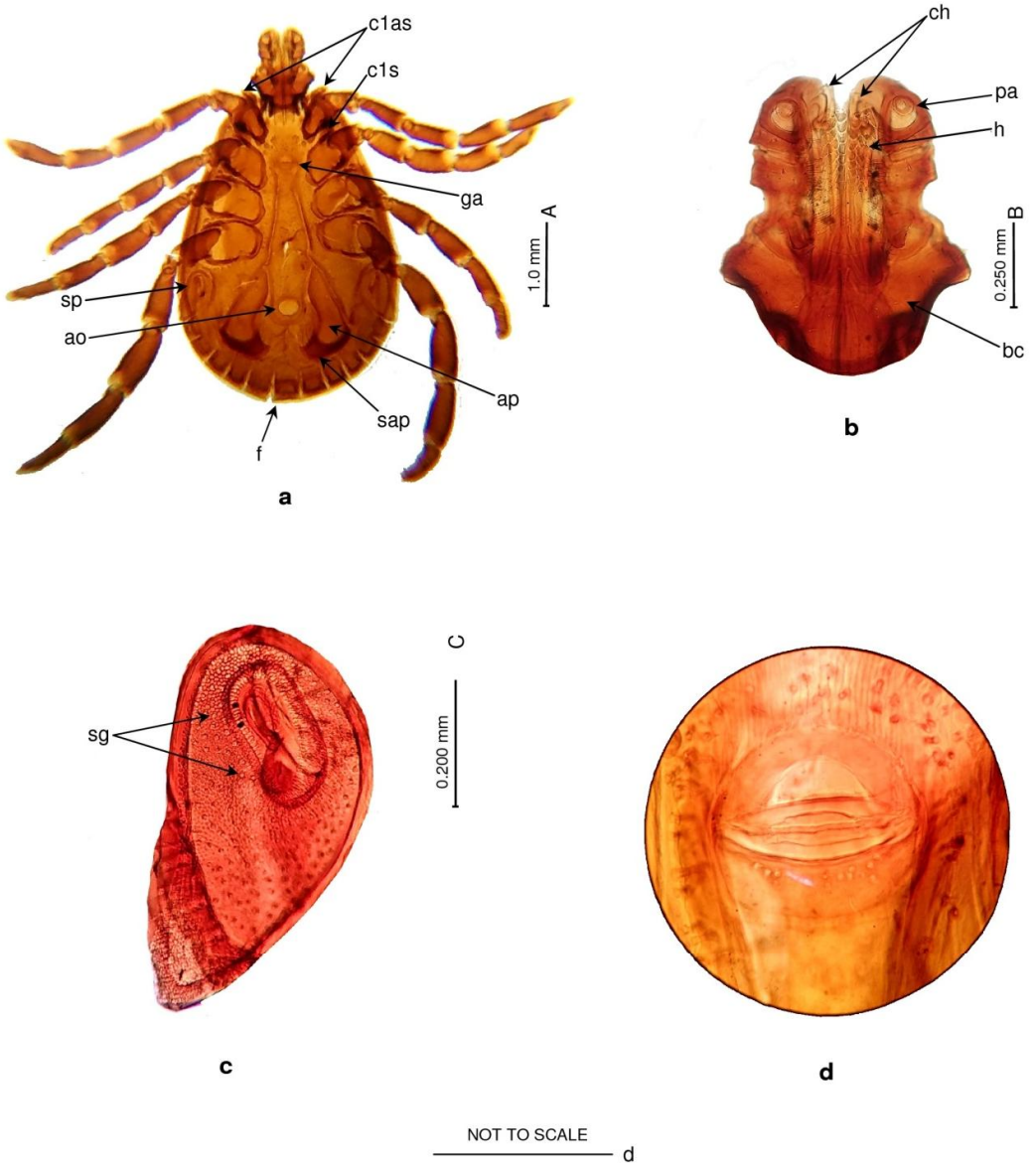

Fig.1 Photomicrograph of *Rhipicephalus kadangbandi* n. sp. Whole body of male
a Ventral view, **b** Capitulum, **c** Spiracular plate, **d** Genital aperture (b – d) Enlarged view
ao - anal opening, ap- adanal plate, bc- basis capitulum, c1as - coxa1anterior spur,c1s - coxa1spur pairing, ch- chelicerae, f- festoon, ga-genital aperture, pa- palp article 4, h- hypostome, sap- subanal plate, sp- spiracular plate, sg- spiracle goblets.

