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NEW BAT CHIGGERS FROM THAILAND AND THE SOLOMON ISLANDS WITH NOTES ON THE SUBGENUS *SASATROMBICULA* VERCAMMEN-GRANDJEAN (ACARINA: TROMBICULIDAE)[1]

By M. Nadchatram[2] and Carl J. Mitchell[3]

Abstract: *Trombicula* (*Sasatrombicula*) *siamensis* from the horseshoe bat, *Rhinolophus luctus*, collected at Doi Suthep, Thailand, and *T.* (*S.*) *keechongi* from the greater horseshoe bat(s), *Hipposideros diadema*, and *Hipposideros* sp., and the sheath-tailed bat(s), *Emballonura raffrayana*, and *Emballonura* sp., from the Solomon Islands are described and illustrated. The subgenus *Sasatrombicula* Vercammen-Grandjean, 1960, is redefined and, in addition to the two species listed above, is considered to contain the following species: *T.* (*S.*) *leveri* Womersley, 1952; *T.* (*S.*) *koomori* Sasa & Jameson, 1954; *T.* (*S.*) *cherrata* Taufflieb, 1960; *T.* (*S.*) *alicola* Domrow, 1961; *T.* (*S.*) *hexasternalae* Vercammen-Grandjean, 1963; and *T.* (*S.*) *kukongensis* Chen & Hsu, 1963.

The known importance of chiggers in the transmission of scrub-typhus, and the recent report of their occurrence on rodents of the epidemic area of Bolivian hemorrhagic fever (Yunker & Brennan 1964) emphasizes the need for a better understanding of the taxonomy of this group. Also, the potential importance of bats as reservoirs of disease transmissible to man makes an understanding of their parasite fauna highly desirable. It is with these objectives in mind that we are publishing the following descriptions of 2 new species of *Sasatrombicula* Vercammen-Grandjean, 1960, from bats collected in Thailand and the Solomon Islands. We have followed Cockrum (1962) in our usage of common names for the host bats.

It is with great pleasure that we acknowledge: Dr J. L. Gressitt and Dr N. Wilson of the Bishop Museum, and the Chief of the Entomology Section, SEATO Laboratory, Bangkok, Thailand, for making this interesting material available for study; the collectors Messrs T. C. Maa and K. Thonglongya; and Dr P. H. Vercammen-Grandjean and Mr Koong Yue Cheong for illustrating *T.* (*S.*) *siamensis* n. sp. and *T.* (*S.*) *keechongi* n. sp. Holotypes are deposited in the Bishop Museum, and paratypes are distributed insofar as available as follows: Institute for Medical Research, Malaysia; Bishop Museum; U. S. National Museum; British Museum (Nat. Hist.); G. W. Hooper Foundation, Univ. of Calif.; Rocky Mt. Laboratory, Hamilton, Montana; Inst. Acarology, Wooster, Ohio; Dr R. Traub, and the collections of the authors.

Subgenus **Sasatrombicula** Vercammen-Grandjean, 1960.

Type: *Trombicula koomori* Sasa & Jameson, 1954.

We propose the following definition for the subgenus *Sasatrombicula* based on Vercammen-Grandjean's original diagnosis (1960) and subsequent comments (1963). Trombiculine mites parasitic on bats with the characters of the genus *Trombicula;* having a quadrate to subquadrate scutum bearing simple punctae (never rugose or ornate); unexpanded sensillae with 8 or more well developed barbs; 2 pairs of well developed eyes; palpal formula B/B/---+5B; palpal claw slender, 3-pronged; galeal seta nude; chelicerae blade-like, of normal contour (never short and spear-like); legs 7 segmented. *Leg I:* with tarsala, subterminala, pretarsala, 2 tibialae; and 3(2) genualae. *Leg II:* with tarsala, pretarsala, 2 tibialae; 1 genuala. *Leg III:* with tibiala; and 2 (1) genualae. In addition to the 2 new species described in this paper, *Sasatrombicula* is considered to contain the following species (asterisks signify species assigned to this subgenus for the first time):

**T.* (*S.*) *leveri* Womersley, 1952. Host: *Emballonura* sp., and unidentified bat. Locality: Delciomo, Lakeba, Lau, Fiji; and Bukit Lagong, F. R., Kepong, Kuala Lumpur, Malaysia.

T. (*S.*) *koomori* Sasa and Jameson, 1954. Host: *Rhinolophus ferrumequinum.* Locality: near Ohara, Kyoto Prefecture, Japan. *Pipistrellus pipistrellus,* Kukong, Kwangtung Province, Mainland China (Chen & Hsu 1963). Note: This is the only species in the subgenus *Sasatrombicula* which has only 1 genuala III; all other species in this group have 2 genualae III.

