

The Proturans from North Korea (II)

By

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Abstract The proturans from North Korea are enumerated. The materials used were obtained by the co-operative scientific expedition made by the Institute of Systematic and Experimental Zoology of the Polish Academy of Sciences and the Institute of Zoology of the Korean Academy of Sciences in 1981. The collection comprises 112 specimens from about 50 collecting sites, which are classified into 11 species of 6 genera. Three of them are new to science, and one newly recorded from Korea. The new names given are: *Eosentomon yinae*, *Yamatentomon breviseta* and *Baculentulus weinerae*.

Concerning the proturan fauna of Korea, five contributions have been published, that is, IMADATÉ (1966, 1973), IMADATÉ and SZEPTYCKI (1976), PAIK (1979) and TUXEN and PAIK (1980), and fifteen species belonging to ten genera have been recorded up to now.

The present paper deals with the new material collected from North Korea in the summer of 1981 by the scientific expedition carried out by the Institute of Systematic and Experimental Zoology of the Polish Academy of Sciences, Kraków, in collaboration with the Institute of Zoology of the Korean Academy of Sciences. All the proturan specimens described in the present paper were obtained by one of the authors, A. SZEPTYCKI, and Dr. W. WEINER, a collembolist, participating in this expedition. The collection was made by means of modified TAMURA's method with small portable plastic funnels and paradichlorobenzene as repellent (cf. TAMURA, 1967). Of about 50 samples, 17 contained 112 proturans of eleven different forms, three of which were new to science and one new to Korea. They are described in the following lines.

The specimens used for the present article, including the holotypes, are to be deposited in the collection of the National Science Museum (Nat. Hist.), Tokyo, and also in the collection of the Institute of Systematic and Experimental Zoology of the Polish Academy of Sciences.

As to the terminology for body setae, we will follow IMADATÉ's (1965) in the

present paper, as in the previous part (IMADATÉ & SZEPTYCKI, 1976), and the terms applied to the recent works of the senior author are partly given in parentheses for reference.

The authors wish to express their cordial thanks to all the participants of the expedition, Dr. Z. STEBNICKA, Dr. W. WEINER and Dr. W. KRZEMINSKI and to the director and staff of the Institute of Zoology of the Korean Academy of Sciences for their unfailing help throughout the field survey. They are also greatly indebted to Dr. Shun-Ichi UÉNO, National Science Museum (Nat. Hist.), Tokyo, for reading the manuscript, for giving them valuable advice and criticism and for taking trouble to publish the present paper.

List of Collecting Sites

Province Phjõngan-pukto

1. Mjohjang-san Mts., Valley of the Hjangsan-chon River; 23-VI-1981, collected by SZEPTYCKI & WEINER; border of a forest (mainly chestnut trees and pines) and a wild meadow; litter (mainly leaves of chestnut trees); *Eosentomon sakura* IMADATÉ et YOSII.

2. Ditto, Path to the Habilo Waterfall; 25-VI-1981, collected by SZEPTYCKI & WEINER; deciduous forest with oaks, maples, etc., and with small admixture of pines; fresh litter; *Baculentulus morikawai* (IMADATÉ et YOSII).

3. Hjangsan; 23-VI-1981, collected by SZEPTYCKI & WEINER; dry slope above the Chongchõn-gang River with heaped granitic stones and scattered shrubs; mosses on soil and stones; *B. morikawai*.

Province Phjõngan-namdo

4. Paeksong-ri near Pyongsong; 15-VI-1981, collected by WEINER; litter at the base of rock near a creek; *E. yinae* sp. nov.

5. Ditto; 11-VII-1981, collected by SZEPTYCKI & WEINER; deciduous forest (oaks, chestnut trees, *Robinia* and some pines) with *Rhododendron* sp. and many species of shrubs and ferns; litter; *E. yinae* sp. nov.

6. Sõkam-Cõsudzi (lake), distr. Sunan; 7-VII-1981, collected by SZEPTYCKI & WEINER; very poor pine forest on quartzitic gravel with grasses and scattered ferns on the slope above the lake; pine needles; *B. morikawai*.

7. Vaudo near Nampo; 10-VII-1981, collected by SZEPTYCKI & WEINER; hill near sea, forest with oaks, chestnut trees, etc., and small admixture of pines; litter & pine needles; *B. morikawai*.

8. Thesõng-ho (lake), distr. Kangsõ; 12-VI-1981, collected by SZEPTYCKI & WEINER; hills above the lake, fresh deciduous forest (oaks, chestnut trees, *Robinia*, etc.); litter; *E. yinae* sp. nov.

Pjõngjang-si

9. Jongak-san Hills; 13-VI-1981, collected by SZEPTYCKI & WEINER; northern

slope, fresh deciduous forest with very rich undergrowth; litter at the bases of rocks (mainly oak leaves); *E. yinae* sp. nov. & *B. morikawai*.

Province Hvange-pukto

10. Sohung-ho (lake) near Pongsan; 17–VII–1981, collected by SZEPTYCKI & WEINER; eastern shore of the lake, rich deciduous forest; litter; *E. sakura* & *E. yinae* sp. nov.

Province Hvanghe-namdo

11. Kwail; 18–VI–1981, collected by SZEPTYCKI & WEINER; dry slope of a hill, pine forest with oaks; litter (mainly oak leaves); *B. weinerae* sp. nov.

Kesōng-si

12. Chōnma-san Mts., Valley under the Pakjon Waterfall; 15–VII–1981, collected by SZEPTYCKI & WEINER; rich deciduous forest (oaks, maples, *Styrax obassia*, *Carpinus cordata*, etc.); litter; *E. sakura*, *E. yinae* sp. nov., *Nipponentomon nippon* (YOSHII) and *Kenyentulus* sp.

13. Ditto, Valley above the Pakjon Waterfall; 16–VII–1981, collected by SZEPTYCKI & WEINER; mixed forest (oaks, maples, pines, etc.) on a rocky slope; litter; *B. morikawai*.

14. About 20 km east of Kesōng Town; 14–VII–1981, collected by SZEPTYCKI & WEINER; slope of a hill covered with *Robinia* and many species of shrubs; litter (much rotten leaves); *E. sakura*, *N. nippon* & *B. morikawai*.

15. About 6 km north of Kesōng Town; 13–VII–1981, collected by SZEPTYCKI & WEINER; slope of a valley covered with *Robinia*, other shrubs and some scattered pines; plant debris (mainly rotten grasses); *E. sakura*, *Kenyentulus* sp. & *B. cf. densus* (IMADATÉ).

Province Kangvōn-do

16. Kymgang-san Mts., Ou-Kymgang; 30–VI–1981, collected by SZEPTYCKI & WEINER; pine forest with very rich undergrowth; pine needles; *E. yinae* sp. nov., *Yamatentomon breviseta* sp. nov., *Filientomon takanawanum* (IMADATÉ), *F. cf. takanawanum*, *N. nippon* & *N. uenoi uenoi* (IMADATÉ et YOSHII).

