

Studies on the Parasite Fauna of Thailand

5. Parasitic ticks on mammals and description of *Ixodes siamensis* sp. n. and *Rhipicephalus tetracornus* sp.n. (Acarina : Ixodidae)*

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Abstract: About twelve species of parasitic ticks on Thai mammals were recorded. *Ixodes siamensis* sp. n. is the second species of the subgenus *Paltipalpiger*. The adults of *Rhipicephalus tetracornus* sp. n. reared from engorged nymphs infesting on *Rattus nitidus* is morphologically characteristic due to its pronounced cornua-like projection on the posterior margin of basis capituli ventrally.

Key words: Ticks, Thailand, Parasite fauna, *Ixodes siamensis* sp. n., *Rhipicephalus tetracornus* sp. n.

INTRODUCTION

Parasitic or phoretic mites on Thai small mammals collected during the survey in 1978 and 1979 were reported in the previous two reports (Suzuki, 1980; Uchikawa and Suzuki, 1980). The other group of acarina, ticks are well known as vectors of many human and livestock's diseases. Recently, Tanskul *et al.* (1983) published a checklist of ticks in Thailand, and thoroughly summarized the information on tick fauna of Thailand consulting about 50 references.

During the present survey, 1 species of *Ornithodoros*, 1 species of *Dermacentor*, 4

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species of *Haemaphysalis*, 3 species of *Ixodes* possibly 2 species of *Rhipicephalus* were recorded from various small mammals, dogs and human beings. Among those species, each 1 species of *Ixodes* and *Rhipicephalus* was noticed new to science.

This paper deals with the collection records and the description of two new species, *Ixodes siamensis* sp. n. and *Rhipicephalus tetracornus* sp. n.

RESULTS AND DISCUSSION

Data for mammal hosts from various places in Thailand are listed in Table 1 and for tick collection in Table 2.

Ixodes (Ixodes) tanuki Saito was described originally from males and females taken from badgers (*Nyctereutes procynoides viverrinus*) in Niigata, Japan, and after that Clifford *et al.* (1951) reported its wide distribution in Nepal. The present record from Thailand was considered that a first step to fill such big gap in the geographical distribution of *I. tanuki*.

Ixodes siamensis sp. n. is the second member of the subgenus *Paltipalpiger* Hoogstraal *et al.*, 1973, which was defined to contain a single species, *I. ovatus* Neuman. *I. ovatus* is common tick parasitizing wide range of mammalian host including freque-

Table 1. List of mammalian hosts examined for ticks

Mammal species		Number examined	Number positive
INSECTIVORA			
<i>Anourosorex squamipes</i>	Chinese short-tailed shrew	10	2
CHIROPTERA			
<i>Rousettus leschenaulti</i>	Leschenault's rousette	2	1
RODENTIA			
<i>Eothenomys melanogaster</i>	Pere David's vole	10	1
<i>Mus pahari</i>	Gairdner's shrew-mouse	4	2
<i>Rattus sabanus</i>	Noisy rat	5	2
<i>R. fluvescens</i>		3	1
<i>R. surifer</i>	Yellow rajah rat	35	3
<i>R. nitidus</i>	Himalayan rat	3	2
<i>R. niviventer</i>	White-bellied rat	50	1
<i>Menetes berdmorei</i>	Indonesian ground-squirrel	28	1
<i>Bandicota savilei</i>	Lesser bandicoot	6	2
CARNIVORA			
<i>Martes flavigula</i>	Yellow-throated marten	1	1
<i>Canis familiaris</i>	Domestic dog	6	6
PRIMATES			
<i>Homo sapiens</i>	Human being	1	1

Table 2. Ticks from mammals collected from 4 localities, Chiang Mai (A), Mae Hong Son (B), Nakhon Nayok (C) and Doi Inthanon (D) in Thailand, in 1978 and 1979

Tick species	Stage collected				Vertebrate species	Date	Locality
	M	F	N	L			
ARGASIDAE							
<i>Ornithodoros batuensis</i>				46	<i>Rousettus leschenaulti</i>	8 VII 31	B
IXODIDAE							
<i>Dermacentor</i> sp.			1		<i>Rattus sabanus</i>	8 VII 23	C
<i>Haemaphysalis bispinosa</i>				1	<i>R. sabanus</i>	8 VII 23	C
<i>H. (Rhipistoma)</i> sp. 1			1		<i>R. fulvescens</i>	9 II 23	D
<i>H. (Rhipistoma)</i> sp. 2			8	66	<i>Menetes berdmorei</i>	9 VIII 3	B
<i>H.</i> sp. 3			1		<i>R. surifer</i>	9 II 24	D
<i>Ixodes granulatus</i>		1			<i>M. berdmorei</i>	8 VII 31	B
<i>I. granulatus</i>			1		<i>Bandicota savilei</i>	9 II 11	C
<i>I. tanuki</i>		2			<i>Martes flavigula</i>	9 II 21	D
<i>I. tanuki</i>				1	<i>Eothenomys melanogaster</i>	9 II 21	D
<i>I. tanuki</i>				1	<i>R. niviventer</i>	9 II 22	D
<i>I. siamensis</i> sp. n.				1	<i>Mus pahari</i>	9 II 20	D
<i>I. siamensis</i> sp. n.				2	<i>Anourosorex squamipes</i>	9 II 23	D
<i>I. siamensis</i> sp. n.				1	<i>A. squamipes</i>	9 II 34	D
<i>Rhipicephalus sanguineus</i>		1			<i>Homo sapiens</i>	8 VII 27	A
<i>Rh. sanguineus</i>			1		<i>Canis familiaris</i>	8 VII 28	B
<i>Rh. sanguineus</i>	10	10	4		<i>C. familiaris</i>	8 VIII 6	A
<i>Rh. sanguineus</i>		2			<i>C. familiaris</i>	9 II 12	C
<i>Rh. sanguineus</i>		1			<i>C. familiaris</i>	9 II 21	D
<i>Rh. sanguineus</i>		4	3		<i>C. familiaris</i>	9 II 24	D
<i>Rh. tetracornus</i> sp. n.				1	<i>R. surifer</i>	9 II 10	C
<i>Rh. tetracornus</i> sp. n.				1	<i>R. surifer</i>	9 II 12	C
<i>Rh. tetracornus</i> sp. n.				1	<i>Bandicota savilei</i>	9 II 11	C
<i>Rh. tetracornus</i> sp. n.				1	<i>M. pahari</i>	9 II 20	D
<i>Rh. tetracornus</i> sp. n.				19	<i>R. nitidus</i>	9 II 20	D
<i>Rh. tetracornus</i> sp. n.?				1	<i>R. nitidus</i>	9 II 20	D
<i>Rh. tetracornus</i> sp. n.?				2	<i>Eothenomys melanogaster</i>	9 II 21	D
<i>Rh. tetracornus</i> sp. n.?				1	<i>Anourosorex squamipes</i>	9 II 23	D

