

On some Collembola of Korea, with notes on the genus *Ptenothrix*.

Riozo Yosii (吉井良三)

Yoshida College, Kyoto University, Japan

and

Lee, Chang-Eon (李昌彦)

Biological Institute, Kyung-Pook University, Taegu, Korea

The present paper deals with 22 species of springtails collected by the second author from the vicinity of Taegu (大邱) during summer months of the year 1961. From the result it is to be said that the Korean Collembolan fauna not only reveals the near relationship to that of Japan, as may be implied by the presence of some common species, but also indicates the strong holarctic nature by the presence of *Allacma*, *Ptenothrix* etc. Occurrence of *Bourletiella spinata* (MACGILLIVRAY) and *Sminthurides bifidus* MILLS, both of which were known from USA alone, is somewhat puzzling. As they are aquatic forms easily transported from one place to another, it is uncertain whether they are indigeneous or recently introduced.

1. *Ceratophysella communis* (FOLSOM 1898)

3 expl. Taegu, 8. VIII 1961

Distr.: Japan, Korea, India, Pakistan, USA, Mexico, Argentine.

2. *Hypogastrura nemoralis* YOSII 1960

8 expl. Taegu, 10. VIII 1961

Korean examples have the paler body colour. It is smaller and have a pair of small lateral teeth of the unguis. Anal spines are upon faint anal papillae. In other respects it is concordant with Japanese forms.

Distr.: Japan, Korea.

3. *Crossodonthina koreana* sp. n. Fig. 1

2 expl. Taegu, 10. VIII 1961

Body length 1.7 mm. Colour totally white in alcohol. Antennae longer than head. Ant. III and IV ankylosed. Ant. IV bears 3 prominent apical bulbs and some erect, socketed setae. Sensory setae long, curving and 6 in number, 7,8 being usual setae. p-seta present. Ant. III-organ is a pair of small, rounded rods in a groove.

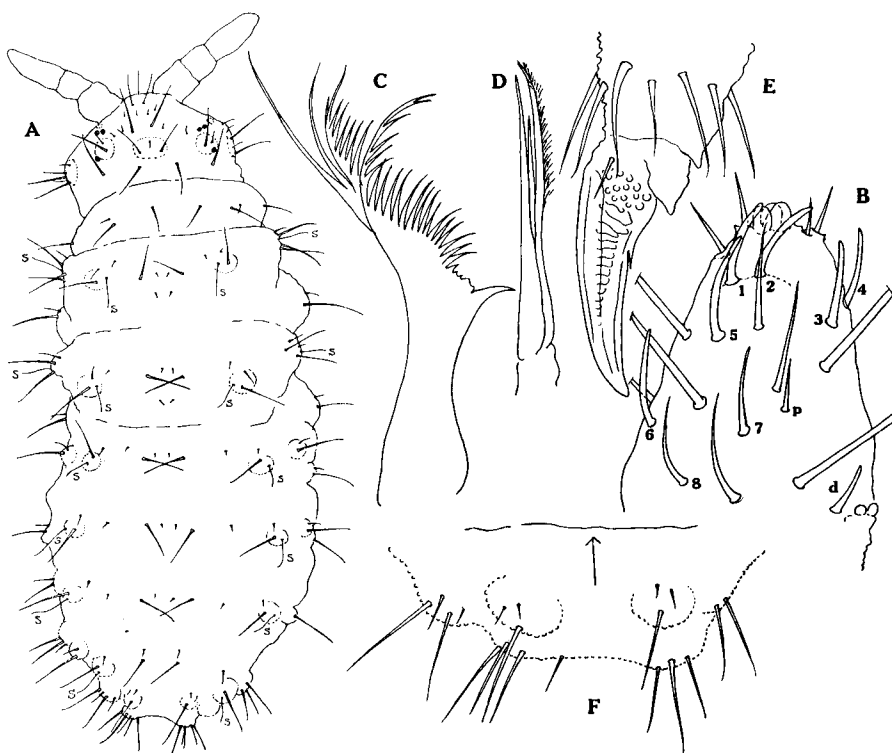


Fig. 1. *Crossodontina koreana* sp. n.
 A: Dorsal view, B: Antennal end,
 C: Mandible, D: Maxilla,
 E: Hind claw, F: Abdominal end.