17. Ditto, Way to the Kurjong-pho Waterfall; 1–VII–1981, collected by SZEPTYCKI & WEINER; gorge of a small creek covered with many species of shrubs and herbs; plant debris under shrubs and herbs; *E. sakura*, *N. nippon* & *N. uenoi uenoi*.

Family Eosentomidae BERLESE, 1909

1. *Eosentomon sakura* IMADATÉ et YOSHII, 1959

Eosentomon sakura IMADATÉ et YOSHII, 1959, Contr. biol. Lab. Kyoto Univ., (6): 7–9; IMADATÉ, 1974, Fauna Japonica, Protura, 261–268.

Other references are not required here.

Specimens examined. 1 ♂, 4 ♀ and 1 matusus junior, Mjohjang-san (collecting site no. 1), 23-VI-1981; 1 Mj and 1 larva I, Sohng-ho (cs 10), 17-VII-1981; 1 ♂, 3 ♀, 1 Mj and 1 LI, Chōnma-san (cs 12), 15-VII-1981; 1 LII and 1 LI, Kesōng-si (cs 15), 13-VII-1981; 1 Mj, Kymgang-san (cs 17), 1-VII-1981.

Foretarsus 88–94 μ m in adults. In one male from Mjohjang-san, one of A 5 on urotergite II is absent. No significant difference is found between Korean and Japanese specimens.

Distribution. Japan, China, Formosa, New Hebrides, Bismarck and Solomon Isalnds; new to Korea.

2. *Eosentomon yinae* SZEPTYCKI et IMADATÉ, sp. nov.

(Figs. 1–9)

Specimens examined. 1 ♂, and 1 Mj, Paeksong-ri (cs 4), 15-VI-1981; 1 Mj,

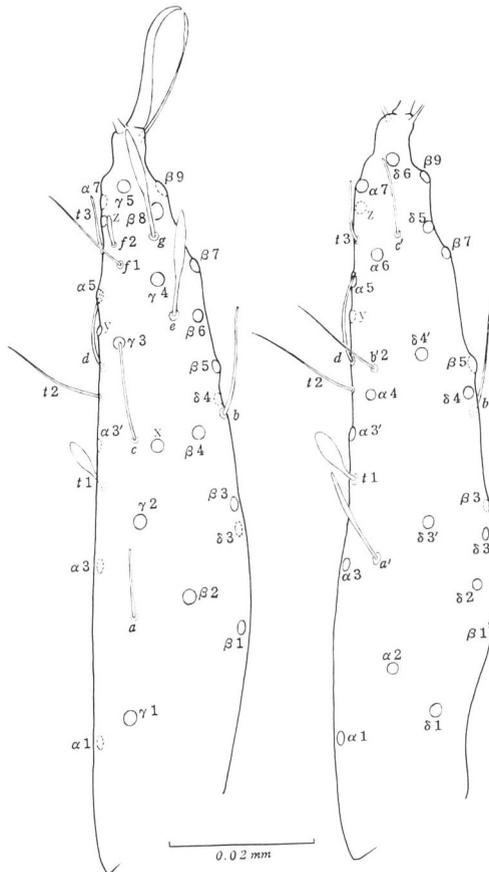


Fig. 1. *Eosentomon yinae* sp. nov.: foretarsus, exterior (left) and interior (right) views (holotype).

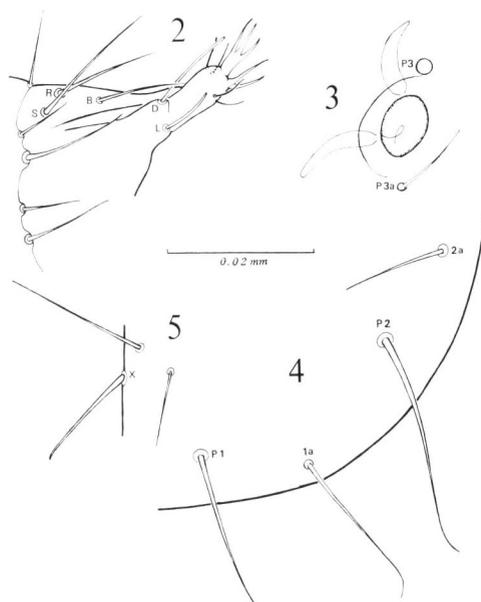
Paeksong-ri (cs. 5), 11-VI-1981, 1 ♂, Thesong-ho (cs 8), 12-VI-1981; 1 ♀ and 1 Mj, Jongak-san (cs 9), 13-VI-1981, 1 ♀, Sohung-ho (cs 10), 17-VIII-1981; 2 ♀, Chŏnmasan (cs 12), 15-VIII-1981; 1 ♀ and 1 LII, Kymgang-san (cs 16), 30-VI-1981.

Body length 1100–1400 μm in expanded adults.

Head 143–187 μm in dorsal view; posterior additional seta present; ratio of posterior seta and subposterior one 1: 1.5–2; labral seta present; rostral seta as long and thick as subrostral one (Fig. 2). Pseudoculus rather small, with no inner structure, PR=12–14. Lateral sensilla on maxillary palpus shorter than dorsal sensilla (Fig. 2).

Setae on nota of medial length; P 1a (p 1') slender, a little longer than P 1 (p 1); P 2a (p 2') seta-like, longer than P 3a (Fig. 4); ratio of P 1: P 1a: P 2 on mesonotum 1: 1.0–1.1: 1.3–1.4 in length. Tracheal camerae slender, distally contracted (Fig. 3).

Foretarsus 94–100 μm in length, claw 20–23 μm , TR=4.7–5.0 and EU=0.9–1.0. Exterior sensilla *a* thin, longer than a half of *c* in length; *b* a little longer than *a'*; apex of *d* reaching the base of $\alpha 5$; *e* and *g* normal, with long spatulate dilatation; *f* *l* relatively long and thin, a little shorter than *g*; dorsal sensilla *t* *l* closer to $\alpha 3'$ than to $\alpha 3$, BS=1.0–1.1; *t* *2* filiform, slightly longer than *b*' *2*; *t* *3* shorter than *c*'; interior sensilla *a*' slightly spatulate and short, its apex not surpassing the base of $\alpha 3$; *b*' *1* absent; *c*' thin, on the line of $\delta 5$ and $\alpha 6$; *c*'' absent; interior seta $\delta 4'$ slightly distal to the level of *b*' *2* (Fig. 1).