T. (*S.*) *cherrata* Taufflieb, 1960. Host: *Rhinolophus*

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ferrumequinum. Locality: Cherrat forest between Casablanca and Rabat, Morocco.

**T. (S.) alicola* Domrow, 1961. Host: *Rhinolophus megaphyllus*. Locality: Bramston Beach, North Queensland, Australia.

T. (S.) hexasternalae Vercammen-Grandjean, 1963. Host: *Rhinolophus blasii blasii* and *R. hipposideros midas*. Locality: Grotte Pialeh, NW of Djalalabad; and Grotte Boulan, Qalat, Afghanistan.

**T. (S.) kukongensis* Chen and Hsu, 1963. Host: *Pipistrellus pipistrellus*. Locality: Kukong, Kwangtung Province, Mainland China.

Trombicula (Sasatrombicula) keechongi Nadchatram and Mitchell, n. sp. Figs. 1–10.

MATERIAL STUDIED: Holotype and 24 paratypes bearing the following collection data: Buka Agricultural Research Station, Solomon Is., 6–10.X.1959, ex *Hipposideros* sp. TMP 1471–81 (Greater Horseshoe Bat), T. C. Maa.

In addition 59 larvae as follows: 2 LARVAE, Buka, Solomon Is., 5.XII. 1959, ex unidentified sp. Sheath-tailed Bats TMP 1389–1490, Maa; 6 LARVAE, Pusisama, Vella Lavella, Solomon Is., 27–28.II.1963, ex *Emballonura* sp. BBM-SI 23218,–36,–38,–42 (Sheath-tailed Bat); 47 LARVAE, Nambusasa, S of Malangona, Choiseul, Solomon Is., 19.III.1963, ex *Hipposideros diadema* BBM-SI 23696, 23698–703 (Greater Horseshoe Bat); 4 LARVAE, Tomea, Fauro, Solomon Is., 8. IV. 1963, ex *Emballonura raffrayana* BBM-SI 23778, 23781–82 (Sheath-tailed Bat), R. Temple.

Diagnosis of larva: Palpal formula B/B/NbB+5B. Palpal claw 3 pronged. Galeal seta nude. *Scutum:* PW/SD=1.45; anterior margin markedly incurved on either side of AM seta; PL corners extended; DS 2.6.6.6.6(4).4.4(2).2=32–36. *Legs:* 3 genualae I; 2 genualae III.