d-seta suberect and small, v-seta dislocated far ventrally and posteriorly, both blunt and short. Buccal cone ventrally situated. Labrum low and truncate apically. Prelabral setae absent. Labral setae 2+2. Mandible is strongly developed, adorned with fine numerous fringes on one side as in *C. japonica* YOSHI 1954. Maxilla is short and slender. In contrast to all other known forms of the genus, it is divided into three stylets and the inner one is finely ciliated on one side. Eyes 3+3, black, anterior two nearer. Each isolated. Postantennal field with smooth integument is present before eyes. Unguis dorsally carinate, ventrally with one inner tooth and its interior face is basally granular and then with many transverse striae in considerable length. Ventral tube with 3+3 setae. Furcal rest is a median rounded area with 3 small setae on it. Body tubercles are very poorly developed: Upon th. II-abd. IV, all dorsal tubercles are reduced and represented by 1+1 long setae, each accompanied by 2+2 (thorax) or by 1+1 (abdomen) minute setae. Subdorsal tubercle

is present in reduced form and setal arrangement is normal for *Lobellini*. Sublateral and lateral tubercles are all small, hemispherical. Abd. V is very small, almost concealed by abd. IV and beset with 2+2 tubercles, the dorsal pair is remote to each other, with one large and 2 minute setae each. Lateral one is very obscure and with some long setae. s.s. is not observed. Abd. VI is also very small and a pair of tubercles are, in reality, nothing but a swelling of the corner, remote to each and with many long setae. All body setae are simple, uncoloured and the distinction between longer and smaller setae are conspicuous.

From other species of the genus *Crossodonthina* YOSH 1954, which is characterized by the peculiar form of mouth parts and by the absence of prelabral setae, this new species is distinct in the reduced body tubercles and special form of maxillae.

4. *Onychiurus flavescens* KINOSHITA 1916

2 ♀, Taegu, 10. VIII 1961

Distr.: Korea, Japan.

5. *Isotomurus balteatus* (REUTER 1876) Fig. 2

5 expl. Nack-Dong River, 17. IX 1961

Body length up to 1.6 mm. Ground colour whitish, with broad violet bands along anterior margin of each body segments. Furthermore, lateral margin of th. II-abd. II are narrowly banded. Antennae pigmented. Legs and furcula pale. Ant./head as 5:4. Ant. ratio as 15:25:27:36. Ant. IV subapically with a slender conical papilla. Ant. III-organ is two blunt rods in separate grooves. No accessory setae present. Postantennal organ elliptical, without median constriction and as large as an eye in diameter. Eyes 8+8, upon black eye patches. Labrum with usual number of 4/5, 5, 4 setae and distal margin has 2+2 longitudinal streaky ridges. Unguis without inner tooth, but with a pair of prominent lateral and one dorsal teeth connected by a dorsal ledge. Unguiculus acute, with rounded inner margin and untoothed. Tenent hair one, slender and setaceous. Large setae of tibiotarsus lightly ciliated. Others smooth. Ventral tube has lateral flaps with 5-6 small setae each. Furcula well extended, man: d as 3:5. Manubrium hirsute on all sides, but without modified setae. Terminal thickening with one spine each. Dentes ventrally hirsute, dorsally hirsute upon proximal 1/2. Mucro quadridentate: outer basal tooth as large as others. No mucronal seta observed. Body setae are brownish, simple, except those upon abd. V, VI, which are densely ciliated. s. s. not observed. Rami tenaculi 4-dentate, corpus with 6 setae.