Figs. 2–5. *Eosentomon yinae* sp. nov. — 2. Anterior margin of head, lateral view. B, labral seta; D, dorsal sensilla on maxillary palpus; L, lateral sensilla on maxillary palpus; R, rostral seta; S, subrostral seta. 3. Trachea of metanotum. 4. Posterior setae of metanotum. 5. Basal seta (x) of hind tarsus (2–5, paratype).

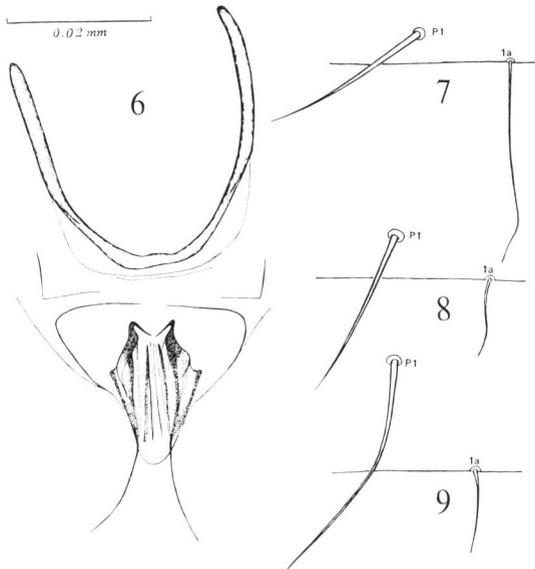
Middle tarsus 48–54 μm , hind one 60–70 μm ; empodial appendage of middle and hind legs short and less than one-fifth the claw length. Basal seta on hind tarsus thick and spine-like (Fig. 5).

Posterior accessory setae on urotergites I–IV longer than principal setae (Fig. 7); on urotergites V–VII, P 1a (p 1') short, less than two-fifths the P 1 length and situated at the hind margin (Figs. 8–9); on urotergites V–VI, A3 absent; on urotergite VII, A 1, 2 and 3 absent; P 2 and 1'' on urotergite VIII not displaced; dorsal setae on urotergite XI subequal to those on urotergite X in length; on urosternite VIII A present; on urosternites IX–X, 1a often missing. Antecosta slender, with slightly visible central lobe. Laterostigmata II–IV large, without reticulation. Lateral sclerotization of urosternite VIII present, with hind line reaching antecosta. On female squama genitalis, caput processus shaped like duck's head, with oblique appendix, filum processus slender and long. Penis with long basiphallar setae.

Holotype: ♀, Jongak-san Hills, Phjōngjang-si, 13–VI–1981, collected by A. SZEPTYCKI & W. WEINER. Paratypes: ♂, Thesong-ho, Phjongan-namdo, 12–VI–1981, collected by A. SZEPTYCKI & W. WEINER; ♀, Sohung-ho, Hvanghe-pukto, 17–VII–1981, collected by A. SZEPTYCKI & W. WEINER.

Maturus junior. Foretarsus 93–94 μm . Important characters as in the adult with the exception of the absence of external genitalic organ, of setae 1a on urosternite X and of 2 and 4 on urosternite XI.

Larva II. Foretarsus 88 μm . Position and shape of foretarsal sensillae, the ratios BS, TR, etc. similar to those of adult.



Figs. 6–9. *Eosentomon yinae* sp. nov. — 6. Female squama genitalis. 7. Setae P 1 and 1a, urotergite III. 8. Ditto, urotergite V. 9. Ditto, urotergite VII (6, holotype; 7–9, paratype).

Table 1. Abdominal chaetotaxy of *Eosentomon yinae* sp. nov.

	Larva II			Maturus junior			Imago		
	Formula	Composition of setae	Formula	Tertiary setae	Formula	Complementary setae			
Dorsal									
Abdomen I	$\frac{0}{10}$	P 1, 1a, 2, 3, 3a	$\frac{4}{10}$	A 1, 2	$\frac{4}{10}$				
II	$\frac{0}{16}$	P 1, 1a, 2, 2a, 3, 4, 4a, 5	$\frac{10}{16}$	A 1, 2, 3, 4, 5	$\frac{10}{16}$				
III	$\frac{2}{16}$	A 4	$\frac{10}{16}$	A 1, 2, 3, 5	$\frac{10}{16}$				
IV	$\frac{4}{16}$	A 4, 5	$\frac{10}{16}$	A 1, 2, 3	$\frac{10}{16}$				
V-VI	$\frac{4}{16}$	P 1, 1a, 2, 2a, 3, 4, 4a, 5	$\frac{8}{16}$	A 1, 2	$\frac{8}{16}$				
VII	$\frac{4}{16}$	A 4, 5	$\frac{4}{16}$		$\frac{4}{16}$				
VIII	$\frac{6}{9}$	P 1, 1a, 2, 2a, 3, 4, 4a, 5	$\frac{6}{9}$		$\frac{6}{9}$				
IX	8		8		8				
X-XI			8		8				
XII	9		9		9				
Ventral									
Abdomen I	$\frac{4}{4}$		$\frac{4}{4}$		$\frac{4}{4}$				
II-III	$\frac{4}{4}$	A 1, 2	$\frac{6}{4}$	A 3	$\frac{6}{4}$				
IV-VII	$\frac{4}{8}$	P 1, 2	$\frac{6}{10}$	A 3	$\frac{6}{10}$				
VIII	$\frac{0}{7}$	P 1, 2, 2a, 3	$\frac{2}{7}$	P 2a'	$\frac{2}{7}$				
IX	4	1, 2	$\frac{6}{4}$	A	$\frac{6}{4}$				
X			4	(1a)	$\frac{6}{4}$	(1a)			
XI			4	1, 2	8	2, 4			
XII	12		12	1, 3	12				

Notes. The present new species is closely similar in many respects to the two Japanese forms, *Eosentomon asahi* IMADATÉ and *E. toi* IMADATÉ, but is distinguishable from them by the absence of foretarsal sensilla *b'1*, by the position of *t1* and by the peculiar pattern of P 1a on urotergites V–VII.

Of the seven adults examined, one male from Thesōng-ho and three females from Jongak-san, Sohung-ho and Chōnma-san have no 1a on urosternites IX–X respectively. In another famel from Chōnma-san, A 1, 2 and 3 are absent on urotergite VI. One matusus junior from Jangak-san has no 1a on urosternite IX and one of 3 on urotergite X. In one matusus junior from Paeksong-ri, one of P 2 on urosternite I and one of A 3 on urosternite II are lacking. Chaetotaxial abnormality seems not to be rare in this species.

This new species is named in honour of Professor YIN Wen-ying of the Shanghai Institute of Entomology, Academia Sinica, the most active scientist in the field of proturan study in Asia.

From the litter sample from Paeksong-ri (collecting site no. 4, 15–VI–1981), in which this new species was found, one eosentomid prelarva was also met with. Due to the lack of significant features, it is impossible to make certain if the prelarva belongs to *E. yinae* or not. As described in the following lines, the fundamental characters are not different from those in the same stage of other eosentomids.