4. DISCUSSION

So far 74 species belonging to the genus *Rhipicephalus* were encountered from different parts the world [7]. The genus *Rhipicephalus,* is found to be dominant in the Afrotropical region. In India, Vijai Dhanda [8] first described a new species *Rhipicephalus ramachandrai* [8,2]. The present specimen shows resemblance with *Rhipicephalus bursa* (Canestrini and Fanzago, 1878) [2,3,4,5] in having hexagonal basis capitulum ; large equally paired internal and external spurs of coxae-I are

distinctly visible; indistinct posterior grooves; presence of festoon. However,the present specimen exhibits different morphological features from the already known species, *Rhipicephalus bursa* (Canestrini and Fanzago, 1878) in having a large, distinctly visible and triangular shape accessory adanal plate; shape of adanal plate is narrow trapezoid with pointed anterior portion, their inner margins slightly concave near basal region and posterior regions with curve blunt end; sub-anal plate is clearly present as a distinct dark shaddy portion in both the plates and appears to be extension of the adanal plate

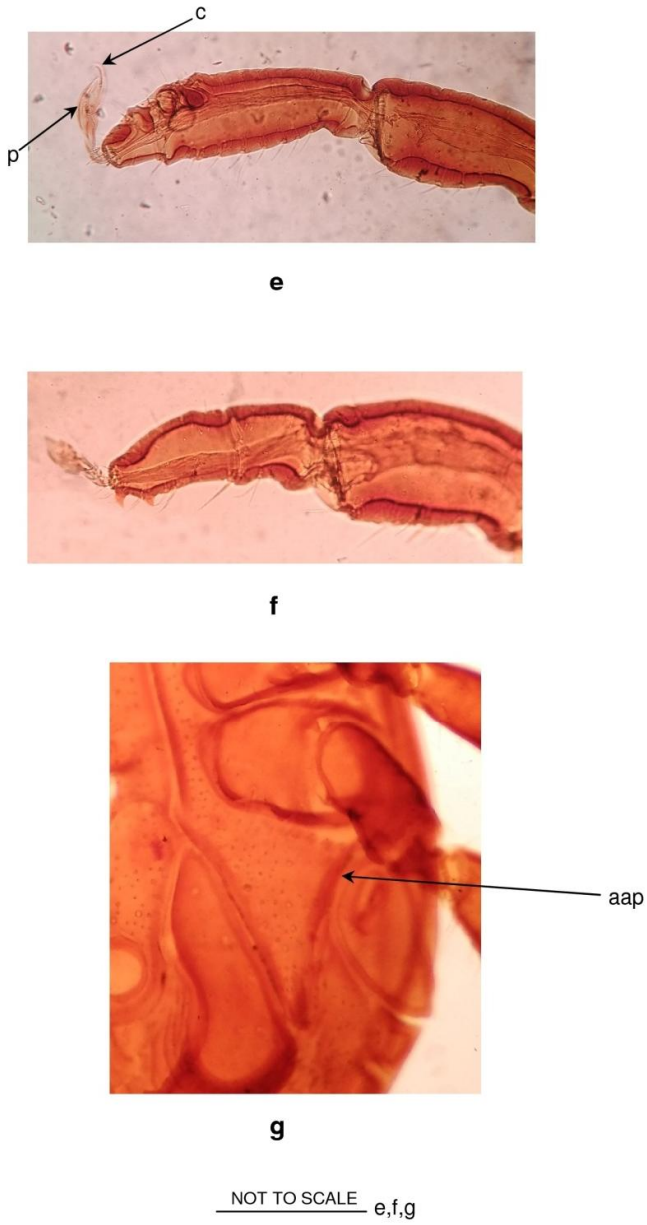

Fig.2 Photomicrograph of *Rhipicephalus kadangbandi* n. sp. **e** Tarsus I, **f** Tarsus IV , **g** Accessory adanal plate (e – g) Enlarged view.

aap- accessory adanal plate, c- claw, p-pulvilli.