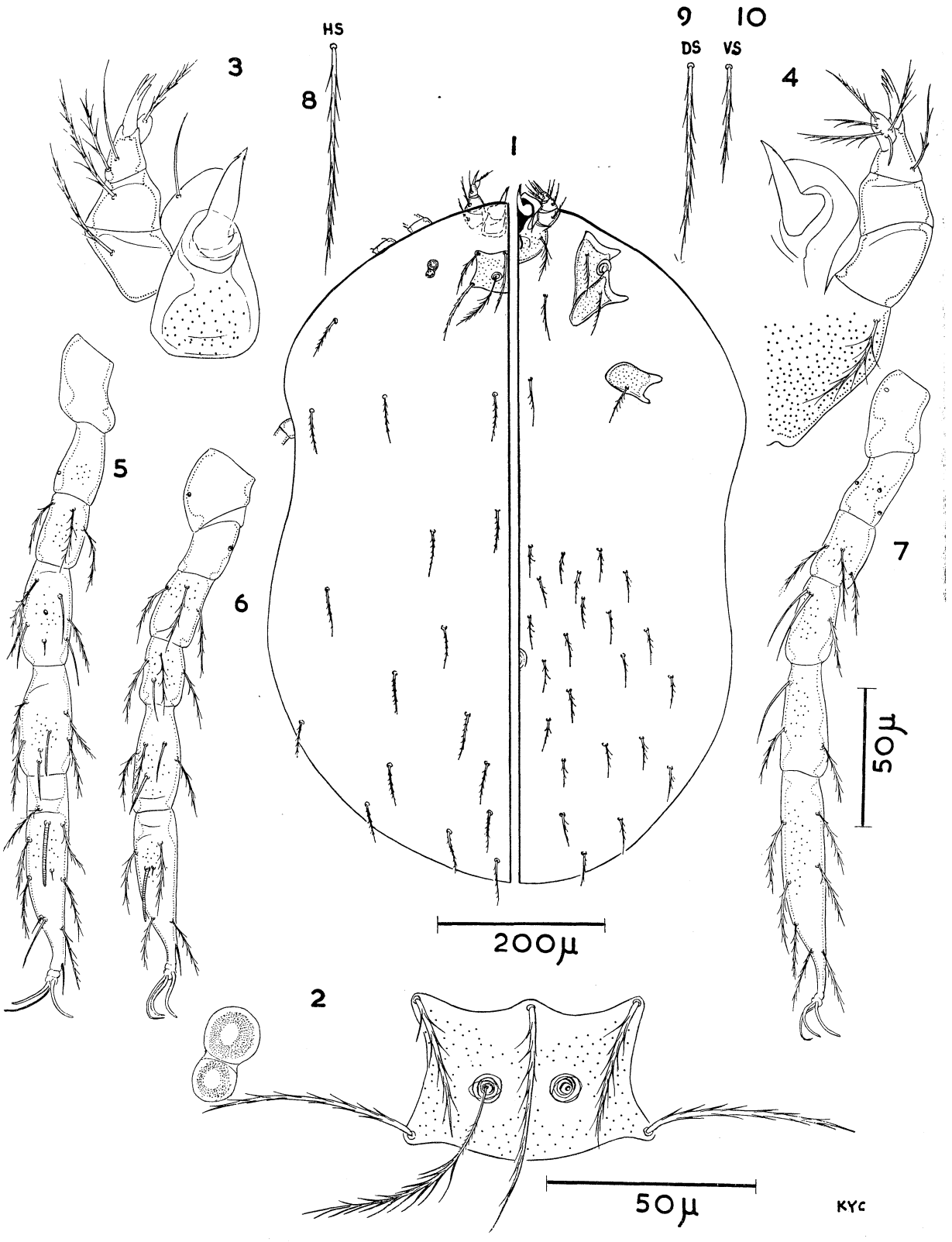
This species keys out to *T. leveri* in Womersley's (1952) key, but is readily separated by the shape and dimensions of the scutum and the number and arrangement of the dorsal setae. It is distinguished from *T. kukongensis* by having 3 genualae I, instead of 2, and by the shape of the scutum. It is distinguished from *T. alicola* by having a nude dorsotibial palpal seta, instead of barbed, and also by the shape of the scutum.

Description of larva: Engorged larva elongate; width of anterior margin of idiosoma slightly greater than posterior portion; larva large, 560×360μ. Eyes 2+2, on ocular plate; anterior eye distinctly larger and more oculate. *Gnathosoma:* Cheliceral base strongly sclerotized, thick-walled, and weakly punctate. Cheliceral blade 29μ long with prominent subapical, dorsal, and ventral teeth. Palpal femur angulate distally; palpal formula B/B/NbB+5B; seta on genu longest, 38μ; tarsus with stout dorsal seta and 4 slender ventral setae. Palpal claw slender; 3-pronged; axial prong 20μ long. Galeal seta nude. Minutely punctate coxa with a pair of setae bearing 8–10 long barbs. *Scutum* subquadrate with markedly biconcave anterior margin; lateral margins incurved; posterior margin convex; PL corners extended; punctae few, often indiscernable. Scutal setae with long barbs which are frequently broken to give nude appearance; PL> AM>AL; AL and PL setae situated in respective corners; SB round, without " eyebrow " ridges, and situated halfway between AL and PL setae. Sensillae strongly developed; distal 2/3 with 10–12 long barbs; short length of proximal portion of stem spiked or serrated.