Body length 710 μm . Mouthparts undeveloped; maxillary palpus with no seta; labial palpus with four setae; pseudoculus indistinct. Foretarsus 70 μm in length, and without claw, no empodial appendage, no S-shaped seta and no sensilla, but with 19 setae and with a triangular projection of 4 μm length at the distal end; middle and hind tarsi with a broad claw, a short empodial appendage and 14 setae on each. Prothorax without seta; meso- and metathoraces and abdomen I–III with 8 dorso-posterior setae and no ventral seta; abd. IV–VII with 8 dorso-posterior and 2 ventral setae; abd. VIII with 6 dorsal and 5 ventral setae. Abdominal appendages I–III with a terminal vesicle and two setae on each.

Family Acerentomidae SILVESTRI, 1907

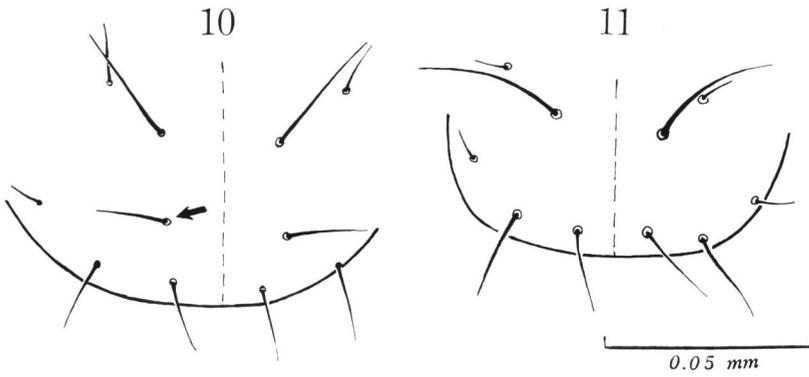
3. *Yamatentomon breviseta* SZEPTYCKI et IMADATÉ, sp. nov.

(Figs. 11–17)

Specimen examined. 1 ♀ and 1 Mj, Kymgang-san (cs 16), 30–VI–1981.

Body length 1410 μm . Head with short rostrum and with no additional seta (Fig. 11); pseudoculus shortened, with distinct lever, PR=21.5 (Fig. 14); canal of maxillary gland of normal shape, its proximal part dilated posteriorly and with small anterior dilatation near calyx, CF=9.1 (Fig. 15).

Foretarsus 95 μm in length, TR=2.5 and EU=0.13. Exterior sensilla *a* slender; *b* strikingly long, its apex reaching the base of γ 4; apex of *c* surpassing the base of *e*; *d* relatively long, its apex slightly surpassing the base of *f*; *e* normal; *f* and *g* very close to each other; dorsal sensilla *t1* baculiform with a small apical knob, BS=0.6; *t2*



Figs. 10-11. Chaetotaxy of the posterior part of the head. — 10. *Yamatentomon* sp. from Japan. The arrow shows the additional seta. — 11. *Y. breviseta* sp. nov. (holotype).

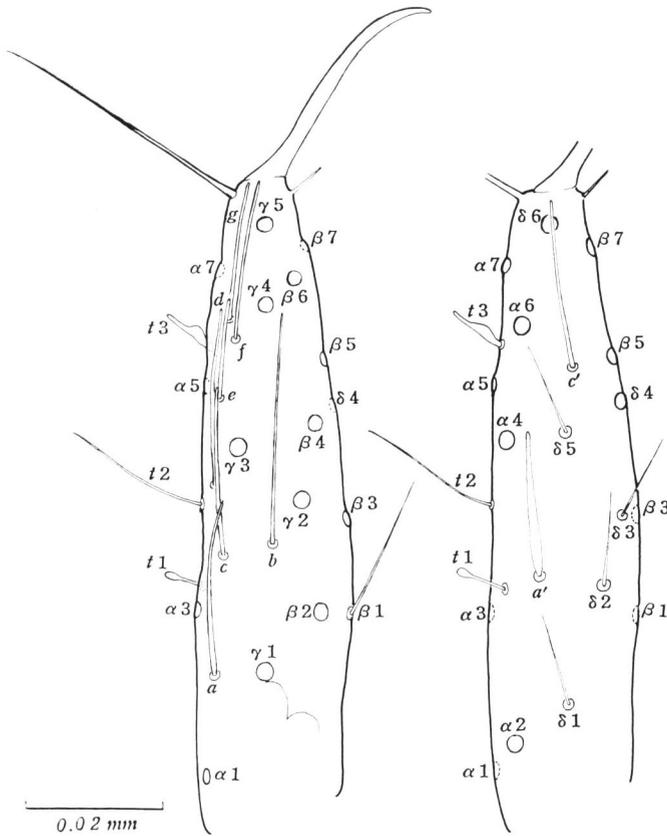
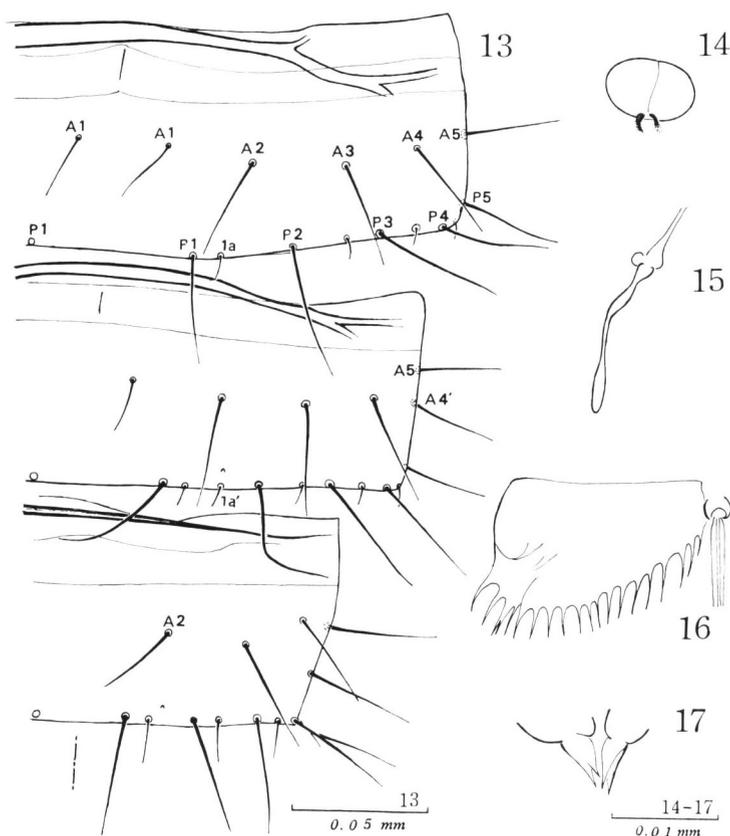


Fig. 12. *Yamatentomon breviseta* sp. nov.; foretarsus, exterior (left) and interior (right) views (holotype).