nt occasions on human beings. Hoogstraal *et al.* (1973) reported the wide distribution of *I. ovatus* in China, Burma, Nepal, and Thailand, but they supposed that a more detailed study may justify the recognition of two or more species in their samples as identified as *I. ovatus*. The present record of a species belong to *Paltipalpiger* from Thailand may considered to justify their assumption.

Rhipicephalus tetracornus sp. n. is dissimilar to *Rh. sanguineus*, *Rh. haemaphysaloides* and other known species of *Rhipicephalus* due to its unique morphological characters in adult stage which is described in the latter part. For description of the specimens,

all measurements are in millimeters.

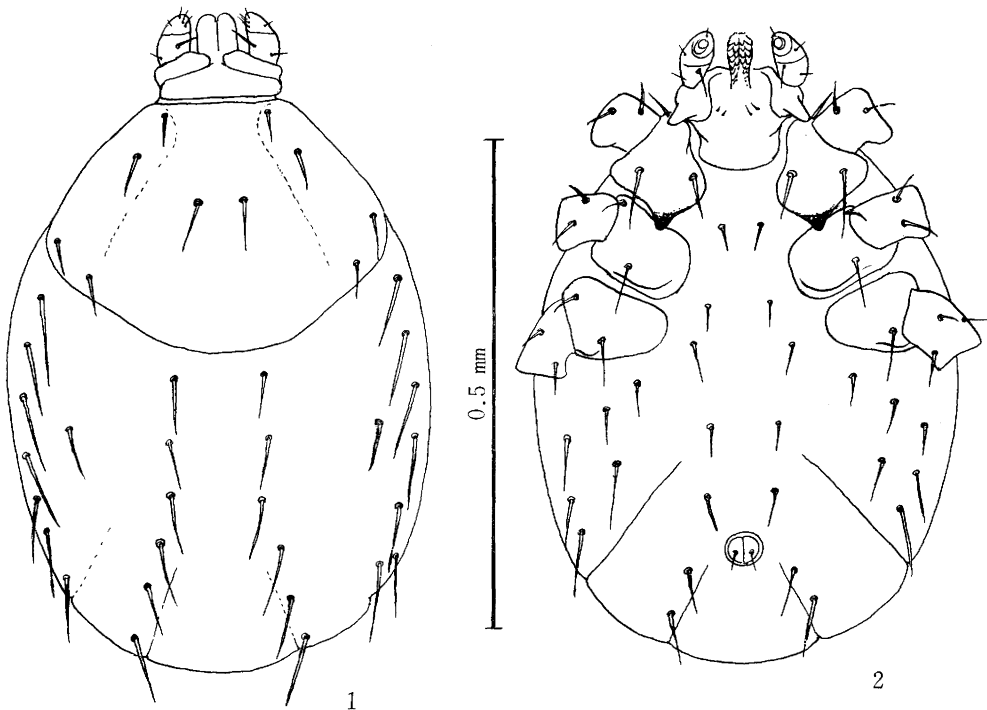
DESCRIPTION

Ixodes (Paltipalpigera) siamensis sp. n.

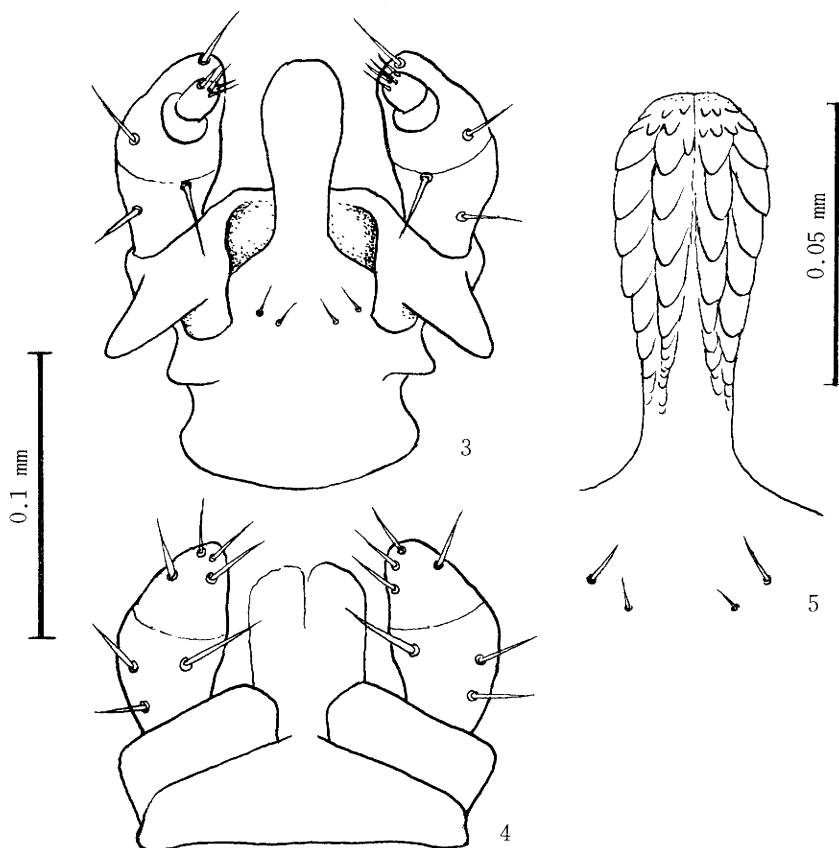
LARVA (Figs. 1-5)

