

Notes on Some Chiggers (Acarina: Trombiculidae) from Southern Korea¹

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THE FOLLOWING ACCOUNT is based upon specimens collected by members of the 207th Preventive Medicine Survey Detachment and the 37th Preventive Medicine Survey Detachment in southern Korea. It is undoubtedly incomplete, and the sampling may be selective: the hosts examined came mostly from agricultural areas and near dwellings. Despite the inevitable shortcomings of such a preliminary survey, this account will serve as a beginning for a study of the trombiculid fauna of Korea.

The area covered by this paper is slightly beyond that discussed by Womersley (1952) in his voluminous work on chiggers of the Asiatic-Pacific area; and this account is, in a small measure, a supplement to the much larger one by Womersley. Six species of chiggers were described from regions to the north of Korea by Schluger (1948), and two of those species have been collected in southern Korea. Pertinent to this account is the apparently heretofore largely overlooked paper

by Kanda, mentioning two species of chiggers from Korea.

There are reported here several species previously known only from Japan, two species described by Schluger from more northerly regions of the Asiatic mainland, and one species known also from North America. Two species are described as new in this paper. There is in preparation an illustrated account of Japanese chiggers, and the Japanese species known from southern Korea are not re-illustrated in this paper.

The illustrations in this paper were made in Kyoto, Japan, and are the work of Mr. M. Endo, Mr. S. Shibata, Mr. A. Shimazoe, and Mr. K. Daishoji. These artists were under the direct supervision of Mr. K. Yamazaki. The bulk of the material collected was mounted by Miss Y. Yoshida.

We would like to express our appreciation to Major Paul W. Oman, MSC, under whose direction and encouragement this work was done; to Dr. James M. Brennan for professional council in this study; to Professor Harujiro Kobayashi for calling our attention to and loaning us a copy of the paper by Kanda; and to Lt. Col. Robert Traub, MSC, for a photostatic copy and translation of the paper by Schluger.

Key to the Chiggers of Southern Korea

1. Anteromedian scutal seta absent
 *Gabrliepia brennani* var. *ventralis*
- Anteromedian scutal seta present (single
 or double) 2

¹ Studies upon which this paper is in part based were conducted under Contract No. DA-49-007-MD-242, between the Regents of the University of California and the Department of the Army. The work was initiated while the senior author was associated with the 406th Medical General Laboratory and the Far East Medical Research Unit in Japan during the period January-October, 1952. Logistical support for the preparation of the specimens and illustrations was supplied by the U. S. Army Hospital, 8164th Army Unit, by special arrangement with the above-mentioned organizations.

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2. Anteromedian scutal setae paired; coxa I with two setae; all legs with six segments *Shunsennia tarsalis*
Anteromedian scutal seta single; coxa I with one seta; all legs with seven segments 3
3. Sensillae capitate; palpal claw five-pronged genus *Euschöngastia*, 4
Sensillae flagelliform; palpal claw three-pronged genus *Trombicula*, 5
4. Two pairs of humeral setae. *E. ikaoensis*
One pair of humeral setae. *E. koreaensis*
5. Scutum more or less pentagonal; one or more mastitarsalae III
..... subgenus *Neotrombicula*, 12
Scutum more or less rectangular; with no mastitarsalae III
..... subgenus *Leptotrombidium*, 6
6. Ventral tibial seta of palpus feathered. . . . 7
Ventral tibial seta of palpus nude. . . . 8
7. Base of sensillae nude or with very minute, closely appressed barbs; first post-humeral row of setae usually ten. *palpalis*
Base of sensillae with small but conspicuous, divergent basal barbs; first posthumeral row of setae usually eight *orientalis*
8. With one nude seta on telofemur III; dorsal palpal tibial seta nude; spur on tarsus II longer than spur on tarsus I. . . . *subakamushi*
With no nude seta on telofemur III; dorsal palpal tibial seta feathered; spur on tarsus II shorter than spur on tarsus I 9
9. Scutum more than twice as wide as long *hiranumai*
Scutum less than twice as wide as long 10
10. Sensillae with conspicuous, divergent basal barbs *pallida*
Sensillae basally nude or virtually so . . . 11
11. Scutum with a pair of crescent-shaped marks near the anterior margin; barbs on dorsal setae short *myotis*

- Scutum without crescent-shaped marks; dorsal setae rather short, but with numerous long barbs *subintermedia*
12. With three mastitarsalae III *tamiyai*
With one or two mastitarsalae III. . . . 12
 13. With two mastitarsalae III
..... "sp." of Kanda
With one mastitarsala III 13
 14. With two pairs of humeral setae. *japonica*
With one pair of humeral setae. . . *nagayoi*

Shunsennia tarsalis

Jameson and Toshioka, 1953

Shunsennia tarsalis Jameson and Toshioka, 1953. Biol. Soc. Washington, Proc. 66: 89-92.

DIAGNOSIS: Palpal femoral, genual, and dorsal and ventral tibial setae densely feathered; lateral tibial seta long with 3-4 small barbs. Palpal claw three-pronged. Galeal seta with a few barbs. Coxal setae 2-1-1. Sternal setae 0-4. Sensillae nude. Scutal measurements of holotype: AW-83, PW-106, SB-35, ASB-61, PSB-20, AP-20, AM-84, AL-76, PL-126, S-109.

DISTRIBUTION AND HOSTS: Known only from the original data.