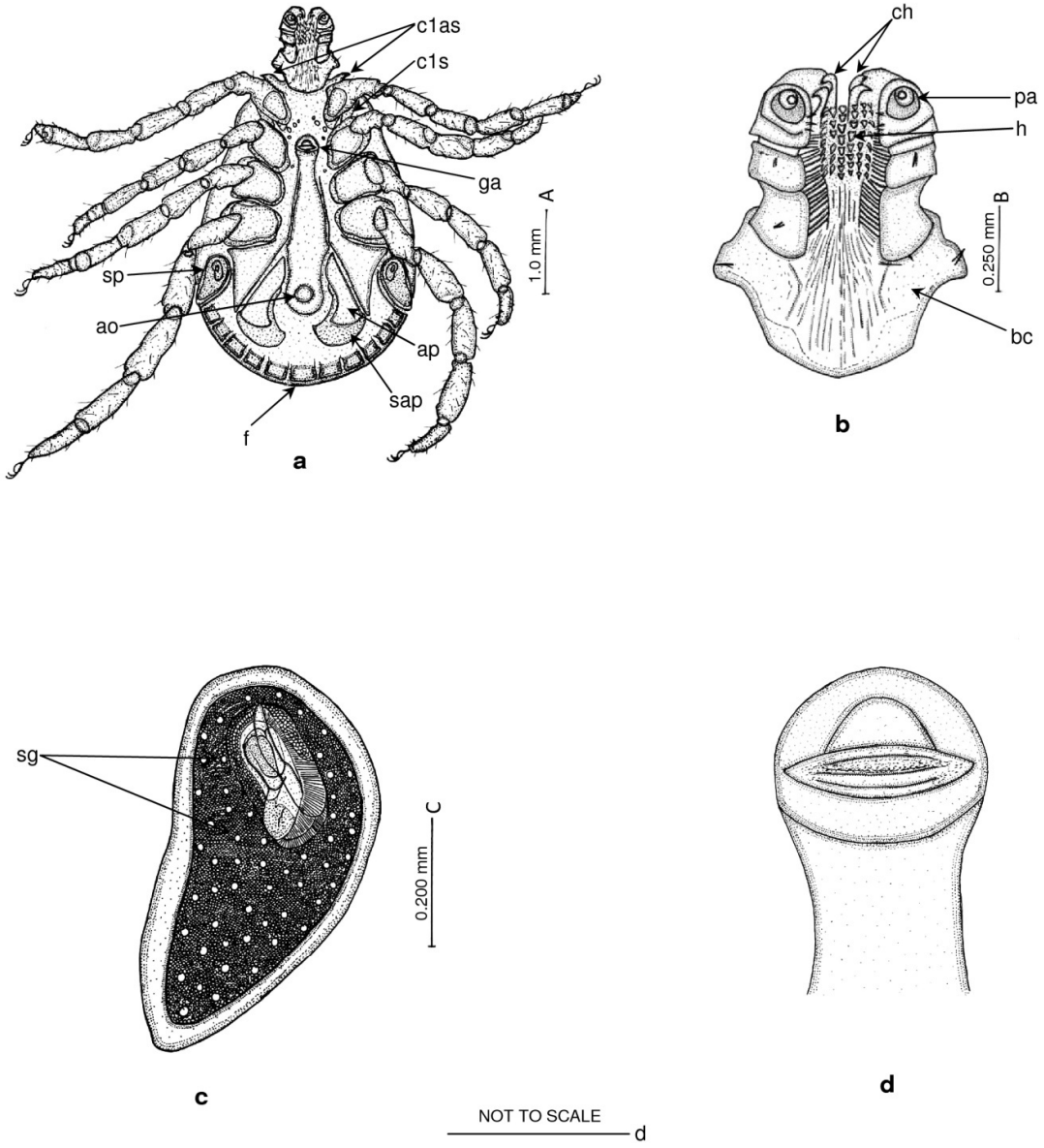

Fig.3 *Rhipicephalus kadangbandi* n. sp. Whole body of male **a** Ventral view, **b** Capitulum, **c** Spiracular plate, **d** Genital aperture (b – d) Enlarged view

ao - anal opening, ap- adanal plate, bc- basis capitulum,c1as - coxa1anterior spur,c1s - coxa1spur pairing, ch- chelicerae, f- festoon, ga-genital aperture,pa- palp article 4, h- hypostome, sap- subanal plate, sp- spiracular plate, sg- spiracle goblets.

with curve and pointed posterior portion. Spiracle is elongated and ovate with prominent middle apparatus and spiracle goblets are scattered around the middle apparatus; indistinct setae in spiracle area which is shown in the Table 1.