Figs. 13-17. *Yamatentomon breviseta* sp. nov. — 13. Chaetotaxy of urotergites V-VII. 14. Pseudoculus. 15. Canal of maxillary gland. 16. Comb on abdomen VIII. 17. Distal part of acrostylus (13, 15-17, holotype; 14, paratype).

thin; *t3* lanceolate; interior sensilla *a'* a little broad; *b'* absent; *c'* thin and its apex surpassing the base of $\delta 6$; $\delta 4$ stout, a little longer than *c'*; $\beta 1$ normal, subequal to a half of $\beta 2$ in length (Fig. 12). Middle tarsus 47 μm in length; claw 21 μm ; hind one 52 μm ; claw 22 μm .

Body chaetotaxy similar to that of *Y. fujisanum* IMADATÉ, but dorsal accessory setae such as P 1a (p 1'), 2a (p 2') on meso- and metanota, P 1a on urotergite I, P 1a, 2a, 3a and 4a on urotergites II-VI equal to each other in shape, short and blunt, sensilla-like; ventral setae A 2 and M 2 on prosternum, A 2 on meso- and metasterna short and pointed, subequal to dorsal accessory setae in length; on urotergites II-VI, P 1a subequal to one-seventh of P 1 in length; on urotergite VI, an extra pair of accessory seta P 1a' present; P 1a, 2a, 3a and 4a on urotergite VII slender and pointed, longer than one-third of P 1 in length; A 1 on urotergite VII and P c (p 0) on urostrenite VI absent (Fig. 13). In the holotype specimen, one of A 1 and one of A 4' on urotergite

Table 2. Chaetotaxy of *Yamatentomn breviseta* sp. nov.

		Maturus junior		Imago	
		Formula	Composition of setae	Formula	Complementary setae
Dorsal					
Thorax	I	4		4	
	II	$\frac{8}{16}$	A 2, 3, 4, M P 1, 1a, 2, 2a, 3, 4, 5, 5a	$\frac{8}{16}$	
	III	$\frac{10}{16}$	A 2, 3, 4, 5, M P 1, 1a, 2, 2a, 3, 4, 5, 5a	$\frac{10}{16}$	
Abdomen	I	$\frac{4}{14}$	A 1, 2 P 1, 1a, 2, 3, 3a, 4, 5	$\frac{6}{14}$	A 3
	II-III	$\frac{8}{16}$	A 1, 2, 3, 5 P 1, 1a, 2, 2a, 3, 4, 4a, 5	$\frac{10}{18}$	A 4 P 3a
	IV	$\frac{8}{18}$	A 1, 2, 3, 5 P 1, 1a, 2, 2a, 3, 3a, 4, 4a, 5	$\frac{10}{18}$	A 4
	V	$\frac{10}{18}$	A 1, 2, 3, 4, 5 P 1, 1a, 2, 2a, 3, 3a, 4, 4a, 5	$\frac{10}{18}$	
	VI	$\frac{8}{18}$	A 1, 2, 3, 5 P 1, 1a, 2, 2a, 3, 3a, 4, 4a, 5	$\frac{12(10)}{20}$	A 4, (4') P 1a'
	VII	$\frac{8}{18}$	A 2, 3, 4, 5 P 1, 1a, 2, 2a, 3, 3a, 4, 4a, 5	$\frac{10}{18}$	A 4'
	VIII	$\frac{6-7}{8}$	A 1, 3, 5, M c, 2, 3, 4 P 2, 3, 4, 5	$\frac{8-7}{8}$	A 2
	IX	10	1, 3, 3a, 4, 5	14	2, 4a
	X	8	1, 2, 4, 5	10	3
	XI	6		6	
	XII	9		9	
	Ventral				
Thorax	I	$\frac{4-2}{6}$	A 1, 2, M 1 P 1, 2, 3	$\frac{4-4}{6}$	M 2
	II	$\frac{5-2}{4}$	A c, 2, 3, M P 1, 2	$\frac{5-2}{4}$	
	III	$\frac{7-2}{4}$	A c, 2, 3, 4, M P 1, 2	$\frac{7-2}{4}$	
Abdomen	I	$\frac{3}{2}$	A c, 2 P 1	$\frac{3}{4}$	P 2
	II-III	$\frac{3}{5}$	A c, 2 P c, 2, 3	$\frac{5}{5}$	A 3
	IV-V	$\frac{3}{8}$	A c, 2 P 1, 1a, 2, 3	$\frac{5}{8}$	A 3
	VI	$\frac{3}{9}$	A c, 2 P c, 1, 1a, 2, 3	$\frac{5}{8}$	A 3 (-P c)
	VII	$\frac{3}{9}$	A c, 2 P c, 1, 1a, 2, 3	$\frac{5}{9}$	A 3
	VIII	$\frac{4}{0}$		$\frac{4}{0}$	
	IX-X	4		4	
	XI	2	2	6	1, 3
	XII	6		6	

VI lacking. Abdominal appendages II–III with two setae, lateral apical seta slightly shorter than the subapical. Striate band on abdomen VIII well developed; the striae rather distinct and stronger on its distal half. Comb of abdomen VIII consisting of about 20 teeth with rounded margin, protruded posteriorly (Fig. 16). Female squama genitalis with stout acrostylus, apically bipartite (Fig. 17).

Holotype. ♀, Kymgang-san Mts., Ou-Kymgang, Kangvön-do, 30–VI–1981, collected by A. SZEPTYCKI & W. WEINER. Paratype. *maturus junior*, Kymgang-san, Ou-Kymgang, Kangvön-do, 30–VI–1981, collected by A. SZEPTYCKI & W. WEINER.

Maturus junior. Foretarsus 79 μm . Important characters such as the foretarsal sensillae, the ratio BS, etc., similar to those of adult. Body setae A 3 on urotergite I, A 4 and P 3a on urotergites II–III, A 4 on urotergite VI, etc., absent as shown in Table 2.

Notes. The specific name, *breviseta*, is derived from the short sensilla-like accessory setae on meso- and metanota and those on urotergites I–VI.

This new species is closely similar to *Y. fujisanum* IMADATÉ, but is distinguished by the bipartite acrostylus of female squama genitalis, by the short sensilla-like setae P 1a and 2a on meso- and metanota and P 1a on urotergite I as well as by the absence of A 1 on urotergite VII.

4. *Filientomon takanawanum* (IMADATÉ, 1956)

Acerentulus lubricus takanawanus IMADATÉ, 1956, Trans. Shikoku ent. Soc., 4: 105–106.