TYPE DATA: Holotype from (?) *Clethrionomys rufocanus*; 15 miles northwest of Wonju; March 13, 1952. One paratype with same data and one paratype from *Apodemus agrarius*, 10 miles west of Chunchon; February 16, 1952. Holotype deposited at the U. S. National Museum.

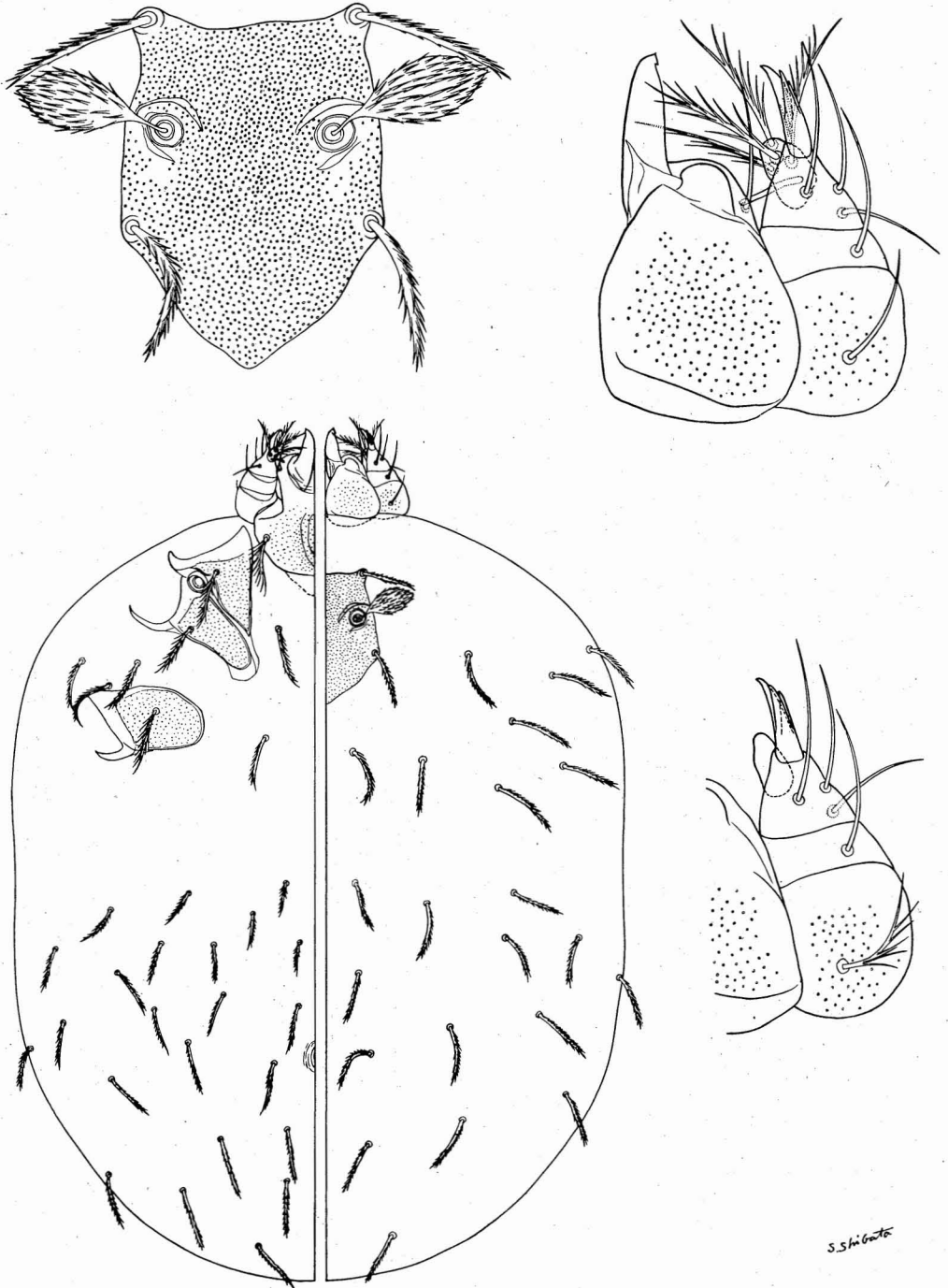
Gahrliepia (Walchia) brennani var.

ventralis Womersley, 1952

Fig. 1

Gahrliepia (Walchia) brennani var. *ventralis* Womersley, 1952. So. Austral. Mus. Rec. 10 (pt. 1): 295.

DIAGNOSIS: Palpal femoral seta nude or branched; other palpal setae nude. Palpal claw three-pronged (stated to be two-pronged in original description). Galeal seta nude. Scu-



S. Shigeta

Fig 1 *Gahliepia brennani* var. *ventralis* Womersley

tum five-sided, the posterior sides more or less straight and forming a right angle with each other. Coxal setae 1-1-1. Sternal setae 2-2. Several setae between coxae II and III. Humeral setae variable, three to five pairs. Scutal measurements of a mean of 17 specimens (given by the describer): "AW-37.5, PW-54.1, SB-32.8, ASB-21.8, PSB-57.8, AP-37.6, AL-27.3, PL-26.8, S-33.5." Scutal measurements of a south Korean specimen: AW-44, PW-50, SB-35, ASB-26, PSB-49, AP-45, AL-37, PL-35, S-34.

DISTRIBUTION AND HOSTS: Originally known only from Ulu Langat Forest Reserve, Selangor, from *Rattus bowersi*. Known in southern Korea from an area 9 miles southeast of Chorwon, Seoul, and in Chipori from *Microtus* sp. and *Apodemus agrarius*.

