

**THE GENUS *SCHOENGASTIELLA* HIRST  
(ACARI: TROMBICULIDAE), WITH DESCRIPTIONS OF  
FIVE NEW SPECIES FROM NEPAL**

**M. Nadchatram and Stan Fernandes**

*ABSTRACT.* - *Schoengastiella* Hirst, 1915 is here treated as a full genus. Five new species are described and new records for three others, all from Nepal, are also given. The new species and hosts are *S. angusta* ex *Rattus rattus brunneus*; *S. absonata* ex *R. fulvescens*; *S. unisternala* and *S. murphyi*, both ex *R. r. brunneusculus*. The new records are *S. ligula* Radford, 1946; *S. punctata* Radford, 1946 and *S. gammonsi* (Traub & Evans, 1954).

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**INTRODUCTION**

The Nepal Health Survey of 1965-1966, a joint project of His Majesty's Government of Nepal; University of Hawaii, Honolulu; Thomas A. Dooley Foundation, San Francisco; and the Bernice P. Bishop Museum, Honolulu, was launched to determine the most important health problems of Nepal with a view to assist in comprehensive health planning. As part of this extensive programme, small mammals and their ectoparasites were collected in various regions and habitats of Nepal for the investigation of viral and rickettsial infections. A comprehensive report of the health survey is given by Worth & Shah (1969).

Nadchatram (1970) reported on the chiggers of the genus *Leptotrombidium* collected during this survey. Also, Nadchatram & Traub (1971) reviewed the trombiculid mites of the genus *Helenicula* of the Old World which included material obtained during this survey. The Nepal survey has yielded much needed data on the geographic distribution of trombiculids. This paper records eight *Schoengastiella* species, five of which are new and described here. New host and locality data are given for the three known species - *S. ligula* Radford, 1946; *S. punctata* Radford, 1946 and *S. gammonsi* (Traub & Evans, 1954).

The genus *Schoengastiella* was erected by Hirst (1915) to accommodate an Indian species, *S. bengalensis* collected from *Rattus rattus* in Calcutta. However, the status of this taxon has remained a controversial issue for a long time. Many prominent workers have regarded *Schoengastiella* as only a subgenus of *Gahrlepiea* Oudemans, 1912. Among the notable authorities were Audy (1954), Chen & Hsu (1955), Kulkarni (1973), Srivastva & Wautal (1973), Taufflieb (1964), Traub & Evans (1954), Womersley (1952) and Womersley & Heaslip (1943). Among those authorities who maintained *Schoengastiella* as a full genus were Abdussalam (1939), Fuller (1952), Kolebinova (1984), Kolebinova &

## New species of *Schoengastiella*

Vercammen-Grandjean (1978), Radford (1946), Vercammen-Grandjean (1974), Wharton (1952) and Wang & Gu (1983). Those of the first school of thought, especially Audy and Womersley, maintained that the nymphs of *Gahrlipeia*, *Schoengastiella* and *Walchia* Ewing, 1939 were very similar. Their observations were confirmed by the senior author following preliminary studies made of correlated nymphs of Malaysian Gahrlipeini. Though this work was unpublished, in essence the nymphs of all three genera have in common a similarly shaped scutum and a subapical blunt spur or papilla on the tarsus of leg I. For this reason, the senior author retained *Schoengastiella* as a subgenus of *Gahrlipeia* (Nadchatram, 1979a; Nadchatram & Dohany, 1974) in unison with his peers.

Factually, a rational classification of an organism must be based on the morphological characters of all its life stages. Mainly for this reason, Nadchatram (1979b) suggested the exercise of caution in creating new genera. He suspected that some genera, and indeed, many described species, were of doubtful status. It was felt that stability in chigger taxonomy would be preserved if a proposal to create a new genus takes into account the morphology of both larval and a post-larval stage (eg. nymph) within a species group. However, such a scheme is impractical due to the nature of the life style of the larval and post-larval stages, the former being an obligatory parasite, the nymphs and adults being free-living predators. Vercammen-Grandjean's earlier proposal (1969) for the recognition of the larval stage alone as the basis for chigger taxonomy seems to be popularly used for practical reasons. The vigour and thoroughness of his proposal, whether well founded or not, seems the only logical solution to the problem for years to come. Because of the ease with which the parasitic larvae are obtained, over 2500 species are known at the present time. In contrast, less than 20% of the post-larval stages of these species have been reported, because of the difficulty in collecting the free-living soil and nest inhabitants.

Our decision to recognise *Gahrlipeia*, *Schoengastiella* and *Walchia* as full genera was arrived at in consideration of the fact that the nymphal characters common to these three genera are also shared by the nymphs of several species of *Schoutedenichia*, a schoengastiine genus (Vercammen-Grandjean, 1958). Furthermore, the known nymphs of a few *Doloesia* species have in common with gahrlipeines, a shortened anterior cristal rod in relation to the distance between sensillary bases (Audy & Nadchatram, 1957).

However, the subapical blunt spur on the tarsus of leg I is absent in *Doloesia*. All facts considered, and to maintain a certain consistency among chigger taxonomists, we are in agreement with Vercammen-Grandjean's proposal to use larval morphology as the anchor of repository for the systematic classification of the family Trombiculidae.

It is the considered opinion of the senior author that the primary taxonomic basis for the separation of larval genera is the dorsal scutum - the palpal tarsal formula (PTF) and leg chaetotaxy contributing a secondary role. The scuta of *Gahrlipeia*, *Schoengastiella* and *Walchia* are distinctive and easily characterised in the larvae, although the PTF and leg chaetotaxy are mostly similar in all three genera. For these reasons, *Schoengastiella* is treated as a genus of the tribe Gahrlipeini in this paper, in keeping with the current trends in larval trombiculid taxonomy.

From an ecological viewpoint, it is noteworthy that studies made in Peninsular Malaysia and Singapore have shown that these three genera share a similar ecological niche which is also occupied by *Schoutedenichia trisetosa* Upham & Nadchatram, 1968. The unengorged pre-parasitic larvae were found to be nidicolous in ground burrows of small mammalian hosts, and were always pallid or pale yellow in colour.

The genus *Schoengastiella* comprises approximately 50 species, including the new species described here. They occur in the Oriental, Palaearctic and Ethiopian Regions. Most of the species recorded are from Africa and the Indian subcontinent. The genus has not been recorded in the Australian Region or the New World.

The holotype and one paratype will be deposited in the British Museum (Natural History), London. Other paratypes will be deposited, insofar as available, in the following institutions - Acarology Laboratory, Department of Entomology, University of Hawaii, Honolulu; Zoological Reference Collection, Department of Zoology, National University of Singapore; National Institute of Virology, Pune, India; Acarology Laboratory, University of Ohio, Columbus; Institute for Medical Research, Kuala Lumpur, Malaysia; and in the collections of the authors.