Although the European examples of the species are not yet investigated, the

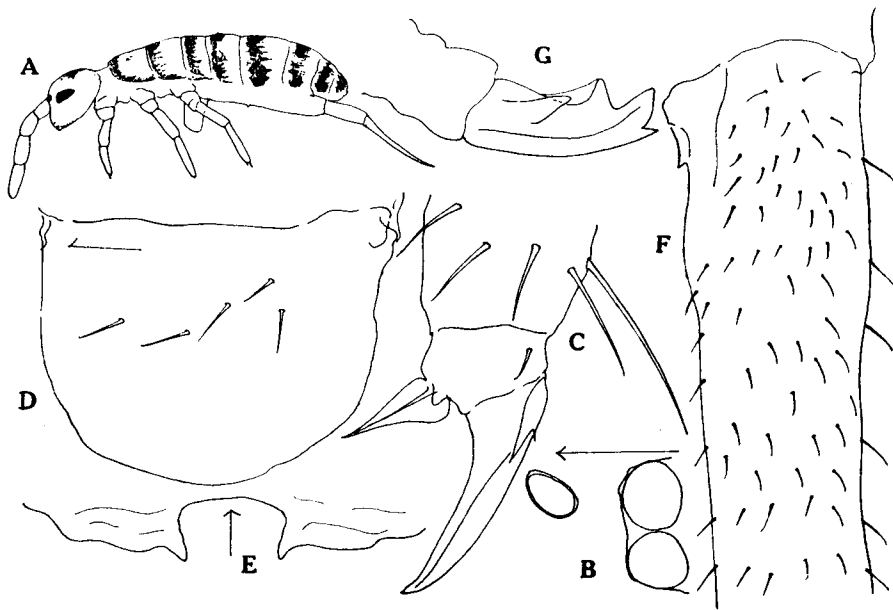


Fig. 2. *Isotomurus balteatus* (REUTER)

A: Habitus, B: Postantennal organ, C: Hind claw,
D: Lateral flap of ventral tube, E: Proximal dorsal view of dentes,
F: Terminal thickening of manubrium, G: Mucro.

Korean ones are to be identified as *balteatus* by the similarity of colour pattern. From other species of the genus it is readily divided by the number of setae upon lateral flap of the ventral tube.

Distr.: holarctic

6. *Isotoma viridis* BOURLET var. *riparia* NICOLET 1844

5 expl. He-In Temple, 2. IX 1961

Distr.: holarctic

7. *Tomocerus ochreatus* DENIS 1948

4 expl. Mt. Un-Mun, 18. VIII 1961, 3 expl. Mt. Phal-Gong, 2. IX 1961

Distr.: Vietnam, India, Honkong, Formosa, Japan, Korea.

8. *Tomocerus ishibashii* YOSII 1954

2 expl. Mt. Phal-Gong, 11. VIII 1961

Body colour is equivalent with Japanese forms in all details. Dental spines are almost black, more cuspidate than in *T. ochreatus* and arranged as 1, 1, 1, 4/4 in contrast to 1, 1, 3-4/4-5 of Japanese forms.

Distr.: Japan, Korea.

9. *Tomocerus violaceus* YOSII 1956
 4 expl. Mt. Phal-Gong, 11. VIII 1961
 Distr: Japan, Korea.
10. *Sinella umesaoi* YOSII 1940
 2 expl. He-In Temple, 2. IX 1961
 Distr.: Japan, Korea.

11. *Entomobrya striatella* BÖRNER 1909 Fig. 3

9 expl. Mt. Phal-Gong, 11. VIII 1961, 4 expl. Nack-Dong River, 17. IX 1961

This species is redescribed in YOSII 1942, p. 480, but following notes are to be added: Ant. IV distally with 2 spherical bulbs. Ant. III-organ is two blunt rods. Labral setae 4/5, 5, 4. Prelabral setae are smooth, not plumose nor ciliated under oil-lens system. Intrusion of distal smooth area is rounded. Distal margin of labrum with 2+2 minute granules, the lateral pair of them are very small, almost invisible. Trochanteral organ composed of ca. 40 spiny setae in a quadrangle. Ventral tube anteriorly with many ciliated setae, distal 2+2 of them are larger than others.