TYPE DATA: From *Rattus bowersi*, Ulu Langat Forest Reserve, Selangor, Federated Malay States; June 13, 1950.

COMMENT: The designation of *ventralis* as a variety is unfortunate, as it is probably either a distinct species or a variation of geographic significance. If the coxal setal condition in *brennani* is as variable as in *Gabrieliepis saduski*, it is of no remarkable significance.

Euschöngastia ikaoensis

(Sasa *et al.*, 1951)

Neoschöngastia ikaoensis Sasa, Sawada, Kano, Hayashi, and Kumada, 1951. Tokyo Iji Shinshi 26 (4): 8.

DIAGNOSIS: All palpal setae feathered. Palpal claw five-pronged. Galeal seta nude. Coxal setae 1-1-1. Sternal setae 2-2. Scutum about 2.5 times as wide as long. Sensillae pyriform. Two pairs of humeral setae. Scutal measurements of holotype: AW-61.5, PW-67, SB-24, ASB-18, PSB-15.5, AP-21, AM-30, AL-30, PL-39, S-33. Scutal measurements of a specimen from southern Korea: AW-62, PW-78, SB-28, ASB-22, PSB-15, AP-20, AM-28, AL-22, PL-39, sensillae missing.

DISTRIBUTION AND HOSTS: Known originally only from Japan from *Apodemus speciosus*.

In Korea this was taken 17 miles southeast of Chorwon from *Apodemus agrarius*.

TYPE DATA: Holotype from *Apodemus speciosus*, Gumma Prefecture, Japan. Deposited at the Institute for Infectious Diseases, University of Tokyo.

Euschöngastia koreaensis n. sp.

Fig. 2

DESCRIPTION: *Gnathosoma:* All palpal setae feathered; palpal claw five-pronged. Galeal seta feathered. Cheliceral base and palpal femur with scattered light punctae. Chelicera with a subapical tooth or notch. *Scutum:* 2.5-3.0 times as wide as long; with a few light punctae. Sensillary bases behind a line connecting the posterolateral setae. Sensillae pyriform. Scutal measurements of holotype: AW-69, PW-86, SB-29, ASB-27, PSB-10, AP-17, AM-35, AL-45, PL-67, S-35. *Legs:* Coxal setae 1-1-1; seta on coxa III arising from the rear edge of the sclerotized part of the anterior margin of the coxa. Specialized (nude) setae as follows: Leg I, 2 genualae, 1 microgenuala, 2 tibialae, 1 microtibiala, 1 spur, 1 microspur, 1 subterminala, 1 parasubterminala, 1 pretarsala; Leg II, 1 genuala, 2 tibialae, 1 spur, 1 microspur, 1 pretarsala; Leg III, 1 genuala, 1 tibiala. *Setae:* Sternal setae 2-2. About 40 ventral setae behind coxa III, similar in character to sternal setae. Dorsal setae similar to scutal setae; dorsal setal formula: 2-12-12-12-6-6.

TYPE: Holotype from *Rattus rattus*, 17 miles southeast of Chorwon; November 15, 1951. Deposited in the U. S. National Museum. Paratypes from *Rattus norvegicus*, 7 miles southeast of Chorwon, and from *Apodemus agrarius*, 4 miles east of Inchon.

Trombicula (Leptotrombidium) palpalis Nagayo *et al.*, 1919

Trombicula palpalis Nagayo, Mitamura, and Tamiya, 1919. Jikken Igaku Zasshi 3(4): 265-312.



K. Dainoff

Fig 2 *Euschöngastia koreaensis*, n. sp.