The present specimen also shows slight resembles with *Rhipicephalus praetextatus* (Gerstacker, 1873) [2,9,4] in having large accessory adanal plate, shape of the adanal plate, absence of posterior groove, indistinct lateral grooves, presence of 11 festoons but it differ from *Rhipicephalus praetextatus* (Gerstacker, 1873) in having an anterior spur of coxae I, presence of large and equal spur pairing of coxae I, presence of large size punctation distributed around the pre-genital area, presence of sub-anal plate. All members of the population shows these characteristic variations, which may be intraspecific.

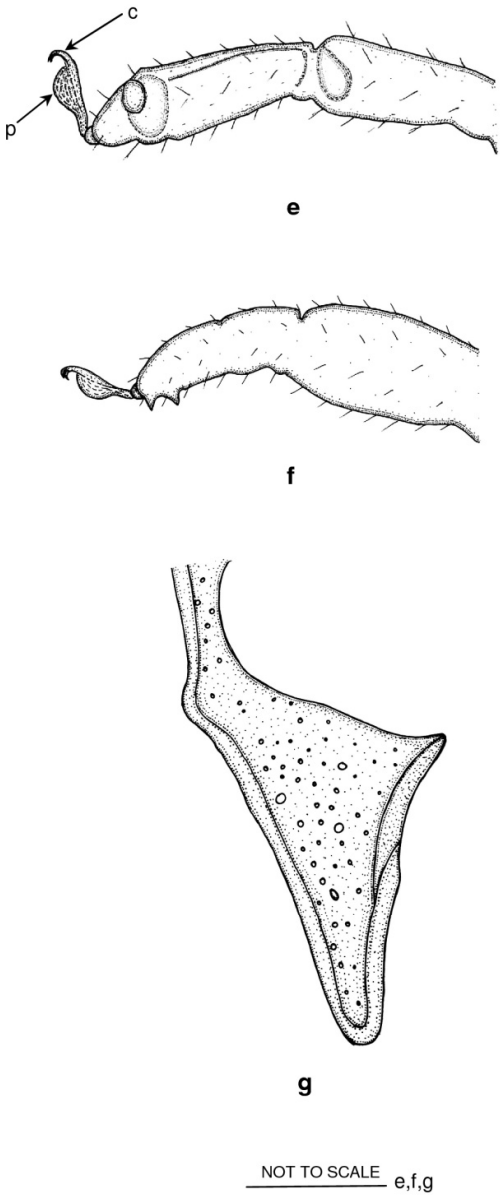

Fig.4 *Rhipicephalus kadangbandi* n. sp. **e** Tarsus I, **f** Tarsus IV , **g** Accessory adanal plate (e – g) Enlarged view. c- claw, p-pulvilli.

Table 1. Comparision of the present species with its closest relative *Rhipicephalus bursa* (Canestrini & Fanzago, 1878)

Character(s)	*Rhipicephalus bursa* (Canestrini & Fanzago, 1878)	*R.kadangbandi* n.sp. (present specimen)
Basis Capitulum	Acute lateral angle	Blunt lateral angle
Coxae 1 spur pairing	Not recorded	Large and equal
Punctation	Numerous, fine, evenly distributed over scutal surface, few larger punctations in scapular area	Small to medium size punctation scattered over scutal surface, few larger punctation about (5-8) confined around pre-genital area
Shape of Spiracle	Broad comma shape	Elongated ovate, plano-convex shape with tapering posterior region
Adanal plate	Pointed anteriorly, broadly rounded posteriorly with pointed prominences on their internal margin	Narrow trapezoid, anterior portion pointed, their inner margin slightly concave near basal region and posterior region with curve blunt end
Accessory adanal plate	Present as very small sclerotized point	Large, distinctly visible, triangular in shape
Sub-anal plate	Not recorded	Distinctly visible as dark brown shaddy demarcation having a curve posterior with pointed internal margin
Spiracle area	Dense setae	no setae
Spiracle goblets	Not recorded	Scattered around middle apparatus

5. CONCLUSION

Based on the above morpho-taxonomical characteristics observed and depicted, the present specimen is considered as new to the science and hence, a new species name *Rhipicephalus kadangbandi* n.sp. is hereby assigned. The specific name '*kadangbandi'* is based on the location of the host where it is found i.e., 'Kadangban'.

ETHICAL APPROVAL

All the procedures performed in research studies were in accordance with the ethical standards of the Institutional Animal Ethics Committee of Manipur University (M.U/D.LSc./IAEC/1/19).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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