Terminology follows Nadchatram & Dohany (1974). In addition, some standard abbreviations are used: PPW = distance between usurped setae, PP = distance from level of usurped setae to posterior margin of scutum, APP = distance between bases of anterolateral setae and the bases of usurped setae. All measurements are in micrometers.

**TAXONOMY**  
**FAMILY TROMBICULIDAE**  
**GENUS *SCHOENGASTIELLA* HIRST, 1915**

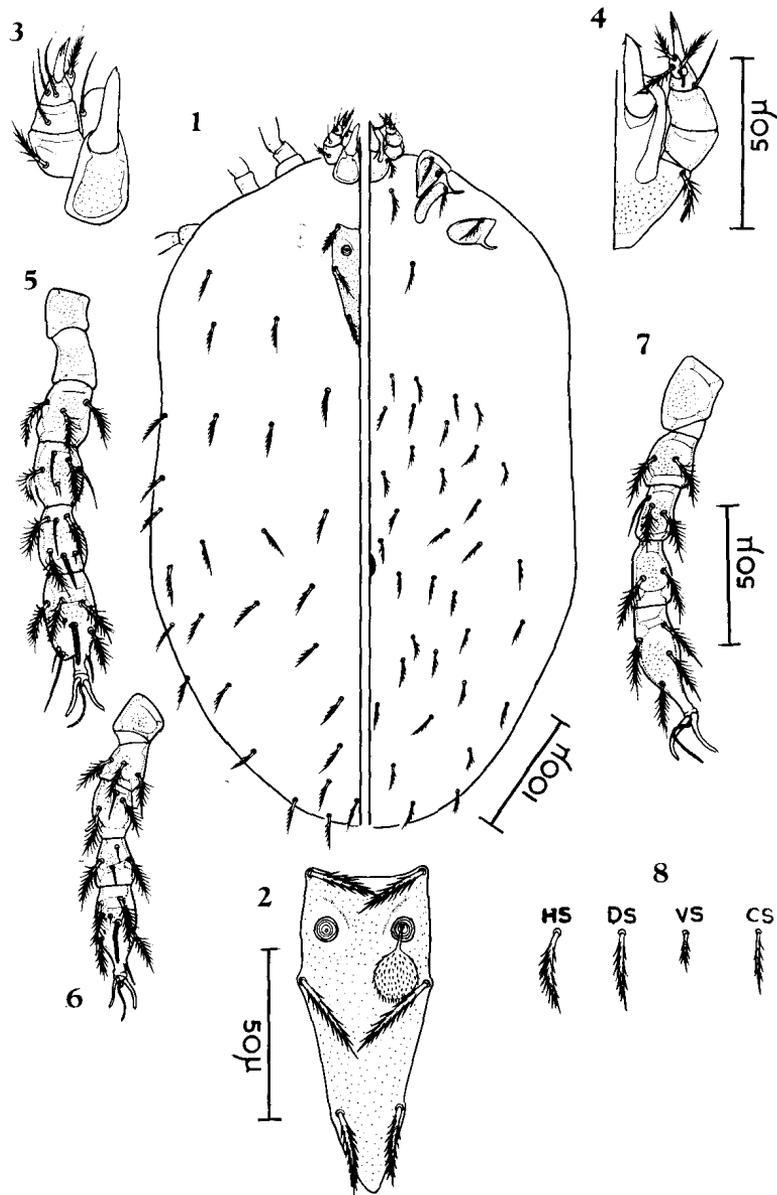
*Schoengastiella angusta*, new species  
(Figs. 1-8)

*Diagnosis.* - Palpal formula B/N/NNN/4B. Gnathobase very sparsely punctate; claw 3-pronged. Galeal seta nude. Scutum narrowly elongate with acute posterior margin. Sensilla globose with short slender stem. Coxala II shortest. Legs short, IP 458-475. *Schoengastiella angusta* is outstanding in having a very narrow scutum. In the nature of the scutal and dorsal setae, globose sensilla and small dimensions of the scutum, this new species is comparable to *S. ceylonica* (Wormersley, 1952). *Schoengastiella angusta* however, differs in having a more elongate scutum, wider PPW (20 not nine), and the coxa III unisetose, not with four to five setae as in *S. ceylonica*.

*Material.* - Holotype (BBM-NP 30318/13) ex *Rattus rattus brunneus*, Nepal, Dunche, 1950 m asl, 28 km northeast of Trisuli, 10.xi.1965. 17 paratypes as follows - 3 with same data as holotype; 5 ex 2 different individuals of *R. r. brunneus*, same locality as holotype, 7, 11.xi.1965; 2 ex *R. r. tistae*, same locality as holotype, 9.xi.1965; 5 ex *R. r. brunneus-culus*, Syabrudens, 1450 m, 35 km northeast of Trisuli, 5, 9.xi.1965; 2 ex *R. fulvescens*, Bokaikunde, 1900 m, 23 km northeast of Trisuli. All specimens collected by L. W. Quate, formerly of the Bernice P. Bishop Museum, Honolulu. Larvae recovered from ear lobes.

*Description.* - Colour of live specimens pallid to pale yellow. Body broadly oval with medial idiosomal constriction clearly defined; fully engorged specimen 720-856 x 468-539. *Eyes* - 2+2, inserted approximately in line with AL setae; anterior pair of eyes oculate, posterior pair smaller, weakly defined. *Gnathosome*-moderate size, prominently displayed; bases of chelicerae strongly sclerotised with approximately 20 punctae, sparsely distributed; each base 32 X 29; cheliceral blade 22-23 long, with prominent closely appressed ventral tooth and pointed dorsal subapical tooth; palpal formula B/N/NNN/4B; seta on femur strongly barbed; genual seta and dorso-tibial seta nude and slender (ca. 20 long); palpal claw slender (ca. 14 long), 3-pronged; galcal seta nude, as long as genual

New species of *Schoengastiella*



Figs. 1-8. *Schoengastiella angusta*, new species. Larva. 1, dorsal and ventral aspects of idiosome; 2, scutum; 3, 4, dorsal and ventral aspects of gnathosome; 5-7, Legs I-III; 8, humeral, dorsal, ventral and caudal setae.

## M. Nadchatram and S. Fernandes

seta. *Scutum* - long, narrow (SD 92), widest at level of PL (36); anterior margin shallowly concave, lateral margin almost straight between AL and PL setae, narrowing behind PL setae so that width of scutum at level of usurped setae reduced to 27; distance between usurped setae and posterior margin (PP) 25-32, apex acutely curved as figured; scutal punctae moderate in number, evenly distributed; SB 20-23, sensilla globose, densely covered with minute pointed barbs, basal stem slender, short (6-8); scutal setae strongly bipectinate; AL shortest, PL and P-PL setae subequal in length; scutal measurements of holotype, mean of 10 (holotype and 9 paratypes) and ranges as follow: AW 32 (31, 29-33); PW 34 (33, 32-36); PPW 20 (18, 16-22); SB 23 (22, 20-23); ASB 16 (17, 16-18); PSB 74 (76, 73-81); PP 32 (29, 25-32); SD 90 (93, 89-97); AP 30 (31, 29-33); APP 64 (64, 59-68); AL 20 (18, 17-20); PL 29 (30, 28-31); PPL 27 (27, 25-30); sensilla 18-22 (14 x 14).