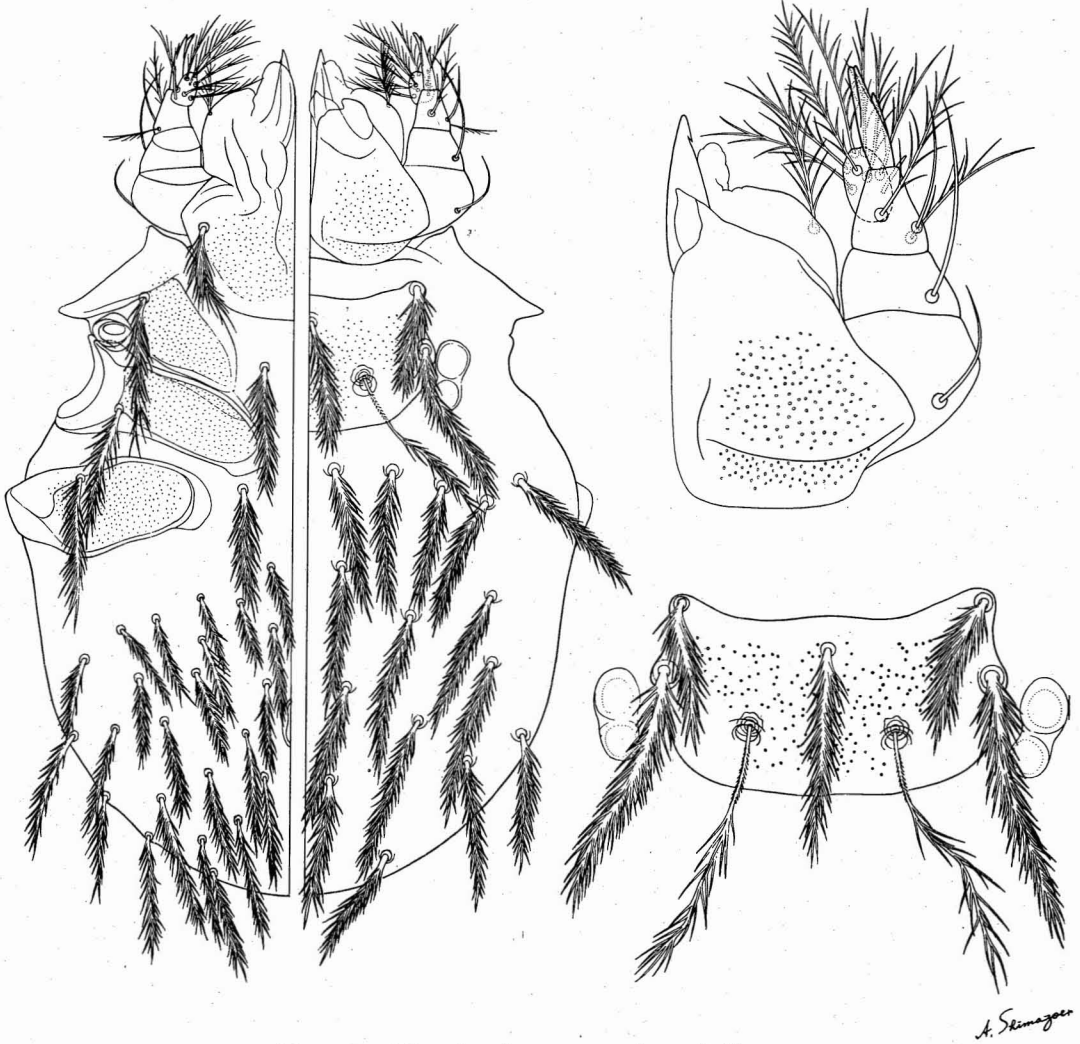


Fig. 3 *Trombicula orientalis* Schluger

DIAGNOSIS: Palpal femoral, genual, and lateral tibial setae nude; dorsal tibial and ventral tibial setae feathered. Galeal seta feathered. Rear corners of the scutum rounded; sensillary bases behind a line connecting the posterolateral setae. Bases of sensillae with minute barbs; sensillae plumose on the distal two thirds. Dorsal setal formula 2-10-10-10-8-4-2-2. Scutal measurements of a specimen from southern Korea: AW-60, PW-64, SB-27, ASB-27, PSB-13, AP-18, AM-42, AL-29, PL-53, S-49.

DISTRIBUTION AND HOSTS: From many localities in southern Korea from *Rattus rattus*,

R. norvegicus, and *Apodemus agrarius*. This is the first record of *T. palpalis* occurring outside Japan.

TYPE DATA: From *Microtus montebelli*, Yamagata Prefecture, Honshu, Japan. A lectotype in the Institute for Infectious Diseases, University of Tokyo.

***Trombicula* (*Leptotrombidium*)
orientalis Schluger, 1948**

Fig. 3

Trombicula orientalis Schluger, 1948. Ent. Obozr. [Moscow] 30: 157.

DIAGNOSIS: Palpal femoral, genual, and lateral tibial setae nude; dorsal and ventral tibial setae feathered. Galeal seta feathered. Cheliceral base with numerous punctae. Seta on coxa III on anterior margin of coxa. Dorsal setal formula: 2-8-8-8-2-2. Scutum with posterior corners rounded; sensillary bases far behind a line connecting posterolateral setae. Sensillae with conspicuous, divergent basal barbs; plumose distally. Scutal measurements of a southern Korean specimen: AW-66, PW-67, SB-31, ASB-29, PSB-14, AP-18, AM-45, AL-40, PL-59, S-63.

DISTRIBUTION AND HOSTS: From many localities in southern Korea from *Apodemus speciosus*, *A. agrarius*, *Rattus rattus*, and *R. norvegicus*. Described from wild rodents from U.S.S.R.

TYPE DATA: Described from *Clethrionomys rufocanus* and *Apodemus speciosus*, South Shore, vicinity of Barabasha, U.S.S.R.

***Trombicula (Leptotrombidium)*
pallida Nagayo *et al.*, 1919**

Trombicula pallida Nagayo, Mitamura, and Tamiya, 1919. Jikken Igaku Zasshi 3: 265-312.

T. burnsi Sasa, Teramura, and Kano, 1950. Tokyo Iji Shinshi 67(10): 22.

T. murotoensis Sasa and Kawashima, 1951. Tokyo Iji Shinshi 68(12): 16.

DIAGNOSIS: Palpal femoral, genual, and lateral and ventral tibial setae nude; dorsal tibial seta feathered. Galeal seta feathered. Scutum more or less rectangular, with the posterolateral setae in the anterior part of the rounded posterior corners. Sensillary bases slightly behind posterolateral setae. Bases of sensillae with small but conspicuous and divergent basal barbs; distal two thirds plumose. Seta on coxa III well behind the anterior margin of the coxa. *T. pallida* is a highly variable species, especially with regard to the number of dorsal setae; but the short, bushy character of the dorsal setae and the nature of the

scutum, sensillae, coxae, and gnathosoma are fairly constant. Scutal measurements of a specimen from southern Korea: AW-64, PW-72, SB-36, ASB-29, PSB-14, AP-21, AM-55, AL-38, PL-56, S-61.