Yamatentomon takanawanum: IMADATÉ, 1964, Bull. natn. Sci. Mus., Tokyo, 7: 286; 1973, Annls. hist.-nat. Mus. natn. hung., 65: 151, from Man-mul san (Kanwon-do); 1974, Fauna Japonica, Protura, 122–129.

Filientomon takanawanum: RUSEK, 1974, Acta ent. bohemoslov., 71: 269.

Other references are not required here.

Specimens examined. 1 ♂, 4 ♀, 1 preimago (♂), 2 Mj, 6 LII, 2 L I, Kymgang-san (cs 16), 30–VI–1981.

Notes. Foretarsus 85–99 μm in adults. In the Korean specimens examined, chaetotaxial variations are very frequently found, e.g., symmetrical or asymmetrical absence of P 3a on urotergites II–IV or II–V, symmetrical or asymmetrical absence of A 1 on urotergite VI and those of A 1, 2 and 4' on urotergite VII.

Distribution. Japan and Korea.

5. *Filientomon* cf. *takanawanum* (IMADATÉ, 1956)

(Fig. 18)

Specimen examined. 1 Mj, Kymgang-san (cs 16), 30–VI–1981.

Body length 1200 μm , foretarsus 107 μm , BS=2.8 and EU=0.08. Such fundamental characters as mouthparts, canal of maxillary gland, pseudoculus, foretarsal sensillae (Fig. 18), body chaetotaxy and pectinated structures are similar to those of *F. takanawanum*, but some differences are observed in the shape of foretarsal sensilla

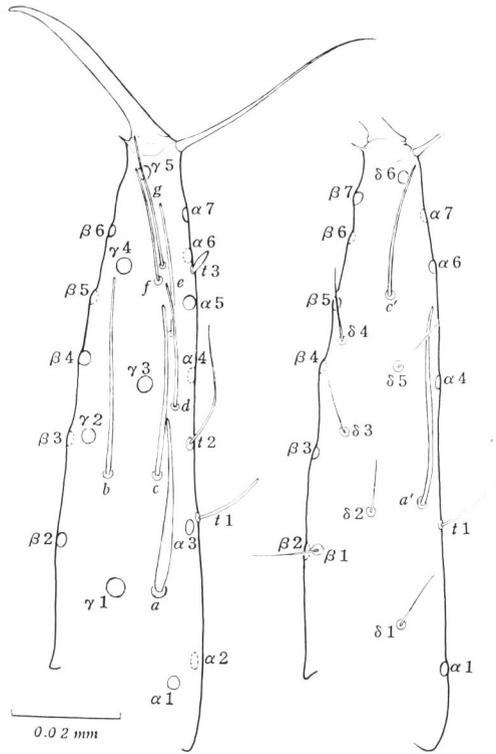


Fig. 18. *Filientomon* cf. *takanawanum*; foretarsus, exterior (left) and interior (right) views.

a, in the relative length of *a'* as well as in the presence of A 4 on urotergite II. In the specimen examined, the foretarsal sensilla *a* is distinctly broad and the apex of *a'* almost reaches the base of *c'*. Such discrepancy may suffice for the erection of a new species. However, we prefer to leave the final decision for future investigations, since the single examined is not the adult but matusus junior.

6. *Nipponentomon nippon* (YOSHII, 1938)

Acerentomon nippon YOSHII (=YOSHII), 1938, Zool. Mag., Tokyo, **50**: 398-400.

Nipponentomon nippon: IMADATÉ & YOSHII, 1959, Contr. biol. Lab. Kyoto Univ., (6): 24-30; IMADATÉ, 1966, Bull. natn. Sci. Mus., Tokyo, **9**: 537-540, from Kosi-gul cave (Kangwon-do); 1973, Annls hist.-nat. Mus. natn. hung., **65**: 151 & 152, from Kum-gang san (Kanwon-do); 1974 Fauna Japonica, Protura, 143-152; IMADATÉ & SZEPTYCKI, 1976, Bull. natn. Sci. Mus., Tokyo, (A), **2**: 269, from Chuul-onbo-ri (Hamgyong-pukto).

Other references are not required here.

Specimens examined. 1 ♀, Chōnma-san (cs 12), 15-VII-1981; 1 Pi (♂) & 5 Mj, Kesōng-si (cs 14), 14-VII-1981; 1 ♀ & 2 LII, Kym gang-san (cs 16), 30-VI-1981; 1 ♀, Kymgang-san (cs 17), 1-VII-1981.

Notes. As mentioned in IMADATÉ (1966, pp. 539–540), such chaetotaxial variations as the symmetrical and asymmetrical absence of body setae are very frequently observed in the Korean specimens examined.

Distribution. Japan and Korea.

7. *Nipponentomon uenoi uenoi* IMADATÉ et YOSII, 1959

Nipponentomon uenoi IMADATÉ et YOSII, 1959, Contr. biol. Lab. Kyoto Univ., (6): 33–35.

N. uenoi uenoi: IMADATÉ, 1965, Bull. natn. Sci. Mus., Tokyo, 8: 25–28; 1973, Annls. hist.-nat. Mus. natn. hung., 65: 151 & 152, from Kum-gang san (Kanwon-do); 1974, Fauna Japonica, Protura, 157–162.

Other references are not required here.

Specimens examined. 2 ♂ & 1 LII, Kymgang-san (cs 16), 30–VI–1981; 3 ♀ & 3 LI, Kymgang-san (cs 17), 1–VII–1981.

Distribution. Japan and Korea.

8. *Kenyentulus* sp.

Specimens examined. 1 LI, Čhōnma-san (cs 12), 15–VII–1981; 1 LII, Kesong-si (cs 15), 13–VII–1981.

Notes. The genus *Kenyentulus* is new to Korea, but it is difficult to identify the exact taxonomic status of the specimens examined due to lack of significant features, since the specimens are in young larval stages. However, the position and shape of foretarsal sensillae are similar to those of the two Asian forms, *K. sakimori* (IMADATÉ) and *K. monlongensis* YIN; the exterior sensilla *a* is relatively long, its apex reaches the base of γ 3, and the apices of *f* and *g* are not surpassing the tarsus. Foretarsal length is 51 μ m in the larva II and 42 μ m in the larva I.

9. *Baculentulus morikawai* (IMADATÉ et YOSII, 1956)

Acerentulus morikawai IMADATÉ et YOSII, 1956, Ins. matsum., 20: 14–16.

Berberentulus morikawai: TUXEN, 1963, Ent. Medd., 32: 97; IMADATÉ, 1973, Annls. hist.-nat. Mus. natn. hung., 65: 151 & 152, from Sagam po (South Phenan) & Kum-gang san (Kanwon-do); 1974, Fauna Japonica, Protura, 195–204; IMADATÉ & SZEPTYCKI, 1976, Bull. natn. Sci. Mus., Tokyo, (A), 2: 270, from Chonma-san (Kesong-si).