Body (Figs. 1, 2): Subcircular, length excluding capitulum, 0.58-0.68 long, 0.44-0.56 wide (slightly engorged, $n=4$), broadest near midlength.

Capitulum (Figs. 3-5): Length from palpal apices to cornus apices 0.095-0.099, breadth at level of cornus 0.116-0.124. Basis capituli dorsally with nearly straight posterior margins, cornus absent, lateral margins widely diverging to short acute sides; ventrally elongate, broadest anteriorly, with small broadly triangular, posterolaterally directed; posterior margin rounded. Palpi clavate, segment 1 greatly enlarged, extending inwardly and anteriorly to ensheath the base of mouthparts, subrectangular dorsally, subtriangular ventrally with a strong, posterolaterally pointed salience. Segments 2 and 3 external margins bowed with rounded apex, no apparent suture, widest midway; segment 3 with internal curvature beginning near juncture of segments 2 and 3. Segments 2 and 3 each with 2 setae ventrally and 4 dorsally, segment 1 lacking setae. *Hypostome* (Fig. 5),



Figs. 1-2. *Ixodes siamensis* sp. n. larva : dorsal and ventral views.



Figs. 3-5. *Ixodes siamensis* sp. n. larva : 3, 4, capitulum, ventral and dorsal views ; 5, hypostome.

bluntly rounded, arising on slightly median extension of basis, length of toothed portion 0.062, width 0.029; dental formula 2/2, 9 or 10 denticles in files, dental formula 3/3 in corona only. Posthypostomal setae 2 pairs, ph1 0.014, ph2 0.010, distance between setae of ph1 0.030, between setae ph2 0.018.

Scutum: Length 0.248–0.252, width 0.334–0.344. Cervical grooves shallow, divergent posteriorly, four pairs setae external to cervical grooves and one pair between cervical grooves near middle; sc3 0.041, sc4 0.027–0.035.

Dorsum: Sensilla sagitifformes absent. Five pairs central dorsal setae; seven pairs marginal dorsal setae; cd1 0.041–0.050, cd5 0.057–0.064; md1 0.041–0.056; md7 0.053–0.060; one pair of supplementaris 0.043–0.054

Ventum: Three pairs sternals, st1 0.037–0.043; two pairs preanal pa1 0.035–0.037; four pairs premarginals, pm1 0.035–0.039; four pairs marginal ventrals, pv1 0.035–0.043. Anal groove distinct, open anteriorly.

Legs: Coxa I with one small triangular internal spur, three setae. Coxae II and

III without spur, each two setae. Trochanters lacking spurs.

Holotype: Larva from *Anourosorex squamipes*, Doi Inthanon, 23 II 1979, H. Suzuki. Deposited in the National Science Museum, Natural History Institute, Shinjuku, Tokyo.

Paratypes: Larva from *Mus pahari*, 20 II 1979; larva from *A. squamipes*, 24 II 1979, Doi Inthanon, H. Suzuki. Deposited in the National Institute of Animal Health, Tsukuba, Ibaraki.

Species relationship: *Ixodes siamensis* sp.n. definitely belongs to the subgenus *Paritipalpigier* erected to contain a single species *I. ovatus*. Hoogstraal *et al.* (1973) examined all stages of *I. ovatus* collected from various domestic and wild animals from Burma, Japan, China, India, Nepal, Taiwan and Thailand and noticed some variation in their morphological characters, but they considered all samples as *I. ovatus*. They did comparative study of tick samples from Japan and Nepal, but found no fundamental differences in larvae of both places. Larvae of *I. siamensis* sp.n. is distinctly different from those of *I. ovatus* as follows: oval rather than pyriform in body-outline, low subtrapezoid capitulum rather than subtriangular one, and short clavate palpi rather than moderately elongate ones.

Rhipicephalus tetracornus sp. n.