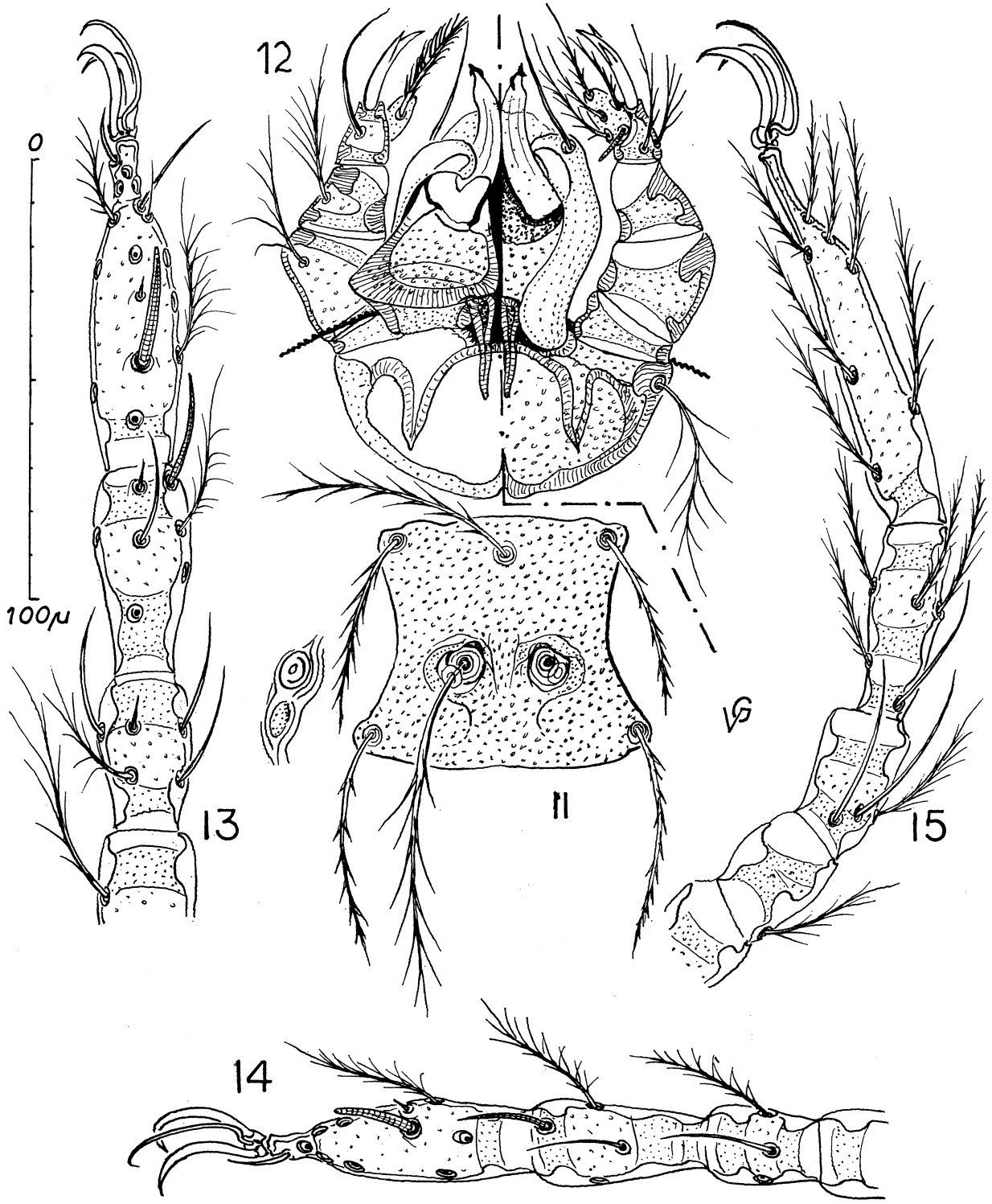
Body setae: HS 52–55μ; DS 48–52μ; VS 23μ; CS 32–34μ; DS 32–36 in number, arranged 2.6.6.6.6 (4).4.4(2.).2. and with numerous short barbs; 30–34 VS plus 10–12 caudal setae; sternal setae 2+2; anterior pair 36μ and slightly longer than posterior pair. *Legs:* 7 segmented; all segments long and strongly sclerotized; coxae I-III unisetose, minutely and sparsely punctate; coxal seta III anteriorly situated and 48μ long; claws flexed, of normal thickness; empodia long and slender. Measurements, type and number of sensory and barbed setae as follows. *Leg I:* Tarsus plus pretarsus 75–81μ; with slender tarsala 22μ long; microtarsala distal to tarsala; subterminala, parasubterminala, pretarsala, and 18–20 barbed setae. Genu with 3 genualae, microgenuala, and 4 barbed setae. Telofemur with 5 barbed setae; basifemur and trochanter with 1 barbed seta each. *Leg II:* Tarsus plus pretarsus 54–61×15μ; with blunt tarsala 18μ long; microtarsala immediately proximal to tarsala; pretarsala and 14–15 barbed setae. Tibia with 2 tibialae in tandem plus 6 barbed setae; genu with 1 tapering genuala plus 3 barbed setae; remaining segments with 4–2–1 barbed setae. *Leg III:* Tarsus plus pretarsus 75–81×15μ, with 14 barbed setae; tibia with one tibiala and 6 barbed setae; genu with 2 genualae and 2 barbed setae; remaining segments with 3–2–1 barbed setae.