Baculentulus morikawai: TUXEN, 1977, Rev. Écol. Biol. Sol, 14: 602.

Other references are not required here.

Specimens examined. 2 ♀ & 2 LII, Mjohjang-san (cs 2), 25–VI–1981; 1 ♂, Hjangsan (cs 3), 23–VI–1981; 1 ♂, 4 ♀, 3 Pi (♂) & 1 Mj, Sōkam-Čōsudži (cs 6), 7–VII–1981; 1 Pi (♂) & 1 LII, Vaudo (cs 7), 10–VII–1981; 1 ♂, 3 ♀, 1 Pi (♂), 1 Mj & 1 LII, Jongak-san (cs 9), 13–VI–1981; 2 ♀ & 1 Mj, Čhōnma-san (cs 13), 16–VII–1981; 1 Pi (♂), 5 Mj & 2 LII, Kesong-si (cs 14), 14–VII–1981.

Distribution. Japan, Korea, Formosa and China.

10. *Baculentulus weineræ* SZEPTYCKI et IMADATÉ, sp. nov.

(Figs. 19–25)

Specimen examined. 1 ♀, Kwail (cs 11), 18–VI–1981.

Body length 1,090 μm , Head 105 μm long, without additional seta (Fig. 25); labial palpus with three setae and one broad sensilla (Fig. 20); pseudoculus rounded, with distinct lever (Fig. 22), PR=9.5; canal of maxillary gland with small calyx, its proximal part 16 μm long with distinct posterior dilatation, CF=6.2 (Fig. 21).

Foretarsus 81 μm in length, TR=4.5 and EU=0.14. Exterior sensilla *a* normal; *b* short, about a half of *c* in length; *c* and *d* very close to each other, the apex of *d* reaching the base of $\alpha 5$; apex of *e* surpassing the base of $\alpha 7$; *f* relatively short, its apex slightly surpassing the base of $\beta 6$; *g* normal; dorsal sensilla *t1* baculiform, BS=0.5; *t2* thin; *t3* long and relatively slender; interior sensilla *a'* broad, at about the same level as *t1*; *b'* absent; *c'* thin, its apex not surpassing the base of $\delta 6$, $\delta 4$ thin and short, subequal to $\delta 5$ in shape and in length; $\beta 1$ thin and short, less than one-fifth of $\beta 2$ in

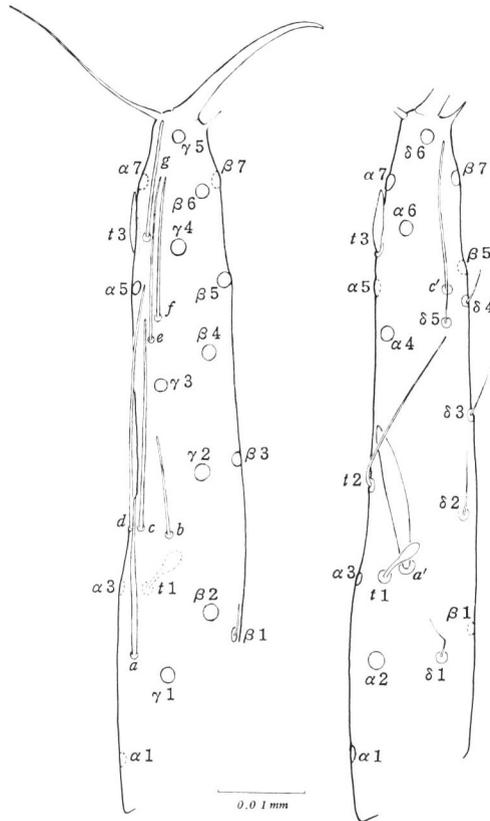


Fig. 19. *Baculentulus weineræ* sp. nov.; foretarsus, exterior (left) and interior (right) views (holotype).

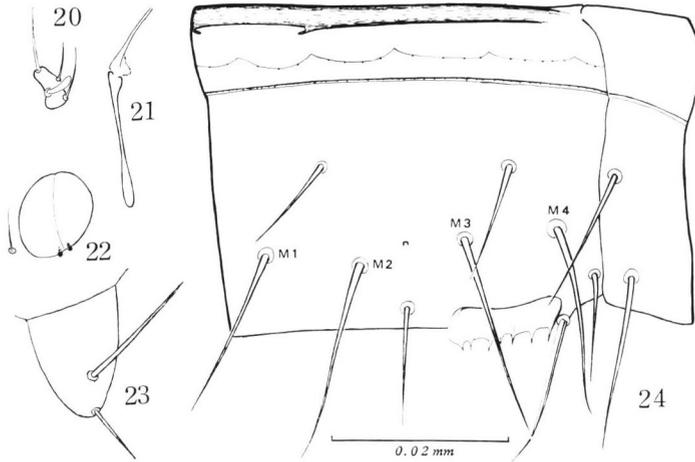


Fig. 20–24. *Baculentulus weineri* sp. nov. — 20. Labial palpus. 21. Canal of maxillary gland. 22. Pseudoculus. 23. Abdominal appendage III. 24. Urotergite VIII (20–24 holotype).

Table 3. Chaetotaxy of *Baculentulus weineri* sp. nov.

		Dorsal		Ventral	
		Formula	Composition of setae	Formula	Composition of setae
Thorax	I	4		$\frac{4-4}{6}$	A 1, 2, M 1, 2 P 1, 2, 3
	II–III	$\frac{6}{16}$	A 2, 4, M P 1, 1a, 2, 2a, 3, 4, 5, 5a	$\frac{7-2}{4}$	A c, 2, 3, 4 M P 1, 2
Abdomen	I	$\frac{6}{10}$	A 1, 2, 5 P 1, 2, 2a, 3, 5	$\frac{3}{2}$	A c, 2 P 1
	II–III	$\frac{6}{14}$	A 1, 2, 5 P 1, 2, 2a, 3, 4, 4a, 5	$\frac{3}{5}$	A c, 2 P c, 2, 3
	IV–VI	$\frac{6}{14}$	A 1, 2, 5 P 1, 2, 2a, 3, 4, 4a, 5	$\frac{3}{8}$	A c, 2 P 1, 1a, 2, 3
	VII	$\frac{6}{16}$	A 2, 4, 5 P 1, 1a, 2, 2a, 3, 4, 4a, 5	$\frac{3}{8}$	A c, 2 P 1, 1a, 2, 3
	VIII	$\frac{6-8}{8}$	A 1, 3, 5, M 1, 2, 3, 4 P 2, 3, 4, 5	$\frac{4}{0}$	
	IX	14	1, 2, 3, 3a, 4, 4a, 5	4	
	X	12	1, 2, 3, 3a, 4, 5	4	
	XI	4	2, 3	6	
	XII	9		6	

length (Fig. 19). Middle tarsus 34 μm in length; claw 15 μm ; hind one 34 μm ; claw 15 μm .