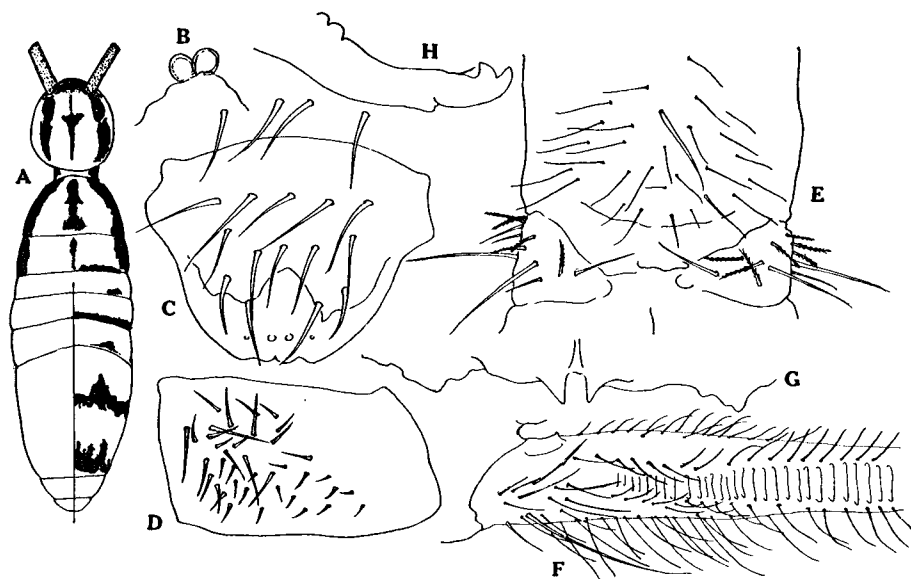


Fig. 3 *Entomobrya striatella* BÖRNER

A: Habitus of pale and heavily pigmented examples, B: End of Antennae,
 C: Labrum, D: Trochanteral organ, E: Terminal thickening of
 manubrium, F: Ventral tube (posterior face), G: Proximal dorsal
 view of dentes, H: Mucro.

Posterior face has ca. 30 small setae, including a median proximal one slightly larger than others. Lateral flap has ca. 5 smooth and 8 ciliated setae each. Marginal thickening of manubrium medially bispinose. Dentes without brush setae, dorso-lateral setae of each sides are not strong, but equally arranged and the rows are, in dorsal aspect, converging upon proximal part. Mucro equally bidentate or anteapical tooth slightly larger than the apical one.

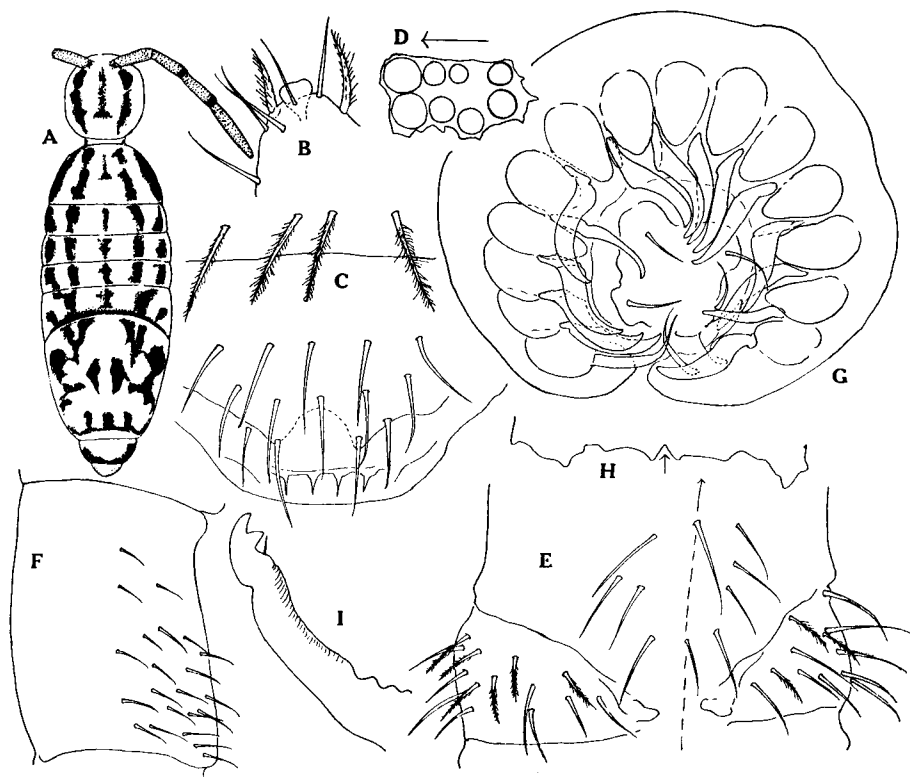
All examples of the species are females and male genital area is not observed. This is the first case of *Entomobrya* in which the prelabral setae of labrum are smooth.