DISTRIBUTION AND HOSTS: In Korea this species has been taken 13 miles southeast of Yonchon and 7 miles southeast of Chorwon, from *Rattus norvegicus* and *Apodemus agrarius*. Previously *T. pallida* was known only from Japan.

TYPE DATA: Lectotype selected from specimens collected by the original authors a-Yachi, Yamagata Prefecture, 1919, from *Mitocrotus montebelloi*. Deposited at the Institute for Infectious Diseases, University of Tokyo.

***Trombicula (Leptotrombidium)*
subintermedia n. sp.**

Fig. 4

This species is allied to *Trombicula intermedia* Nagayo *et al.* of Japan and *T. lanceolata* Womersley of the tropical Orient.

DESCRIPTION: *Gnathosoma*: Palpal femoral, genual, and lateral and ventral tibial setae nude; dorsal tibial seta feathered. Galeal seta feathered. Palpal claw three-pronged. Cheliceral base and palpal femur with punctae. Chelicera with a dorsal subapical notch. *Scutum*: More or less rectangular, slightly more than twice as wide as long, with delicate punctae; rear corners rounded. Sensillary bases slightly behind a line connecting the posterolateral setae. Sensillae nude basally (minute barbs visible on some specimens), plumose distally. Scutal measurements of holotype: AW-70, PW-77, SB-31, ASB-27, PSB-20, AP-25, AM-50, AL-36, PL-63, S-67. *Legs*: Coxal setae 1-1-1; seta on coxa III considerably behind anterior margin of coxa. Specialized (nude) setae on legs: Leg I, 2 genualae, 1 microgenuala, 2 tibialae, 1 microtibiala, 1 spur, 1 microspur, 1 subterminala, 1 parasubterminala, 1 pretarsala; Leg II, 1 genuala, 2 tibialae, 1 spur, 1 microspur, 1 pretarsala; Leg III, 1 genuala, 1 tibiala. *Setae*: Dorsal setae moderately short and well provided with

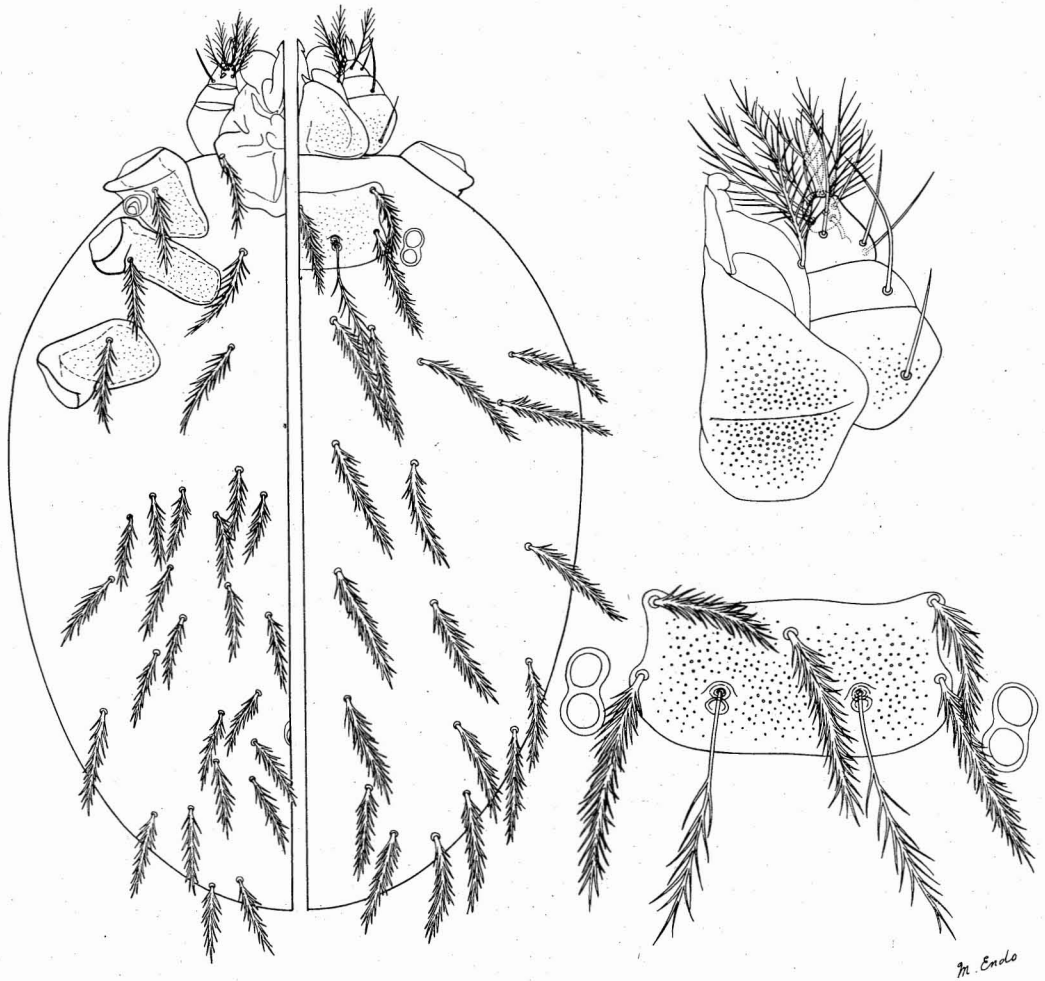


Fig. 4 *Trombicula subintermedia*, n. sp.

barbs. Dorsal setae formula: 2-8-6-6-6-4-4. Sternal setae 2-2. About 44 small setae ventrally, behind coxae III.