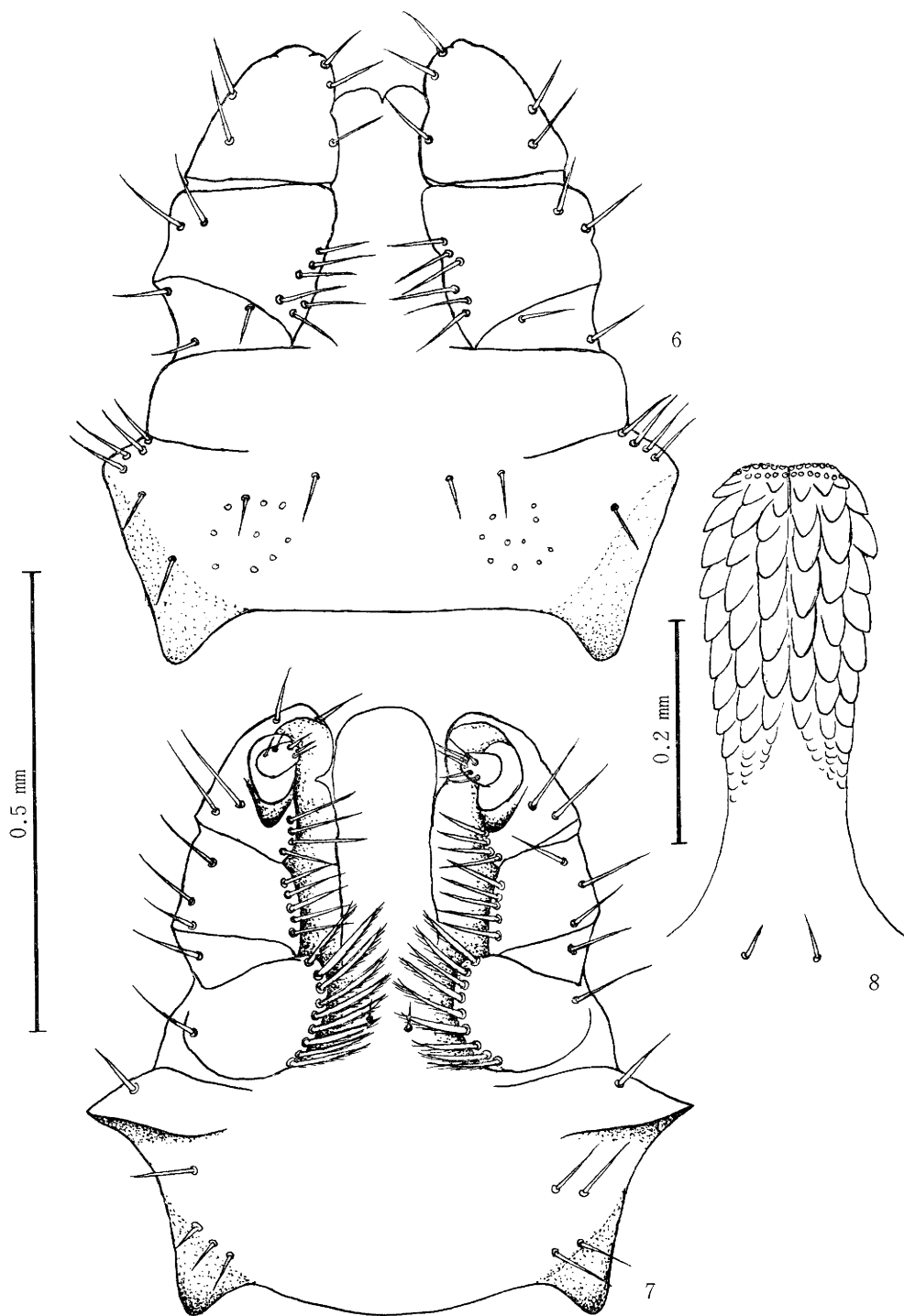
MALE (Figs. 6–8, 9–11)

Body: Pyriform, with comparatively small capitulum.

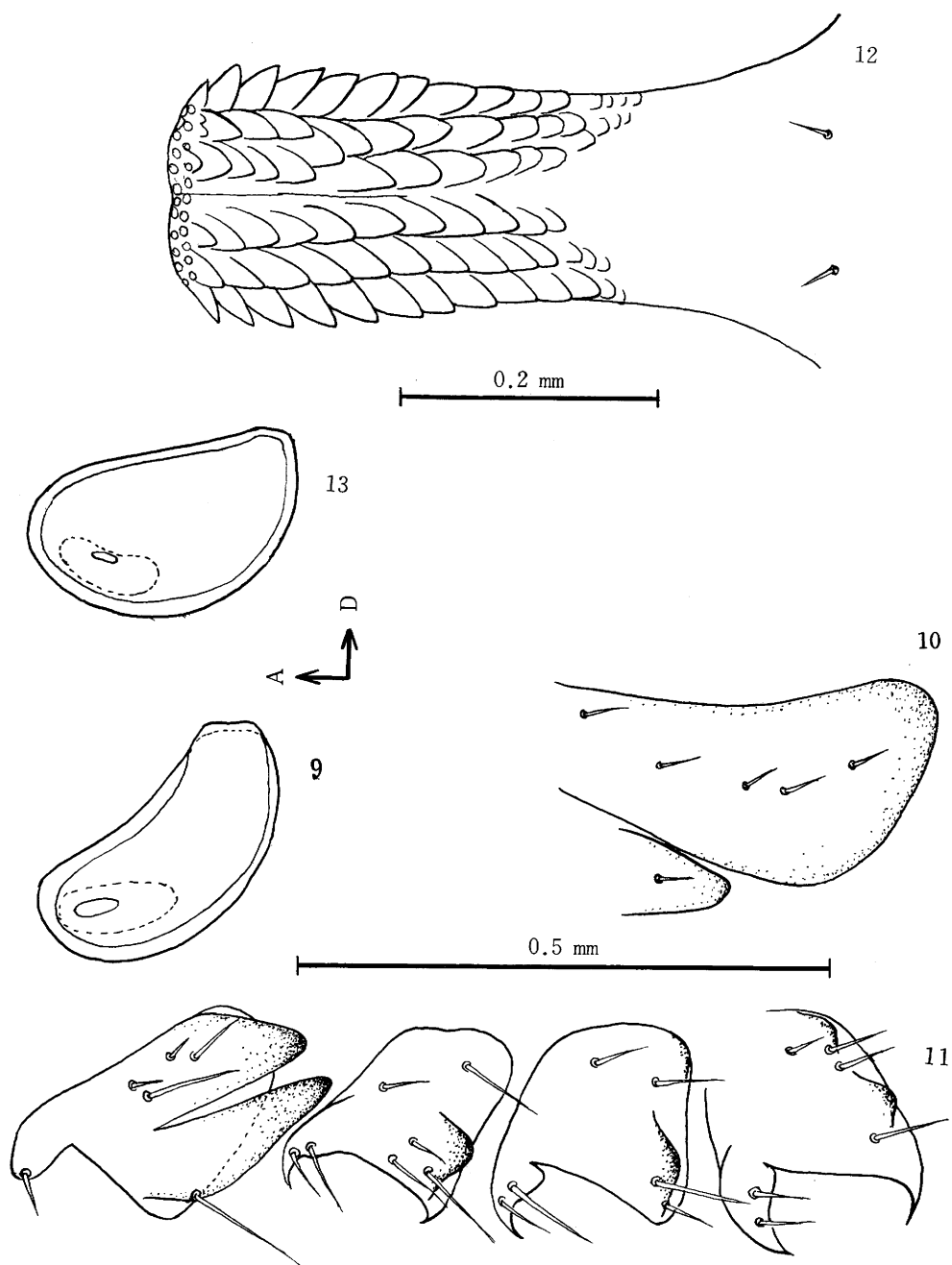
Capitulum (Figs. 6, 7): Basis capituli dorsally 0.69 long and 0.63 wide, roundly tropezoid in outline, anterolateral angles salient at midlength abruptly from convex lateral margins; posterolateral margins slightly concave; cornua well developed, triangular, about 8 pairs of setae. Basis capituli ventrally subtriangular with ridge-like auriculae; lateral angles pointed; posterior margin slightly convex with developed cornua-like projections. Palpi longer than wide. Segment 1 dorsally subtriangular, ventrally covered by a well-developed subtriangular plate, with 10 feathery setae on inner side, 3 dorsal and 2 ventral setae. Segment 2 slightly longer than 1, with 5 feathery infrainternal setae, ca 8 dorsal and 2 ventral setae. Segment 3 triangular with 4 slender infrainternal setae and 4 setae ventally and 5 setae dorsally; dorsal margin with a narrow depression area to produce a notch in external profile; a minute conical ventral spur directed internally. Hypostome (Fig. 8) spatulate, apex of corona nearly straight and very short; dental formula 3/3, about 10 teeth in files; posthypostomal setae 0.02 long.