Distr.: Japan, Korea.

12. *Entomobrya handschini* STACH 1922 Fig. 4

1 ♂, Mt. Phal-Gong, 11. VIII 1961

Body length 1.8 mm. Ground colour whitish, but with beautiful purplish black patches. Antennae reddish black, distal end of ant. II, III are darker. Head with a median and a pair of lateral longitudinal patches, the latter containing black eye-fields. Th. II to abd. III has a median and two pairs of longitudinal streaks, hind margin of abd. III and IV dark. Abd. IV is irregularly but symmetrically patched. Abd. V is with black margin. Abd. VI pale. Legs patched diffusely upon femur and tibiotarsus. Furcula with a slight patch ventrally near the basis. Ant./head as 7:2. Ant. ratio 12:19:15:24. Ant. IV not annulated, apically with a club-shaped end-bulb in a groove. Setae around it are spinose or intensely feathered. Ant. III-organ is two blunt rods without groove. Labral setae 4/5, 5, 4. Prelabral setae intensely feathered and inner pair near together. Median intrusion of smooth distal area shallow, rounded. Distal margin of labrum with two pairs of minute, but high spinose papillae. Eyes 8+8, intensely black. Legs with usual type of claws and tibial tenent hairs. Trochanteral organ composed of ca. 20 rather feeble setae in a quadrangle. Ventral tube anteriorly with many long, ciliated setae on both sides of the median groove. Posterior face has 3, 2+2, 3 setae all simple. Lateral flap bears some 14 setae either simple or ciliated. Furcula well developed. Manubrium ventrally with many slender setae, terminal thickening is weakly developed, with a small median intrusion. Dentes proximal dorsally without large setae, but with some 10 medium-sized feathered setae somewhat thickened. Mucro is equally bidentate, with a basal spine. Male genital opening is surrounded by 16 papillate ring and 17 genital setae, latter are broad, long, geniculate, laterally compressed, apically pointed and hyaline. The first pair of them are rather slender. All body setae well developed, clubbed ones are castaneous in colour.

Fig. 4 *Entomobrya handschini* STACH

A: Habitus, B: End of antenna, C: Labium, D: Eyes,
 E: Posterior face of ventral tube, F: Trochanteral organ,
 G: Male genital opening, H: Terminal thickening of manubrium,
 I: Mucro.

The Korean example coincides well with STACH's description and figure in body pattern, but as other details of the species is unknown, identity is to be affirmed by comparing it with European examples.

Distr.: Poland, Hungary, Korea (first record from Asia).

13. *Entomobrya pulcherrima* YOSII 1942 Fig. 5

2 expl. Mt. Phal-Gong, 11. VIII 1961, 2 expl. Nack-Dong River, 17. IX 1961

Body length 2.0 mm. Ground colour yellowish, sometimes either light brown or whitish, adorned by deep blue-black patches. Antennae distinctly banded upon distal part, the last segment almost in whole length. Head with a broad transverse band between eyes and distal part obscurely dark. Th. II, III with a pair of pigmented areas dorsally, which may become larger to form a transverse band