TYPE DATA: Holotype from *Apodemus agrarius*, 2 miles southeast of Yonchon, November 27, 1951. Deposited in the U. S. National Museum.

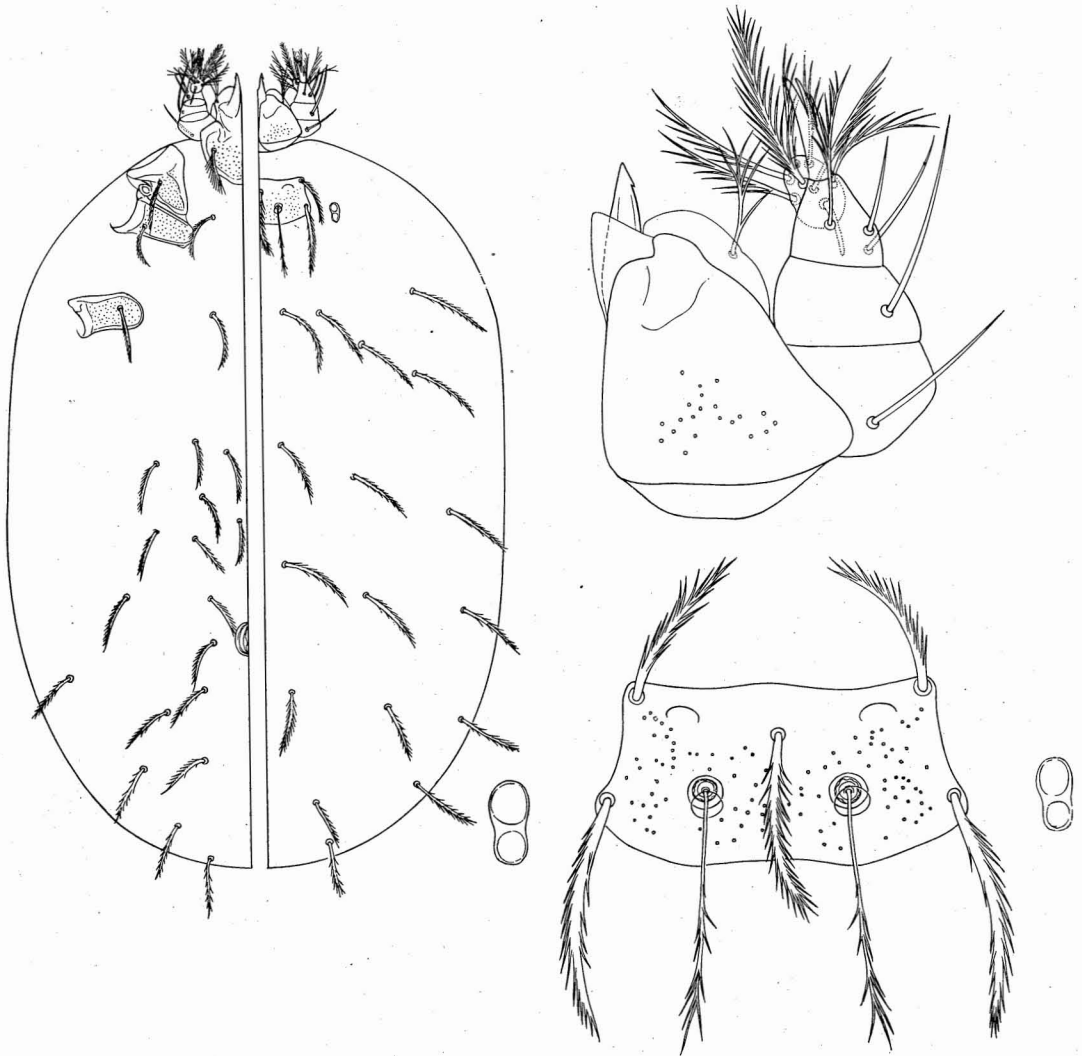
COMMENTS: *T. subintermedia* can be separated from *T. intermedia* by the dorsal setal formulae: in *T. intermedia* this is 2-10-8-8-6-4-2, considerably more setae than in *subintermedia*; from *lanceolata* the new species differs in the sensillae being nude or almost so, whereas the original illustration of *lanceo-*

lata shows numerous rather long sensillae, and the scutal measurements of *lanceolata* and *subintermedia* differ appreciably.

Trombicula (*Leptotrombidium*) *hiranumai* Kanda, 1942

Trombicula hiranumai Kanda, 1942. Chosen Nat. Hist. Soc., Jour. 9(37): 174.

DIAGNOSIS: Palpal femoral, genual, and lateral and ventral tibial setae nude; dorsal tibial seta feathered. Palpal claw three-pronged. Galeal seta feathered. Scutum rectangular, more than twice as wide as long, with the

Fig. 5 *Trombicula myotis* Ewing

A. Shimazoe

rear corners angulate. Sensillary bases in advance of a line connecting posterolateral setae. Sensillae basally nude, with plumose barbs distally. Dorsal setae arranged 2-10-8-8-7-4-2.

DISTRIBUTION AND HOSTS: Apparently known only from the original collection; not found in this survey.

TYPE DATA: From a cony, *Ochotona hyperborea*, from Konkyo-hokudo. The location of the type is not known.