*Body setae* - dorsal setae strongly bipectinate, similar to scutal setae. Whilst total number of DS varies only slightly (46-52), much variation observed in number of setae in each row; due mainly to the difference in the degree of engorgement of the specimens studied; in the holotype, DS arranged 2.4.8.4.8.8.6.4.4.2. = 50; number of DS in first 5 rows of all specimens examined showed constant pattern, i.e. 2.4.8.4.8....., ventral setae 42-46, caudal setae 20-22 in number; VS and CS pectinate; HS 19-23; DS 27-28; VS 12-15; CS 19-21 long; sternal setae 2 pairs, anterior pair 27, posterior pair 20-21 long.

*Legs* - 7-6-6 segmented, segments short; coxae sparsely punctate, all coxae unisetose, coxala III longest (36-37), coxala II shortest (20-23); IP 458-475; ordinary setae short, pectinate or bipectinate; terminal claws slender, empodia longer than claws; measurements of legs, type and number of sensory and ordinary setae as follows: *Leg I* - 165-176 long, tarsus 36-38 x 15-17; tarsala slender, blunt, 19 long in remounted holotype, length varies from 14-15 in 3 older specimens (probably due to contraction); microtarsala beside base of tarsala, with a subterminala, a nude parasubterminala, a pretarsala and ca. 22 ordinary setae; tibia with 2 tibialae in tandem, distal tibiala though slender, of similar texture as tarsala; microtibiala inserted beside base of distal tibiala and 8 additional ordinary setae; genu with 2 proximal tapering genualae and a distal microgenuala plus 4 ordinary setae; remaining segments with 5, 1, 1 ordinary setae. *Leg II* - 138-141 long; tarsus 36-38 x 15-17; tarsala 16 long (in older specimens 13-14), slightly thinner than tarsala I; microtarsala inserted immediately behind base of tarsala; a pretarsala and 14 ordinary setae; tibia with 2 tibialae in tandem and 6 ordinary setae; genu with single tapering genuala and 3 ordinary setae; remaining 2 segments with 6, 1 ordinary setae. *Leg III* - 155-166 long; coxa 36-43 x 23-24; tarsus 40-41 x 14-15, with 13-14 ordinary setae; tibia with 6 ordinary setae, tibiala absent; genu with single genuala and 3 ordinary setae; femur with 5 ordinary setae, one which is short, almost nude, inserted on inner lateral margin of segment; trochanter with single ordinary seta.

*Etymology.* - The species name is derived from the Latin, and draws attention to the narrow elongate scutum which is very distinctive for the taxon.

### *Schoengastiella absonata*, new species

(Figs. 9-16)

*Diagnosis.* - This species is very closely related to *S. angusta*, new species, in having a slightly narrow scutum and in the similarity of their palpal formulae, i.e. B/N/NNN/4B.

## New species of *Schoengastiella*

These two species however, are readily separable by virtue of other characters as tabulated below:

	<i>S. absonata</i>	<i>S. angusta</i>
Coxa III	trisetose 50-56 x 31-34	unisetose 36-43 x 23-24
IP	583-600	458-475
AW/PW	39/49	31/33
DS	2.6.8.... = 50-54	2.4.8.... = 46-52
VS+DS	82-100 in number	62-68 in number
Tarsus III	48-61 x 15-18	40-41 x 14-15

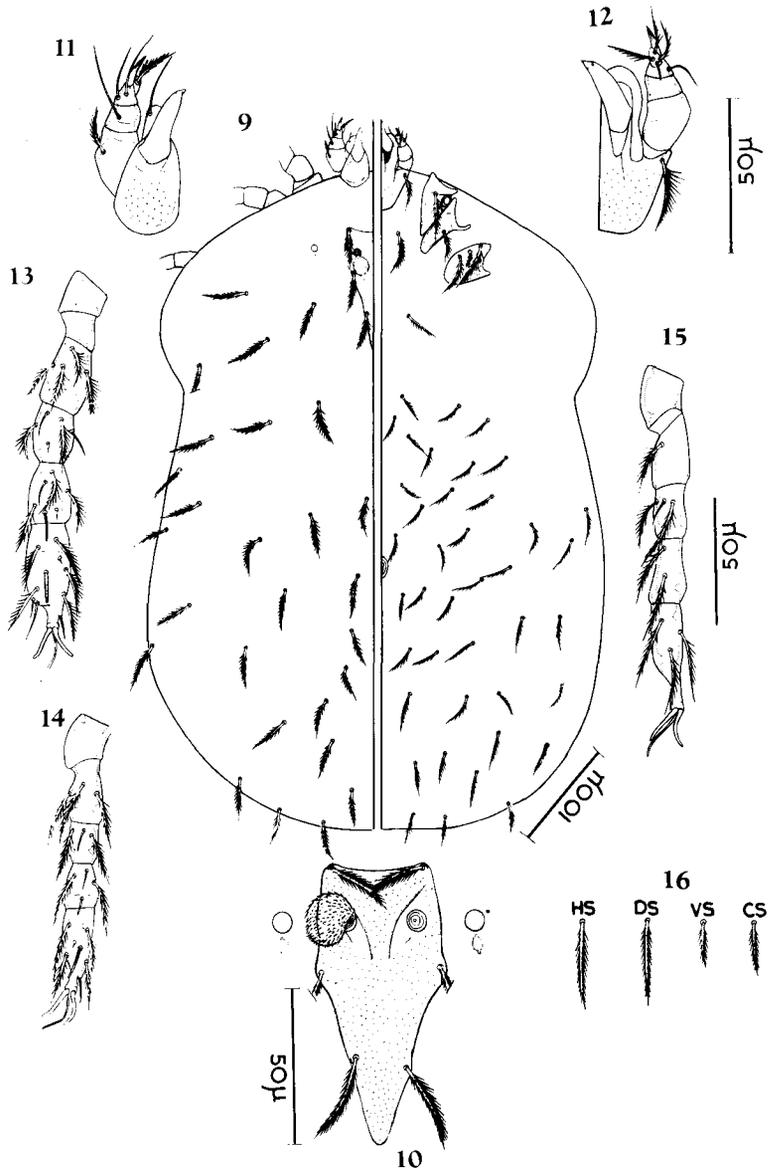
*Material.* - Holotype (BBM-NP 30347-49/39) ex *Rattus fulvescens*, Nepal, Bokai-kunde, 1900 m asl, 23 km northeast of Trisuli, 14.xi.1965. 9 paratypes as follows — 6 ex 3 individuals of *R. fulvescens*, same locality as holotype, 15-16.zi.1965; 1 ex *R. nitidus*, same locality as holotype; 1 ex *R. r. tistae*, same locality as holotype, 13.xi.1965; 1 ex *R. r. brunneus*, Pokhara, 910 m, 19.ix.1965. All specimens collected by L. W. Quate, formerly of the Bernice P. Bishop Museum, Honolulu. Larvae recovered from ear lobes.