Scutum: Pyriform, widest at level of spiracles, ca 2.4 long, 1.9 wide. Eyes flat, indistinct, marginal, anterior one fifth of scutum; setae sparse, ca 0.02 long. Festoons number 11.

Venter: (Figs. 11–13). Spiracular plates as illustrated (Fig. 9). Genital operaculum large, oval, with minute seration between coxa II. Genital grooves subparallel from operaculum to coxa IV, divergent posteriorly. Anal groove with lateral arms well



Figs. 6-8. *Rhipicephalus tetracornus* sp. n. male : 6, 7, capitulum, dorsal and ventral views ; 8, hypostome.



Figs. 9-13. *Rhipicephalus tetracornus* sp. n. male : 9, spiracular plate (A=anterior; D=dorsal); 10, adanal shields; 11, coxae I-IV, female: 12, hypostome; 13, spiracular plate.

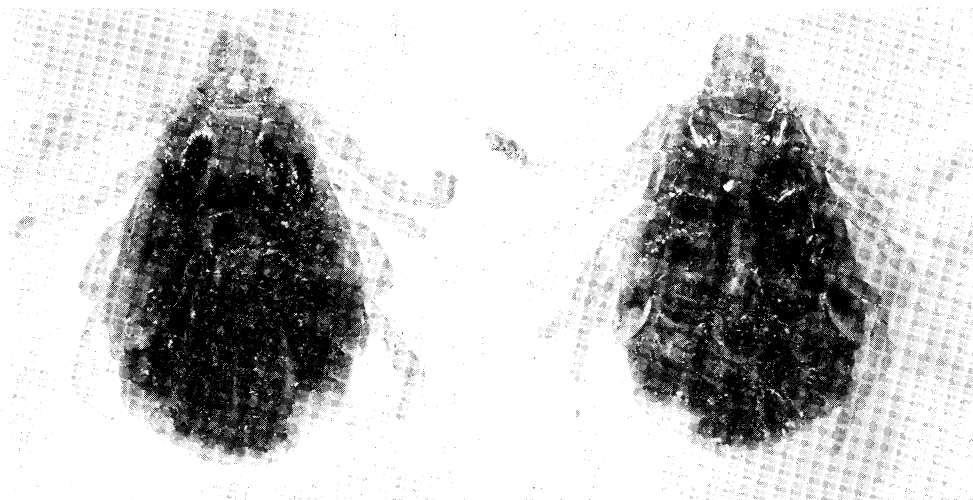
developed, posterior arm short. Adanal shields (Fig. 10) boot-shaped; accessory shields rounded posteriorly, situated lateral to each adanal plate. Festoons better differentiated than on dorsal surface, number 11. Central surface with setae 0.03–0.06 long.

Legs (Fig. 11). Coxa I deeply divided, external spur rectangular, rounded; internal spur long, bluntly triangular. Coxae II to IV each with obtuse triangular spur not exceeding margin and internal spurs distinguishable as marginal saliences. Tarsi II to IV with distinct apicoventral hooks.

FEMALE (Figs. 12 — 15)

Body (Figs. 14, 15). Pyriform, 0.26 long, 1.8 wide.

Capitulum: Basis capitulum larger than in male, porose areas small, circular, ca 0.12 in diameter, interval separating them greater than their diameter. Palpi similar to those of male, differ in segment 2 with 8 infrainternal setae. *Hypostome* (Fig. 12) more robust than that of male and dental formula 3/3; each 11 denticles in files; post-typostomal setae 0.03 long. *Scutum* almost as wide as long, ca 1.3 long; surface with few setae ca 0.02 long. *Spiracular plates* elongate oval (Fig. 13); ventral surface with few curved setae, ca 0.02 long.



14

15

Figs. 14–15. *Rhipicephalus tetracornus* sp. n. female; dorsal and ventral views.