COMMENT: This species resembles in some

ways *T. akamushi* (Brumpt): *hiranumai* differs in having the scutum more than twice as wide as long in contrast to the scutum of *akamushi* which is less than twice as wide as long.

***Trombicula* (*Leptotrombidium*)
myotis Ewing, 1929
Fig. 5**

Trombicula myotis Ewing, 1929. Ent. News 40: 294.

DIAGNOSIS: Palpal femoral, genual, and lateral and ventral tibial setae nude; dorsal tibial seta feathered. Palpal claw three-pronged. Galeal seta feathered. Cheliceral base with a few punctae. Scutum with rear corners slightly rounded. Sensillary bases in advance of a line connecting posterolateral setae. Two crescent-shaped lines near the anterior margin of the scutum. Dorsal setae formula: 2-8-6-6-6-4-2. Scutal measurements of a specimen from southern Korea: AW-65, PW-71, SB-31, ASB-22, PSB-13, AP-24, AM-42, AL-40, PL-61, S-64.

DISTRIBUTION AND HOSTS: Previously recorded only from North America (see comments below), from various kinds of bats. In Korea *T. myotis* is known from Tobang-san from *Myotis* sp.

TYPE DATA: Cotypes from *Myotis lucifugus*, Mt. Katahdin, Maine, U. S. A. Deposited in the U. S. National Museum.

COMMENTS: Fuller (1948, Brooklyn Ent. Soc., Bul. 43: 106) has pointed out the similarity between *T. myotis* Ewing, 1929, and *T. russica* (Oudemans, 1902) of the Old World. We have not had the opportunity to compare our Korean specimens with *russica*, but they are very similar to North American specimens of *T. myotis* and, in our opinion, are not more than subspecifically distinct.

***Trombicula (Leptotrombidium)*
subakamushi Schluger, 1948**

Fig. 6

Trombicula subakamushi Schluger, 1948. Ent. Obozr. [Moscow] 30: 157.

DIAGNOSIS: All palpal setae nude (except setae on palpal thumb). Palpal claw three-pronged. Galeal seta branched. Coxal setae 1-1-1. Sternal setae 2-2. Nude setae on tarsi I and II and leg III as illustrated; spur on tarsus II slightly longer than that on tarsus I. Scutum rather rectangular, with the rear corners angulate, and the rear margin slightly undulate. Sensillary bases in advance of a line

connecting posterolateral setae. Bases of sensillae nude; sensillae with scattered branches on the distal half. Scutal measurements of a specimen from southern Korea: AW-59, PW-78, SB-25, ASB-28, PSB-10, AP-28, AM-36, AL-28, PL-38, S-47.

DISTRIBUTION AND HOSTS: Previously reported only from the original collection. In Korea this species has been collected from *Myotis* sp. from Tobang-san.

TYPE DATA: From *Vespertilio superans* from Mt. Voroschilov, U.S.S.R.

COMMENTS: *T. subakamushi* resembles in some respects *T. insolli* Philip and Traub, 1950, a species described from bats from Selangor, Malaya, but the two are clearly distinct species: In *insolli* the galeal seta is nude and the scutum is approximately as long as wide.

***Trombicula (Neotrombicula) tamiyai*
Philip and Fuller, 1950**

Trombicula tamiyai Philip and Fuller, 1950. Parasitology 40(1, 2): 51.

DIAGNOSIS: All palpal setae feathered or branched. Galeal seta feathered. Cheliceral base and segments of palpi dorsally with numerous small punctae. Scutum rounded posteriorly; sensillary bases behind a line connecting posterolateral setae. Sensillae nude basally, with eight or more branches distally. One pair of humeral setae. Three mastitarsalae III. Scutal measurements of a specimen from southern Korea: AW-60, PW-73, SB-25, ASB-27, PSB-35, AP-17, AM-39, AL-42, PL-49, S-61.

DISTRIBUTION AND HOSTS: Previously known only from Japan. This species is exceedingly common in many localities in southern Korea and was taken mostly from *Rattus rattus* and *R. norvegicus*.

TYPE DATA: Holotype from *Microtus montebelloi*, Okiage Village, Yamagata Prefecture; September 17, 1920. Deposited in U. S. National Museum.