*Description.* - Colour in life pallid or light yellow. Idiosome of partially engorged larva 350 x 280; fully engorged larva 550 x 380. *Eyes* - 2+2 as in preceding species but weak. *Gnathosome* - cheliceral base with many more punctae than preceding species. *Scutum* - differs in overall dimensions from preceding species, being larger; scutal measurements of holotype, mean of 6 (holotype and 5 paratypes) and ranges as follow: AW 41 (39, 37-41); PW 45 (49, 45-53); PPW 19 (22, 19-24); SB 30 (31, 30-33); ASB 18 (19, 18-22); PSB 92 (96, 90-104); PP 34 (31, 29-36); SD 110 (115, 108-123); AP 29 (35, 29-38); APP 73 (76, 72-81); AL 29 (30, 27-32); PL 38 (38, 36-41); PPL 38 (35, 32-38); sensilla 27-31 (20-23 x 15-17).

*Body setae* - similar in texture to preceding species, but varies in number of DS, VS and CS; measurements as follows: HS 31-38, DS 32-36, VS 18-23, CS 23-24; sternal setae 2 pairs, anterior pair 32, posterior pair 25 long. *Legs* - as in preceding species except for differences under *Remarks*. Measurements as follows: IP 583-600. *Leg I* - 202-204 long, tarsus 46-50 x 18-23. *Leg II* - 175-182 long; tarsus 36-50 x 18-19. *Leg III* - 206-215 long; Coxa 50-56 x 31-34; tarsus 48-61 x 15-18.

*Etymology and remarks.* - The species name is derived from the Latin meaning "inharmonious", to denote the variations in this and, indeed, the preceding species, especially in the variable number of coxal setae III, idiosomal setae and dimensions of the scutum.

In the preliminary stages of this study, it was suspected that three species were represented on the basis of the number of setae on coxa III, i.e. unisetose, bisetose or trisetose. A total of 15 specimens were bisetose, but were similar to *S. angusta* in other respects. Also ascribed to *S. angusta* were three specimens that had a single seta on one leg and two on the other. Variation was also observed in the series ascribed to *S. absonata*. In two of the specimens, the coxal setation was two and three on the each individual.



Figs. 9-16. *Schoengastiella absonata*, new species. Larva. 9, dorsal and ventral aspects of idiosome; 10, scutum and eyes; 11, 12, dorsal and ventral aspects of gnathosome; 13-15, Legs I-III; 16, humeral, dorsal, ventral and caudal setae.

## New species of *Schoengastiella*

### *Schoengastiella goffi*, new species

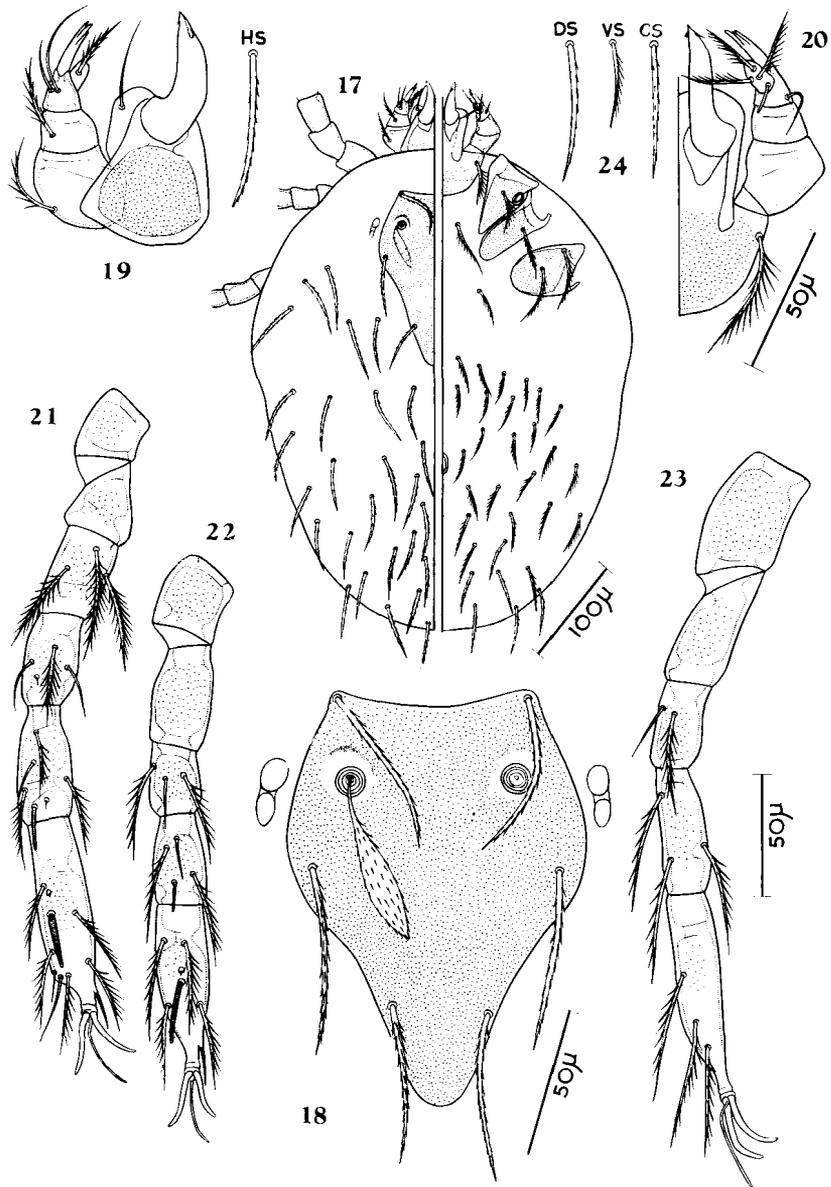
(Figs. 17-24)

*Diagnosis.* - Palpal formula B/B/NNN/4B; claw 3-pronged. Galeal seta nude. Scutum subpentagonal with U-shaped posterior margin, broadest at level of PL setae, markedly narrowing posteriorly; PW 86, SD 143. Sensilla narrowly clavate and pointed at apex, as figured. Coxa III bisetose. Legs long, IP 907-958. DS 44-48 and VS+CS 60-74 in number. *Schoengastiella goffi* is comparable to *S. liota* (Traub & Evans, 1953) and *S. punctata* Radford, 1946 in having a bisetose coxa III and in the general shape of scutum. However, the new species is readily separable on the basis of palpal formula, higher scutal dimensions, and the number and arrangement of dorsal and ventral setae.