Chaetotaxy similar to that of *B. densus* (IMADATÉ). On urotergites I–VI, three pairs of anterior setae, A 1, 2 and 5, present and P 1a absent. On urotergite VII, A 2, 4 and 5 present, but A 1 lacking and P 1a present. Dorsal accessory setae P 1a and

2a on meso- and metanota equal to each other in shape, minute and club-shaped, less than $2\ \mu\text{m}$ in length; ventral setae A 2 and M2 on prosternum, A 2 on meso- and metasterna and all the dorsal accessory setae on urotergites I–VII similar to each other in shape, short and blunt, about $3\ \mu\text{m}$ in length. Abdominal appendages II–III with two setae, lateral apical seta less than a half of the subapical (Fig. 23). Striate band on abdomen VIII reduced; comb on abdomen VIII consisting of about seven distinct teeth (Fig. 24). Female squama genitalis with stout acrostylus, apically bipartite.

Holotype. ♀, Kwail, Hvanghe-namdo, 18–VI–1981, collected by A. SZEPTYCKI & WEINER.

Notes. The specific name, *weinerae*, is given in honour of Dr. Wanda WEINER, who actively co-operated with the senior author throughout the collecting, extracting and sorting of the present survey in North Korea.

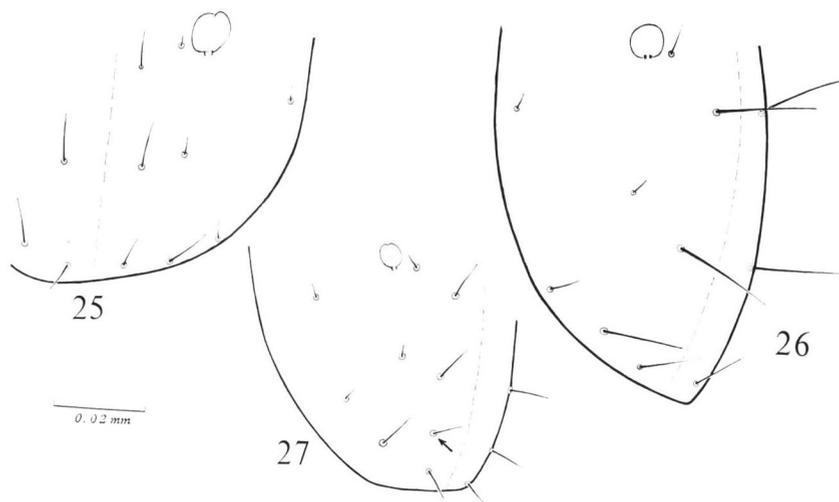
The new species is related to *B. densus* (IMADATÉ) from Japan and *B. loxoglenus* YIN from Northeast China. However, it is distinguished from the former by the characteristics of the foretarsal sensillae such as the position of *a'*, the relative length of *d* and the shape of *t3*, by the ratio TR, and by the shape of comb on abdomen VIII, and from the latter by the absence of P 1a on urotergites I–VI, the relative length of foretarsal sensilla *d*, the shape of *a'* and TR.

11. *Baculentulus* cf. *densus* (IMADATÉ, 1960)

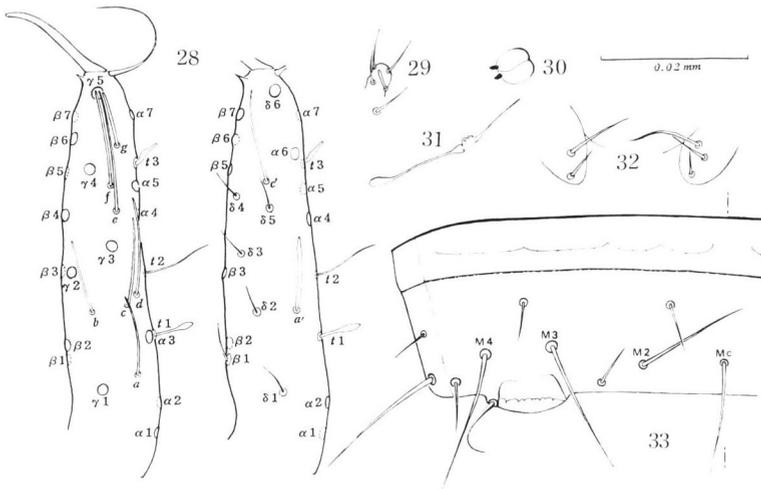
(Figs. 27–33)

Specimen examined. 1 ♂, Kesōng-si (cs 15), 13–VII–1981.

Body length $770\ \mu\text{m}$. Head $95\ \mu\text{m}$ long, with additional seta (Fig. 27); labial



Figs. 25–27. Chaetotaxy of the posterior part of the head. — 25. *Baculentulus weinerae* sp. nov. — 26. *B. densus* from Japan. — 27. *B. cf. densus*. The arrow shows the additional seta.



Figs. 28–33. *Baculentulus* cf. *densus*. — 28. Foretarsus, exterior (left) and interior (right) views. 29. Labial palpus. 30. Pseudoculus. 31. Canal of maxillary gland. 32. Left and right abdominal appendage III. 33. Urotergite VIII.

palpus with three setae and one short sensilla (Fig. 29); pseudoculus relatively small, with distinct lever, $PR=17$ (Fig. 30); canal of maxillary gland simple, its proximal part $13\ \mu\text{m}$ (Fig. 31), $CF=7.2$. Foretarsus $57\ \mu\text{m}$, $TR=3.7$ and $EU=0.13$. The position and shape of foretarsal sensillae similar to those of *B. densus* (IMADATÉ), but *b* longer than three-fourths of *c* in length and *a'* a little broad at about the same level as $\delta 2$, $BS=0.54$ (Fig. 28). Body chaetotaxy also similar to that of *B. densus*, but meso- and metanota without P 1a; urotergite VII with seven middle setae; urostermite XI with only two pairs of setae, 1 and 3, and without seta 2. On urotergites II–VI, asymmetrical absence of such body setae as A 5, P 2a and 4a or asymmetrical presence of P 1a frequently found. On abdominal appendages II–III, the left ones with three setae and the right with two setae (Fig. 32). Comb on abdomen VIII consisting of 8–9 fine teeth (Fig. 33).

Notes. The present form is presumably an unknown species related to *B. densus* (IMADATÉ). However, we cannot decide its exact systematic status, since the single known specimen is asymmetrically aberrant in the important characteristics as mentioned above. Further materials are expected.

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