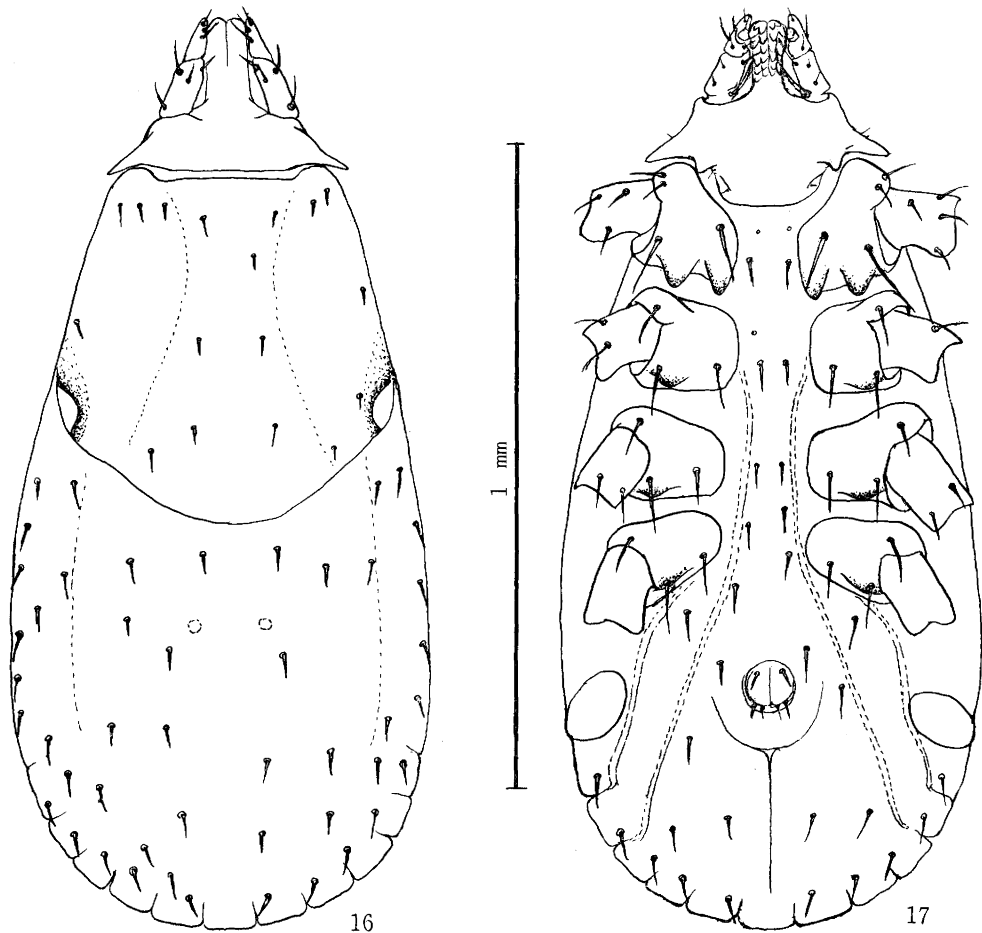
NYMPH (Figs. 16–19)

Body (Figs. 16, 17). Slender pyriform (nearly unfed), widest at level of coxa IV and spiracular plates 1.1 long and 0.6 wide.

Capitulum (Figs. 18, 19). Subtriangular, 0.25–0.27 long, 0.35–0.37 wide. Basis capituli dorsally broadest at posterior margin, anteriorly forming a slight palpal base,

external margins sharply forming triangular pointed saliences; ventrally with triangular median projection, with 3 pairs of setae. Palpi relatively long and narrow, external profile nearly straight, internal profile gently convex; apex bluntly pointed. Segment 1 obscure or fused with segment 2, single feathery infrainternal seta. Segment 3 subtriangular, with wide ventral spur. Segment 2 and 3 each setae number 3 dorsally, 2 ventrally and 1 ventrointernally. *Hypostome* ca 3 times as long as broad; apex bluntly rounded; corona small; dental formula 2/2, denticle in files ca 9; posthypostomal setae ca 0.015 long.

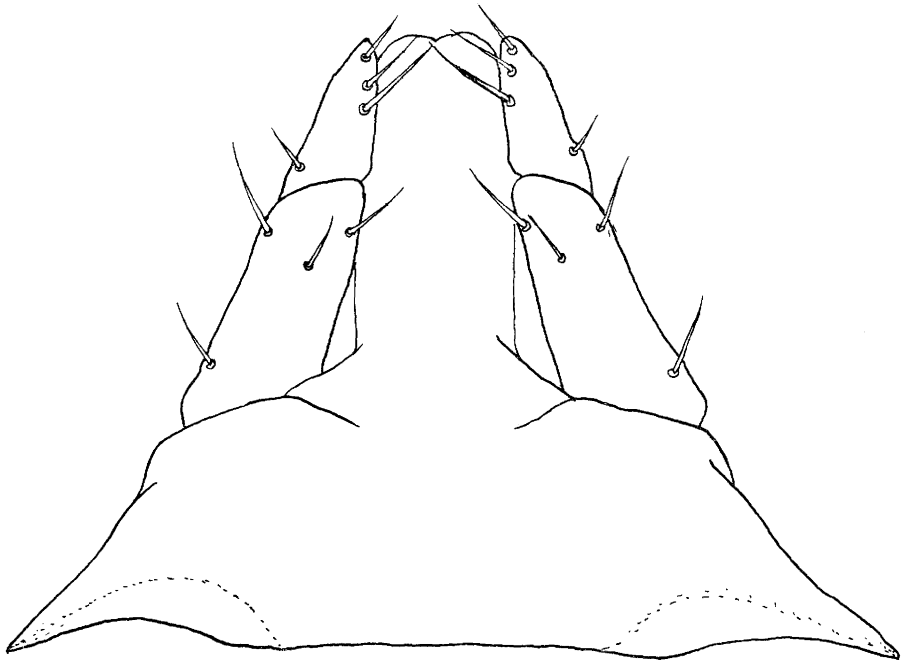
Scutum (Fig. 16). Length 0.53 to 0.57, width 0.45 to 0.49; anterior emargination broad, shallow, scapular apices broadly rounded; external margins almost rectilinear, posterolateral and posterior margins broadly rounded, slightly extended medially. Cervical



Figs. 16-17. *Rhipicephalus tetracornus* sp. n. nymph: dorsal and ventral views.