*Material.* - Holotype (BBM-NP 30350-52/44) ex *Rattus nitidus*, Nepal, Bokaikunde, 1900 m asl, 23 km northeast of Trisuli, 15.xi.1965. 16 paratypes as follows - 10 with same data as holotype; 2 ex *R. nitidus*, same locality as holotype, 16.xi.1965; 1 ex *R. nitidus*, Pokhara, 910 m, 20.ix.1965; 2 ex *R. r. brunneus*, same locality as holotype, 14.xi.1965; 1 ex *R. r. tistae*, Dunche, 1950 m, 28 km northeast of Trisuli, 9.xi.1965. All specimens collected by L. W. Quate, formerly of the Bernice P. Bishop Museum, Honolulu. Larvae recovered from ear lobes.

*Description.* - Colour in life pale yellow. Idiosome of fully engorged larva broadly ovoid, 610 x 520; unengorged larva 270 x 190, without medial constriction of idiosome. *Eyes* - 2+2, inserted midway between AL and PL setae; posterior pair elongate, reduced; both eyes not easily discernible in old mounts. *Gnathosome* - normal contour, moderately sclerotised; gnathobase densely punctate; cheliceral base 40-50 x 35-45, as densely punctate as gnathobase; proximal region of cheliceral base broad, sharply angulate in some specimens; cheliceral blade 40-45 long, with fairly long ventral tooth and a pointed subapical dorsal tooth; palpal formula B/B/NNN/4B; femoral and genual setae well developed, bearing 5 or more distinct barbs; claw 3-pronged, accessory prongs unequal; galeal seta nude, tapering. *Scutum* - subpentagonal, anterior margin shallowly concave; lateral margins between ALs and PLs flaring outwards, reaching widest point (95) at level of PLs, then narrowing noticeably behind PLs so that the margins at the level of PPL less than half that at widest width; caudal margin U-shaped behind PPL, depth (PP) 25-32. Scutal punctae dense, uniformly distributed over entire scutum; SB wide apart (55-60), slightly nearer to line of AL than to line of PLs; sensilla narrowly clavate with expanded portion 41-45 x 11-12; apex pointed; sensillary barbs long, thin, not thickened at base; scutal setae slender with short ciliae; PL and PPL setae somewhat submarginal; scutal measurements of holotype, mean of 9 (holotype and 8 paratypes) and ranges as follow: AW 65 (60, 56-65); PW 79 (86, 79-92); PPW 29 (29, 24-32); SB 59 (58, 55-60); ASB 27 (29, 27-32); PSB 104 (114, 104-126); PP 32 (30, 25-32); SD 131 (143, 131-156); AP 56 (58, 54-61); APP 99 (111, 99-123); AL 57 (54, 50-59); PL 60 (58, 55-60); PPL 52 (54, 52-57); sensilla 51-56 (41-45 x 11-12).

*Body setae* - dorsal setae slender, weakly bipectinate; DS 44-48 in number, somewhat irregularly arranged; examples of 2 arrangements are: 6(4).2(4).8.8.8.6.4.2.2(0), 4.4.8.4.8.8.6.4.2; ventral setae number 42-50 plus 18-22 caudal setae, number in each row poorly defined; ventral setae pectinate and caudal setae similar to DS in texture; HS 52-60, DS 50-54, VS 25-35, CS 41-45 long; sternal setae 2 pairs, anterior setae 48, posterior setae 34 long. *Legs* - With the exception of coxae III being bisetose, number of sensory and ordinary setae similar to *S. angusta*, though ordinary setae long, more developed than



Figs. 17-24. *Schoengastiella goffi*, new species. Larva. 17, dorsal and ventral aspects of idiosome; 18, scutum and eyes; 19, 20, dorsal and ventral aspects of gnathosome; 21-23, Legs I-III; 24, humeral, dorsal, ventral and caudal setae.

## New species of *Schoengastiella*

preceding species; all coxae densely punctate, coxala I and III subequal (48-57); coxala II 38-45; IP 907-958. *Leg I* - 306-325 long, tarsus 77-81 x 24-29; tarsala 23-24 long; micro-tarsala proximal to tarsala, approximately 9 apart. *Leg II* - 264-281 long; tarsus 63-66 x 23-24; tarsala slender, 19-22 long; microtarsala immediately proximal to base of tarsala. *Leg III* - 337-354 long; coxa 77-83 x 43-50; tarsus 84-86 x 19-21.

*Etymology.* - This species is warmly dedicated to Dr. M. Lee Goff, Department of Entomology, University of Hawaii, Honolulu, in recognition of his numerous contributions to acarology in the Pacific Region.

### *Schoengastiella unisternala*, new species

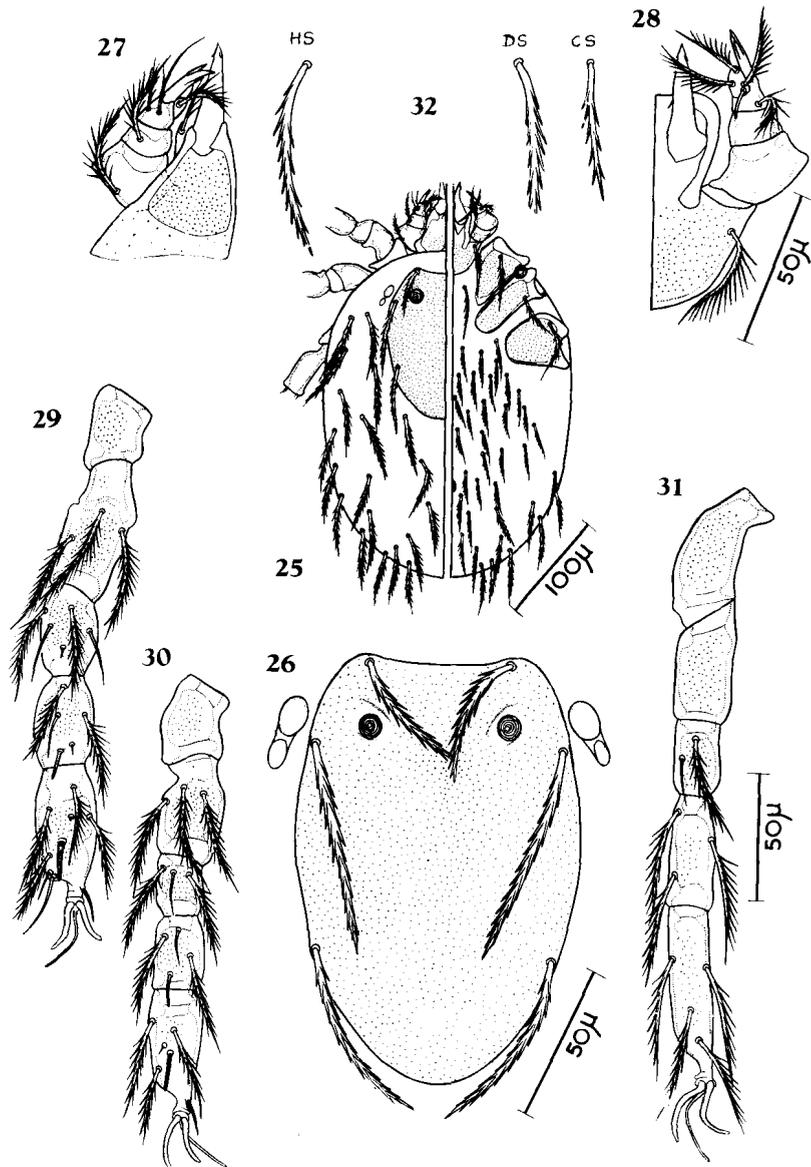
(Figs. 25-32)

*Diagnosis.* - Palpal formula B/B/BbB/4B; claw 3-pronged. Galeal seta with 1-4 barbs. Scutum broadly tongue-shaped. Eyes 2+2, PW 77, SD 130. DS 40, VS+CS 70-80 in number. Only one pair of sternal setae. Coxae I-III unisetose. IP 745-820. In the shape of scutum, *S. unisternala* is closest to *S. erula* (Traub & Evans, 1953). It is readily separable in having a single pair of sternal setae and strongly barbed palpal setae.