Standard Measurements (in micra) of *T. keechongi* n. sp.

	AW	PW	SB	ASB	PSB	SD	AP	AM	AL	PL	Sens.
Holotype	52	57	18	23	18	41	33	50	36	61	64
Mean of 8	53	58	19	24	17	41	33	50	39	59	62
Range	52–54	55–58	17–20	21–25	16–18	37–43	29–33	48–53	36–40	58–61	61–64



Figs. 1–10. *Trombicula* (*Sasatrombicula*) *keechongi* n. sp. 1, dorsal and ventral aspects of idiosoma; 2, scutum and eyes; 3, 4, dorsal and ventral aspects of gnathosoma; 5–7, legs I, II and III; 8–10, humeral, dorsal and ventral setae.



Figs. 11–15. *Trombicula* (*Sasatrombicula*) *siamensis* n. sp. 11, scutum and eyes; 12, dorsal and ventral aspects of gnathosoma; 13–15, legs I, II and III.

Standard Measurements (in micra) of *T. siamensis* n. sp.

	AW	PW	SB	ASB	PSB	SD	AP	AM	AL	PL	Sens.
Holotype	48	59	19	33	24	57	40	58	45	58	78
Mean of 5	50	61	19	34	23	57	42	56	44	58	—
Range	47–54	59–64	19–20	33–34	22–24	55–58	40–45	55–58	40–45	56–58	—

This species is named for Mr Lim Kee Chong, Hooper Foundation, I.M.R., Kuala Lumpur, Malaysia, in recognition of his enthusiastic performance of routine laboratory duties during the past 3 years.

Trombicula (Sasatrombicula) siamensis Nadchatram and Mitchell, n. sp. Figs. 11–15.

MATERIAL STUDIED: Holotype and 4 paratypes bearing the following collection data: Doi Suthep, Thailand, 10.IV.1962, ex *Rhinolophus luctus* SMRL 740 (Horseshoe Bat), K. Thonglongya.

Diagnosis of larva: Palpal formula B/B/NBB+5B; palpal claw 3 pronged; galeal seta nude; scutum quadrate; PW/SD=1.0; anterior margin sinuate; P-PL distance short; 30–32 DS arranged 2.6.6.6.4 (6).4.2.; readily distinguishable from *T.* (*S.*) *keechongi* by scutal shape, particularly by the PW/SD ratio, and A-P distance.

Description of larva: Fed larva large, ranging to 700×500μ; cordiform to broadly elongate idiosoma; color in life pallid to yellow; eyes 2+2, small but prominent and situated roughly at a level between AL and PL bases. *Gnathosoma:* Heavily sclerotized and prominently displayed; chelicerae of normal contour with pointed, dorsal tooth and blunt, lobe-like, ventral tooth; palp slender, with femur distinctly angulate distally; long genual and femoral setae bearing several long barbs; dorsotibial seta nude; dorsolateral and ventrotibial setae short, with long barbs; dorsotarsal seta stout and brush-like; 4 ventral setae slender, hence, palpal tarsal formula B/B/NBB+5B; palpal claw slender, 3-pronged; axial prong 23μ long; galeal seta nude; palpal coxae minutely punctate bearing a pair of pectinate setae. *Scutum:* Trapezoidal; anterior margin sinuate; lateral margins incurved; posterior margin convex; punctae small, numerous, and evenly distributed; diameter of sensillary bases approximately equal to distance between bases, and placed nearer to posterior than to anterior margin of scutum; sensillae long, midstem thicker than proximal and distal portions and bearing long, tapering barbs; scutal setae slender and distinctly ciliated; AM and PL setae subequal; AL setae shortest.

Body setae: HS 60μ; DS 55μ; VS 28μ; CS 36μ; DS 30–32 in number, slender and distinctly ciliated, arranged 2.6.6.6.4(6).4.2.; 18 VS plus 18–20 caudal setae; sternal setae 2+2; posterior pair 32μ and slightly longer than slender anterior pair. *Legs:* 7-segmented; all segments long and strongly sclerotized; number and type of barbed and sensory setae as described for *T.* (*S.*) *keechongi.* Measurements as follows. *Leg I:* tarsus plus pretarsus 86×20μ; tarsala 30μ long. *Leg II:* tarsus plus pretarsus 68×20μ; tarsala 18μ long. *Leg III:* tarsus plus pretarsus 92×18μ; coxa 64×30μ.

The species name *siamensis* is derived from the word Siam, a former name for Thailand, and refers to the locality from which the material was collected.

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