0.2 mm



Figs. 18-19. *Rhipicephalus tetracornus* sp. n. nymph: capitulum, ventral and dorsal views.

grooves shallow to near margin. Punctations setiferous, number ca 5 in each lateral field, ca 8 in median field, 0.015–0.02 long. Eyes flat, not extend margin.

Dorsum (Fig. 16) as illustrated, festoons number 11.

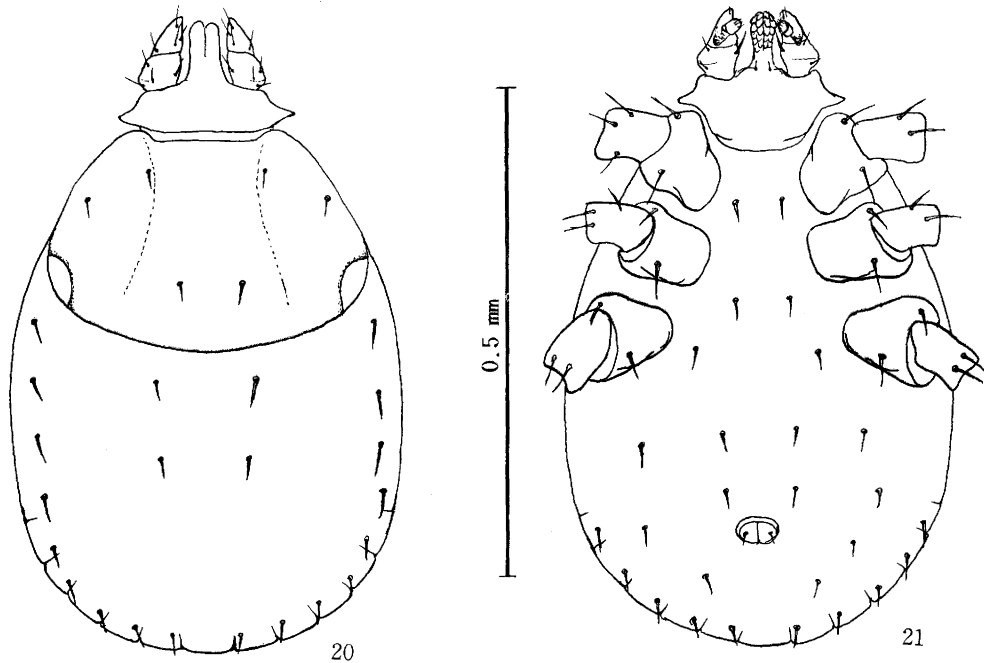
Venter (Fig. 17) with a paired sensilla sagitiformia immediately posterior of each coxal posteroexternal juncture; anus with 3 setae on each valve. Spiracular plates circular, 0.11 long, 0.09 wide.

Legs (Fig. 17). Coxa I external spur and internal spur broadly triangular, subequal. Coxae II to IV each with external spur successively smaller than that of II; internal spur lacking. Setae number 4 on coxa I and 3 each on coxae II to IV. Trochanter I dorsally lacking plate. pulvilli I reaching apical curvature, II to IV reaching 2/3 of claw length.

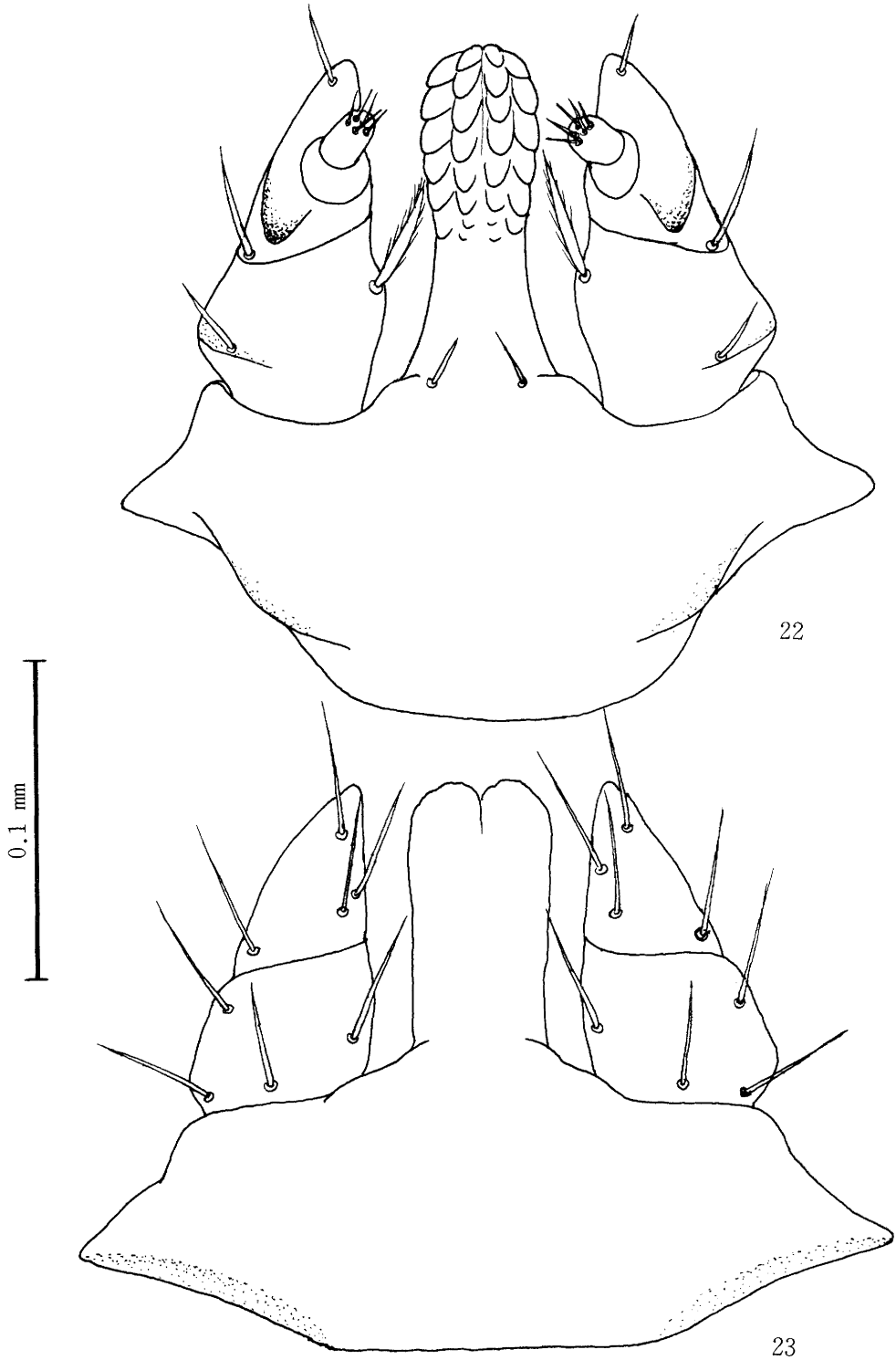
LARVA (Figs. 20–23)