*Material.* - Holotype (BBM-NP 30512/27) ex *Rattus rattus brunneusculus*, Nepal, Ilam District, Sakhejung, 1300 m asl, 12.xii.1965. 13 paratypes as follows - 12 with same data as holotype — 1 ex *R. ? nitidus* (BBM-NP 30086), Pokhara, 910 m, 24.ix.1965. All specimens collected by L. W. Quate, formerly of the Bernice P. Bishop Museum, Honolulu and M. Nadchatram. Larvae recovered from ear lobe.

*Description.* - Colour in life pale yellow. Idiosome of partially engorged larva oval 275 x 240, fully engorged larva 460 x 350 without medial idiosomal constriction. *Eyes* - 2+2, prominent, anterior pair bigger, conspicuous even in old mounted specimens. *Gnathosome* - gnathobase minutely punctate, punctae uniformly distributed; cheliceral base laterally salient, basal portion seen as transparent flap, ca. 42 x 35; punctae numerous, not as dense as in gnathobase; cheliceral blade 39-42 long, with long appressed ventral tooth and a short pointed dorsal subapical tooth; palpal femur angulate, notched; palpal formula B/B/BbB/4B, all setae well developed, strongly barbed, though in few specimens barbs not well displayed; claw slender, 3-pronged; galeal seta with 1-4 barbs. *Scutum* - broadly tongue-shaped, widest at midpoint between PL and PPL (80-95); margins of scutum almost smooth, not sinuate; margins between AL and PLs rounded; ALs inserted in vertical line with SB; punctae minute, dense and uniformly distributed; sensilla missing in all extant specimens; scutal measurements of holotype, mean of 10 (holotype and 9 paratypes) and ranges: AW 44 (43, 37-47); PW 80 (77, 62-81); PPW 77 (75, 60-86); SB 47 (44, 38-47); ASB 21 (21, 19-23); PSB 107 (108, 99-117); PP 40 (37, 35-47); SD 128 (130, 118-140); AP 30 (29, 27-32); APP 86 (89, 83-95); AL 47 (44, 42-47); PL 61 (62, 54-68); PPL 59 (56, 54-59); sensilla missing.

*Body setae* - very strongly ciliated; DS 40-42 in number, arranged 4.4(2.2).2.6.6.6.6.4.2; though arrangement somewhat irregular, anterior-most row constantly has two pairs (humeral setae), a pair on each side of scutum; rows of ventral setae poorly defined, total 48-54 in number plus 22-26 caudal setae; only one pair of sternal setae, located between coxae I, 45-46 long, anterior VS measure 24-27; length of HS 57-63, DS 54-58, VS 24-27, CS 37-40. *Legs* - moderately long, IP 745-820. Coxa III with anterolateral margin



Figs. 25-32. *Schoengastiella unisternala*, new species. Larva. 25, dorsal and ventral aspects of idiosome; 26, scutum and eyes; 27, 28, dorsal and ventral aspects of gnathosome; 29-31, Legs I-III; 32, humeral, dorsal and caudal setae.

## New species of *Schoengastiella*

rounded, not angulate; coxala III longest (58), coxala I and II subequal (43-45); ordinary setae of legs well developed, pectinate to bipectinate, number of ordinary and sensory setae as given for *S. angusta* new species. *Leg I* - 250-270 long; tarsus 57-63 x 23-25; tarsala 16 long, blunt; microtarsala proximal to base of tarsala, 12 to 14 apart. *Leg II* - 220-250 long; tarsus 48-50 x 22; tarsala 14 long; microtarsala only slightly proximal to tarsala. *Leg III* - 275-300 long; coxa 75-80 x 45-50; tarsus 66-68 x 16.

*Etymology.* - The species name refers to the single pair of sternal setae.

### *Schoengastiella murphyi*, new species

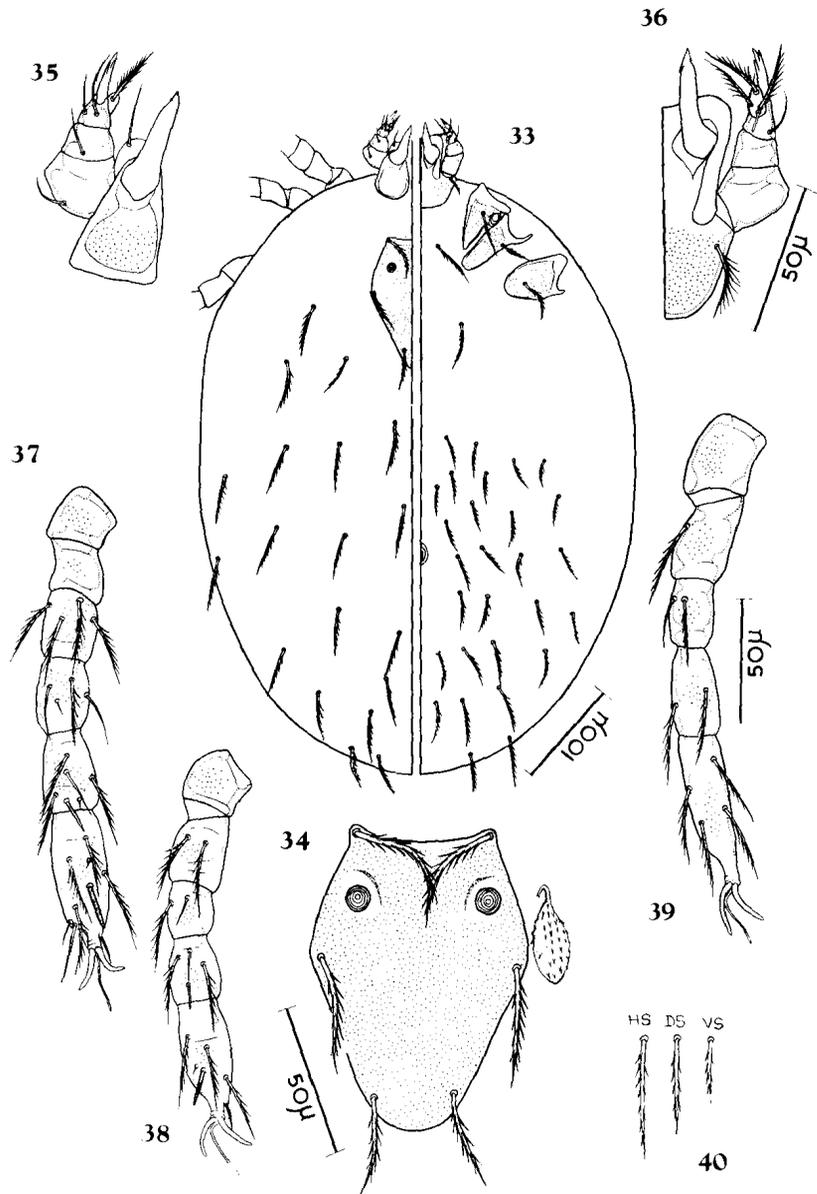
(Figs. 33-40)