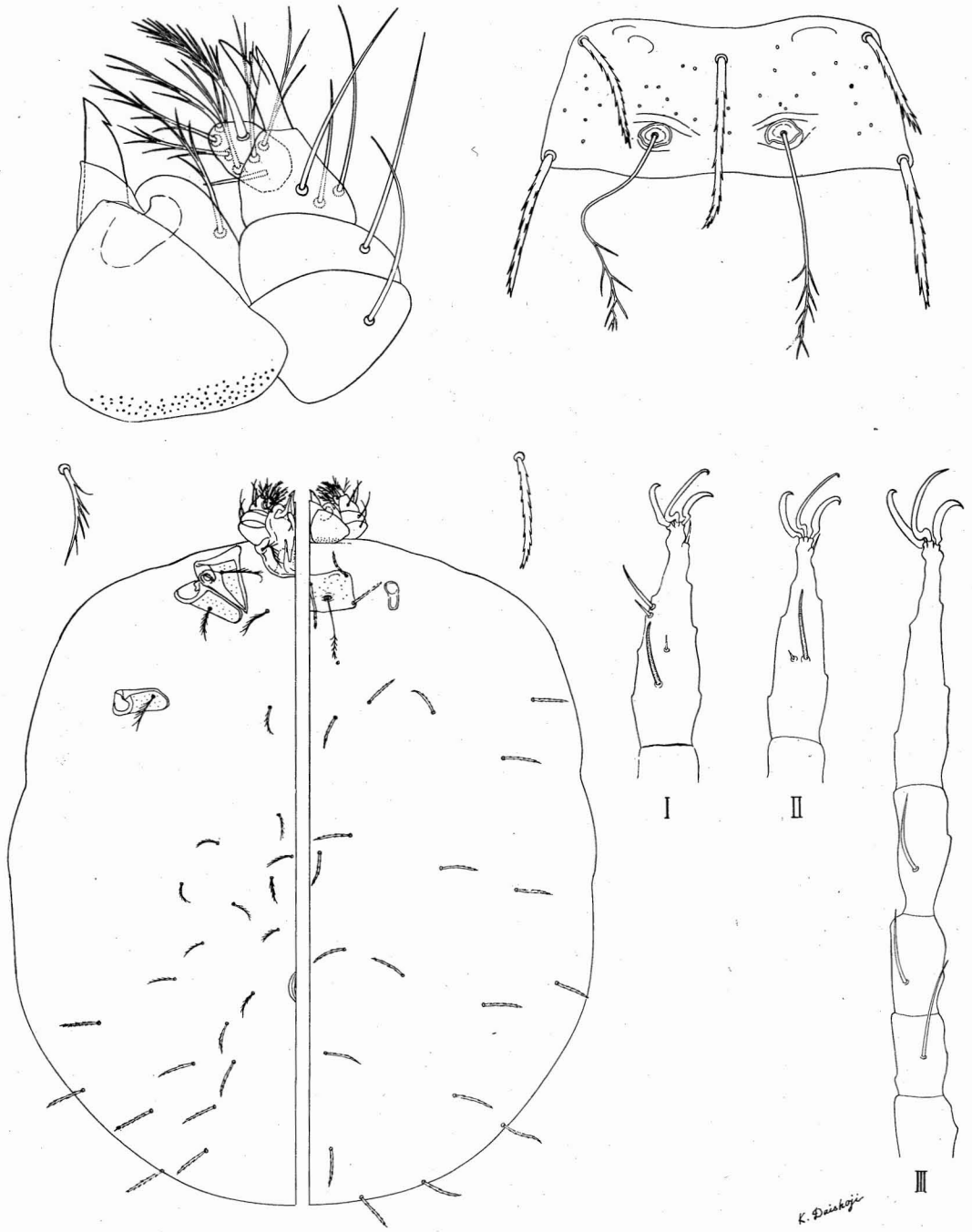


Fig. 6 *Trombicula subakamushi* Schluger

Trombicula (Neotrombicula) japonica
Tanaka *et al.*, 1930

Trombicula autumnalis japonica Tanaka, Kaiwa, Teramura, and Kagaya, 1930. Zentbl. f. Bakt. 116: 353.

DIAGNOSIS: Palpal femoral, genual, and ventral tibial setae feathered; lateral tibial seta forked or nude; dorsal tibial seta nude. Galeal seta usually nude, sometimes forked. Sensillary bases approximately on a line with posterolateral setae. Basal third of sensillae nude; distal two thirds plumose. Dorsal setae rather long; usually two pairs of humeral setae. Scutal measurements of a specimen from southern Korea: AW-81, PW-94, SB-33, ASB-35, PSB-31, AP-33, AM-65, AL-55, PL-75, S-88.

DISTRIBUTION AND HOSTS: Widely distributed and common in Japan; previously not known outside Japan. In Korea taken near Yonchon from *Rattus norvegicus* and *Apodemus agrarius*.

TYPE DATA: Described from *Microtus montebelloi*(?) taken at Yuzawa, Akita Prefecture, Japan.

Trombicula (Neotrombicula) nagayoi
Sasa *et al.*, 1950

Trombicula nagayoi Sasa, Hayashi, Sato, Miura, and Asahina, 1950. Tokyo Iji Shinshi 67(12): 14.

DIAGNOSIS: The gnathosomal features of *nagayoi* are similar to those of *japonica*, but there are usually fewer branches on the palpal setae. Sensillary bases distinctly forward of a line connecting posterolateral setae. Dorsal setae shorter than in *japonica* and with more barbs. A single pair of humeral setae. Scutal measurements of a specimen from southern Korea: AW-70, PW-91, SB-31, ASB-31, PSB-28, AP-33, AM-45, AL-40, PL-60, S-74.

DISTRIBUTION AND HOSTS: Previously known only from Japan where it is common and widely distributed. From southern Korea there are five specimens from 2 miles south-east of Yonchon from *Apodemus agrarius*.

TYPE DATA: From *Apodemus speciosus*, Yamanashi Prefecture, Honshu, Japan. Holotype deposited at the Institute for Infectious Diseases, University of Tokyo.

Trombicula (Neotrombicula) sp. Kanda
Trombicula sp. Kanda, 1942. Chosen Nat. Hist. Soc., Jour. 9(37): 174.

Kanda illustrated leg III of a chigger but did not identify or describe this species. From the presence of 1. mastifemorale III, 1 mastitibiale III, and 2 mastitarsalae III, this species belongs in the *microti* group of Brennan and Wharton. This species is possibly *T. pomeranzevi* Schluger, 1948, or *T. microti* Ewing, 1928, both of which have been taken in Manchuria by Dr. Kiyoshi Asanuma.