Body (Figs 20, 21). Oval, longer than wide, widest near midlength, 0.5 to 0.58 long, 0.44 wide in nearly unfed specimens.

Capitulum (Figs. 22, 23). Basis capituli dorsally ca 3 times as broad as long, broadest at midlength anteriorly forming a slight palpal base; external margins sharply angular forming triangular saliences; surface with 2 small sensilla hastiformis; ventrally



Figs. 20–21. *Rhipicephalus tetracornus* sp. n.? larva: dorsal and ventral views.



Figs. 22–23. *Rhipicephalus tetracornus* sp. n.? larva, capitulum, ventral and dorsal views.

ca 2 times as broad as long, 1 paired posthypostomal setae, 0.015 long. Palpi dorsally subtriangular, apex bluntly pointed. Segment 1 absent or fused ventrally and 4 dorsally. Ventrointernal setae thick and plumose. *Hypostome* ca 2.5 times as long as broad, dental formula 2/2, denticles in files of 6 or 7.

Scutum (Fig. 20). Length 0.23, width 0.32; cervical grooves shallow, 3 pairs setae 0.018–0.021 long and 5 pairs sensilla on scutum. Eyes flat, not extending beyond margin.

Dorsum (Fig. 20). Two pairs central dorsal setae, 8 pairs marginal dorsal, 0.10–0.21 long; 1 pair sensilla sagitiformia on lateral margins. Venter (Fig. 21) 3 pairs sternal, 0.25–0.37 long. Other setae 0.02–0.025.

Legs (Fig. 21) Coxa I with broadly rounded spur, somewhat beyond posterior margin, 3 setae. Coxae II and III each with a successively smaller, broadly rounded ridge not breaking posterior margin, 2 setae. Tarsus I long and gently tapering distally, 0.195 long. Claws I larger than II and III. Pulvilli I reaching to apical curvature, II and III reaching 2/3 length of claw.

Holotype: Nymph (N) collected from *Rattus nitidus*, Doi Inthanon, 20 II 1979, H. Suzuki, deposited in the National Science Museum, Natural History Institute, Shinjuku, Tokyo.

Paratypes: 4 NN and 1 larva (L) from *R. nitidus*, 20 II 1979; 1 N from *Mus pahari*, 20 II 1979; 1 L from *Anourosorex squamipes*, 23 II 1979, Doi Inthanon, H. Suzuki, 1N from *R. surifer*, 10 II 1979; 1 N from *R. surifer*, 12 II 1979, Nakorn Nayok, H. Suzuki.

Taxonomic relationship: One male and two females of *R. tetracornus* sp. n. molted from engorged nymphs collected from *R. nitidus* were described and illustrated here, but unfortunately, those adults and some of nymphal and larval paratypes were lost on the way of sending to Dr. H. Hoogstraal, NAMRU-3, Cairo. The larvae different from larvae of *Rh. sanguineus* were described tentatively as those of *Rh. tetracornus* sp. n., because of the larvae and the nymphs of *Rh. tetracornus* sp. n. were recovered concurrently from all five specimens of *R. nitidus*, but it needs experimental proof to associate between both stages in the future.

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タイ国の寄生虫相 5. 哺乳動物寄生マダニと新種 *Ixodes siamensis* と *Rhipicephalus tetracornus* の記載

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タイ国のマダニはこれまで10属53種が知られ、1978, 1979年、4地点で採集した13種の哺乳動物と人から *Ornithodoros* 1種, *Dermacentor* 1種, *Haemaphysalis* 4種, *Ixodes* 3種, *Rhipicephalus* 2種などを記録した。その中タヌキマダニ *I. tanuki* が新記録, *I. siamensis* と *Rh. tetracornus* を新種として記載した。 *I. siamensis* はヤマトマダニ *I. ovatus* 唯一を含んでいた *Partipalpiger* 亜属の2番目の種である。 *Rh. tetracornus* は *Rattus nitidus* から得られた飽血若ダニから1♂, 1♀が脱皮し, 成ダニは顎体部の腹面後縁に, 背面の角状体に類似する顕著な突出部を有する。

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