*Diagnosis.* - Palpal formula N/N/NNN/4B; claw 3-pronged. Galeal seta nude. Scutum subpentagonal with posterior margin broadly rounded, widest at insertion of PL setae; SD 101. Eyes 2+2, weak. AW 44, PW 68, APP 87. DS 38-42 arranged 3+3(2.4).8.8.6... VS+CS 54-58 in number. Coxae I-III unisetose. IP 700-730. Scutal shape similar to *S. liota* (Traub & Evans, 1953). However, the new species is separable from the closely related *S. liota* by virtue of the higher scutal dimensions, greater number of DS and VS, and in having a single seta on coxa III.

*Material.* - Holotype (BBM-NP 30296-98/10) ex *Rattus rattus brunneusculus*, Nepal, Syabrudens, 1450 m asl, 35 km northeast of Trisuli, 5.xi.1965. 18 paratypes as follows - 4 from three different individuals of *R. r. brunneusculus* with same locality data as holotype, 1, 4, 5.xii.1965; 3 ex 1 *R. brunneus*, Pokhara, 910 m, 19.ix.1965; 6 ex 3 different individuals of *R. brunneus*, Dunche, 1950 m, 28 km southeast of Trisuli, 9-11.xi.1965; 2 ex *R. nitidus*, Bokaikunde, 1900 m, 23 km northeast of Trisuli; 1 ex *R. r. tistae*, Syabrudens, 1450 m, 35 km northeast of Trisuli, 3.xi.1965; 3 ex *R. r. tistae*, Bokaikunde, 1900 m, 13.xi.1965. All specimens collected by L. W. Quate, formerly of the Bernice P. Bishop Museum, Honolulu. Larvae recovered from inner ear lobe.

*Description.* - Pale yellow in life. Fully engorged larva 610 x 435 without medial idiosomal constriction; partially engorged larva somewhat cordiform. *Eyes* - 2+2 inserted at a level midway between AL and PL setae, weak, not discernible in old mounts. *Gnathosome* - as described for *S. goffi*, new species, except basal portion of cheliceral base of normal contour, latero-posterior margin not extended as transparent flap; palpal formula N/N/NNN/4B; galeal seta nude. *Scutum* - subpentagonal with posterior margin broadly rounded with PPW 27; anterior margin shallowly concave; anterolateral margin slanting outwards, reaching widest point at level of PL setae, as figured, narrowing gradually behind PLs; caudal margin extending 11-14 beyond PPL; sensillary stem short, approximately 8 long, with expanded portion broadly clavate (28 x 15) armed with slender spicules; scutal setae ciliated, AL and PL subequal in length, PPL slightly shorter; scutal measurements of holotype, mean of 10 (holotype and 9 paratypes) and ranges as follow: AW 45 (44, 41-50); PW 68 (68, 66-76); PPW 25 (27, 23-31); SB 42 (42, 39-45); ASB 23 (23, 20-25); PSB 77 (78, 73-90); PP 13 (13, 11-14); SD 100 (101, 94-117); AP 41 (44, 40-48); APP 85 (87, 73-102); AL 36 (38, 35-42); PL 36 (39, 34-42); PPL 33 (32, 29-36); sensilla 36 (28 x 15).

*Body setae* - similar to scutal setae; DS 38-42 in number, arranged 3+3(2.4).8.8.6.6(2.4).4(2).2.2(0). Though arrangement is irregular in partially engorged specimens, 3 setae consistently present on each side of scutum preceding first row of 8 setae; VS pectinate,



Figs. 33-40. *Schoengastiella murphyi*, new species. Larva. 33, dorsal and ventral aspects of idiosome; 34, scutum and sensilla; 35, 36, dorsal and ventral aspects of gnathosoma; 37-39, Legs I-III; 40, humeral, dorsal and ventral setae.

### New species of *Schoengastiella*

40-44, and CS ciliated and 14-16 in number; 2 pairs of pectinate sternal setae, anterior 33-36, longer than posterior pair; measurements: HS 36-43; DS 29-36; VS 19-23 and CS 31-35 long. *Legs* - as described for *S. angusta*, but segments longer, IP 700-730; all coxae unisetose; coxalae I and III subequal (41-43), coxala II shortest (27-32). *Leg I* - 250-260 long; tarsus 51-59 x 23-27; tarsala 18-20 long, microtarsala proximal to base of tarsala, 10 apart. *Leg II* - 205-260 long; tarsus 41-47 x 21-25; tarsala 15-16 long. *Leg III* - 245-260 long; coxa 60-68 x 30-34; tarsus 60-65 x 18-24.

*Etymology.* - It is a pleasure to name this species for Associate Professor D. H. Murphy of the Department of Zoology, National University of Singapore to whom ecologists in the Southeast Asian region must be grateful for ideas and guiding principles in the sphere of invertebrate animal ecology.

### NEW RECORDS OF *SCHOENGASTIELLA* COLLECTED IN NEPAL (SEPTEMBER 1965 TO JANUARY 1966)

#### *Schoengastiella ligula* Radford, 1946

Originally described from *Rattus rattus rufescens* in Imphal, India. *New host and locality records.* - Numerous specimens recovered from *Rattus rattus brunneus*, *R. r. brunneusculus*, *R. r. tistae*, *R. nitidus*, *Bandicota bengalensis* and *Suncus murinus soccatus* in Pokhara, 910 m; Syabrudens, 1450 m; Sakkejung, 1300 m; Shoktem, 550 m, Ghorva, 220 m; Ilam District; Jhapa, 200 m, Chandranagarapur, 100-200 m, eastern Terai; Gokarna Game Reserve, 1240 m, near Kathmandu; and Rapti River Valley, 230 m, 16 km west of Hitaura. Coll. L. W. Quate and M. Nadchatram.

#### *Schoengastiella punctata* Radford, 1946

Originally described from *Suncus caeruleus fulvocinereus* in Kangla Tongbi, Imphal, India. *New host and locality records.* - *Rattus rattus brunneus*, *R. r. brunneusculus*, *R. r. tistae*, *Bandicota bengalensis* and *Suncus murinus soccatus* in Pokhara, 910 m; Syabrudens, 1450 m; Dunche, 1950 m; Bokaikunde, 1900 m; Jhapa, 200 m, eastern Terai; Shoktem, 550 m, Ghorva, 220 m, Ilam District. Coll. L. W. Quate and M. Nadchatram.

#### *Schoengastiella gammonsi* (Traub & Evans, 1954)

Originally described from *Anourosorex squamipes assamensis* in Assam, India. *New host and locality records.* - *Rattus r. brunneusculus*, *R. r. tistae*, *Bandicota bengalensis* and *Suncus murinus caeruleus* from Dunche, 1950 m, Jhapa, 200 m, eastern Terai; Sakkejung, 1300 m, Shoktem, 550 m, Ilam District. Coll. L. W. Quate and M. Nadchatram.

*Acknowledgements.* - Grateful thanks are extended to Professor T. J. Lam, Head, Department of Zoology, National University of Singapore and to Dr. K. M. Pavri, Director, National Institute of Virology, Pune, for permission to publish this paper. The senior author is very grateful to Prof. T. J. Lam and Assoc. Prof. K. L. Chan for providing the excellent facilities for the continuation of his taxonomic work on acarines. We thank Mr. H. K. Yip for photographic assistance. This study has been partially supported by Grant 60/83 to the senior author from the National University of Singapore.

### LITERATURE CITED

Abdussalam, M., 1939. A new trombiculid larva parasitic on house rat (*Rattus rattus*). *Ind. J. Ent.*, 1: 83-86.

## M. Nadchatram and S. Fernandes

- Audy, J. R., 1954. Malaysian Parasites IX. Notes on the taxonomy of trombiculid mites, with description of a new subgenus. *Stud. Inst. Med. Res., Malaya*, 1953, 26: 123-170.
- Audy, J. R. & M. Nadchatram. 1957. Malaysian Parasites XXVI. New intranasal species of *Traubacarus* n. gen. (Acarina, Trombiculidae). *Stud. Inst. Med. Res., Malaya*, 28: 187-230.
- Chen, H. T. & P. K. Hsu, 1955. Report on 12 species and varieties of chiggers in China, including six new species and two new varieties, and the creation of a new genus. *Acta Zool. Sinica*, 7: 101-135. (Chinese with English abstract)
- Fuller, H. S., 1952. The mite larvae of the family Trombiculidae in the Oudemans Collection; taxonomy and medical importance. *Zool. Verh., Leiden*, 18: 1-261.
- Hirst, S., 1915. On some new acarine parasites of rats. *Bull. Ent. Res.*, 6: 183-190.
- Kolebinova, M., 1984. Three new larval Trombiculidae from Africa (Acarina). *Senckenbergiana biol.*, 65: 105-111.
- Kolebinova, M. & P. H. Vercammen-Grandjean, 1978. Five new larval Trombiculidae (Acarina) from Liberia and one from Zaire. *Entomol. Mitt., Hamburg*, 6: 101-131.
- Kulkarni, S. M., 1973. Two new species of chiggers from Western Ghats in Poona District, Maharashtra, India. *J. Med. Entomol.*, 10: 519-523.
- Nadchatram, M., 1970. Nepal chiggers - 1. Species of the genus and subgenus *Leptotrombidium*, with synonymic notes (Prostigmata: Trombiculidae). *J. Med. Entomol.*, 7: 145-163.
- Nadchatram, M., 1979a. Two new species of chigger mites (Acarina: Trombiculidae) from India and Indonesia. *Oriental Insects*, 13: 75-80.
- Nadchatram, M., 1979b. The nymphal leg chaetotaxy of seven genera of trombiculid mites. In: *Recent Advances in Acarology - II*. Pp. 417-424. Ed. J. G. Rodrigues. Academic Press, New York.
- Nadchatram, M. & R. Traub, 1971. Chiggers of the genus *Helenicula* of the Old World including description of 9 new species (Acarina: Prostigmata, Trombiculidae). *J. Med. Entomol.*, 8: 562-597.
- Nadchatram, M. & A. L. Dohany, 1974. A pictorial key to the subfamilies, genera and subgenera of Southeast Asian chiggers (Acarina, Prostigmata, Trombiculidae). *Bull. Inst. Med. Res., Malaysia*, 16: 1-67.
- Radford, C. D., 1946. New species of larval mites (Acarina: Trombiculidae) from Manipur, India. *Proc. Zool. Soc. Lond.*, 116: 247-265.
- Srivastva, S. P. & B. L. Wattal, 1973. Descriptions of two new species of trombiculid mites (Acari: Prostigmata) from small mammals in Nagpur (Maharashtra State), India. *Ind. J. Ent.*, 35: 150-155.
- Taufflieb, R., 1964. Les *Schoengastiella* (Acarina, Trombiculidae) de la region Subsaharienne. *Acarologia*, 6: 455-475.
- Traub, R. & T. M. Evans, 1954. Malaysian Parasites. VI. Indo-Malaysian Gahrlepiine mites of the subgenus *Schoengastiella* Hirst. *Stud. Inst. Med. Res., Malaya*, 1953, 26: 89-107.
- Wang, C. S. & Y. M. Gu, 1983. A new species of the genus *Schoengastiella* Hirst, 1915 (Acarina: Trombiculidae). *Acta Zootaxonomica Sinica*, 8: 381-383. (Chinese with English abstract)
- Wharton, G. W. & H. S. Fuller, 1952. A manual of chiggers. *Mem. Ent. Soc. Wash.*, 4: 1-186.
- Womersley, H., 1952. The scrub-typhus and scrub-itch mites of the Asiatic-Pacific region. *Rec. S. Aust. Mus.*, 10: 1-435, 118 plates.
- Womersley, H. & W. G. Heaslip, 1943. The Trombiculinae (Acarina) or itchmites of the Austro-Malayan and Oriental Regions. *Trans. Roy. Soc. S. Australia*, 67:68-142.
- Worth, R. M. & N. K. Shah, 1969. *Nepal Health Survey 1965-1966*. Univ. Hawaii Press, Honolulu, 158 pp.
- Vercammen-Grandjean, P. H., 1958. Revision de genre *Schouedenichia* Jadin and Vercammen-Grandjean. *Ann. Musée Roy. Congo Belge, Tervuren*, 65 (8): 1-97.
- Vercammen-Grandjean, P. H., 1969. Repository of phylogeny and taxonomy in acarines. *Proc. 2nd Intl. Cong. Acarol.* Pp. 107-112. Ed. G. O. Evans. Akademiai Kiado, Budapest.
- Vercammen-Grandjean, P. H., 1974. The chigger mites of the Far East (Acarina: Trombiculidae & Leeuwenhoekidae). *U. S. Army Med. Res. & Dev. Comm. Wash.*, 135 pp.

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