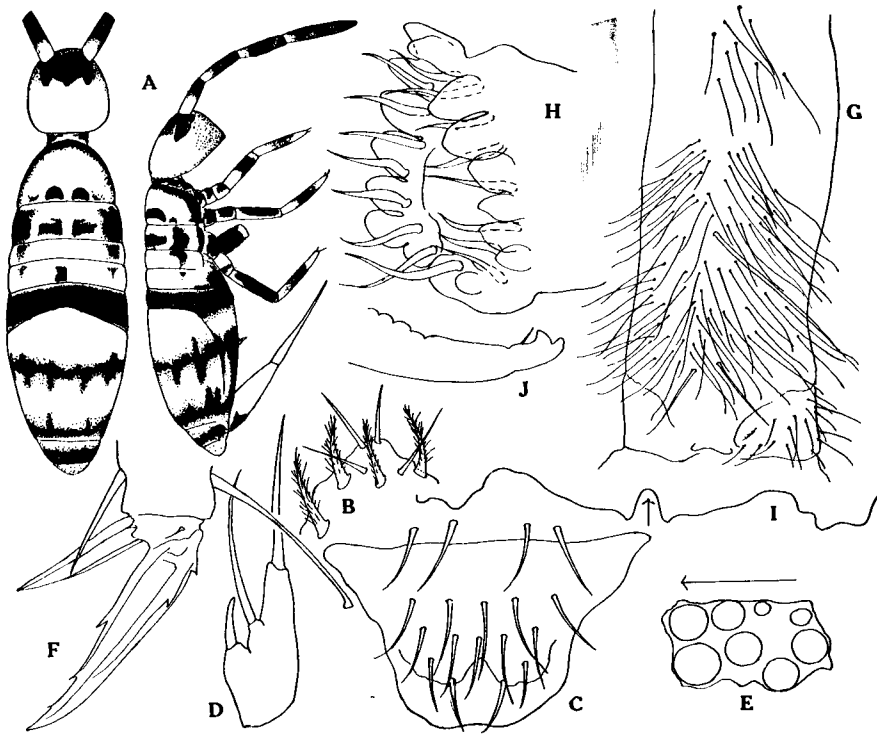


Fig. 5 *Entomobrya pulcherrima* YOSII

A: Habitus, B: End of antenna, C: Labrum, D: Outermost papilla of labium, E: Eyes, F: Hind claw, G: Posterior face of ventral tube, H: Male genital opening, I: Terminal thickening of manubrium, J: Mucro,

interrupted medially. Th. III has, besides, a large lateral patch, which is extended posteriorly to abd. I and II. Furthermore, segmental margin of th. II, III are narrowly pigmented. Abd. II is almost pale, but a median unpaired patch may be present (1 expl.). Abd. III is almost wholly and deeply pigmented in dorsal view, but with a pale area in lateral portion. Abd. IV has two narrow transverse stripes. Abd. V pigmented. Abd. VI pale or pigmented. Ventral side of the body is considerably dark, including the cervical part, subcoxae and ventral tube. Coxa and trochanter of all legs with pigments. Femur with a longitudinal stripe. Tibiotarsus diffusely or distinctly pigmented at about the middle. Furcula pale, but with a basal patch. Ant./head as 5/2. Ant. ratio as 18:28:28:36. Ant. IV without any apical bulb. Ant. III-organ is two short rods. Labral setae 4/5, 5, 4. The prelabral setae are either smooth (Korean examples) or feathered (Japanese ex.), the

median pair is located widely apart to each other. Median intrusion of smooth area is broadly cuspidate. Distal margin without any granules nor tubercles. Outermost papilla of labium as in fig. D. Eyes 8+8, unequal and upon black patch. Tenent hair slender, apically slightly dilated and shorter than inner side of unguis. The latter, is slender, with a dorsal, one pair of lateral, one pair of inner proximal and two inner distal teeth, all not very prominent. Unguiculus lanceolate, apically acute and undentated. Tibiotarsal setae all ciliated. Trochanteral organ composed of more than 60 small spinose setae, marginal ones are larger. Ventral tube anteriorly with many ciliated setae, terminal 3+3 are very long and large. Posterior face is densely hirsute, with many slender setae. A proximal median one among them is thicker than others and alike to that of *Homidia* spp. The terminal 1+1 is smooth. Lateral flap has ca. 7 smooth and 10 feathered setae. Furcula well extended. man: d. as 10: 11. Manubrium hirsute on all sides, with many ciliated setae, and laterally with a row of more than 20 larger setae. Terminal thickening is medially with a low, insignificant process. Dental setae on both sides of the dorsal crenulated stripe is not at all differentiated. Mucro bidentate and with a basal spine, the apical tooth is smaller than the anteapical one. Male genital opening (observed in a male from Mt. Kamuriki, Japan) has a papillate ring and some 17 slender, slightly curving setae, the basal two pairs of which are more slender and elongated.

The species is near *E. corticalis* (NICOLET 1841) of Europe in the body pattern, but different in the banded antennae and legs. *E. corticalis* var. *affinis* BÖRNER 1909 may be a near relative of *E. pulcherrima*. The specimen described with figures by YOSHII in 1942 is an intensely coloured example.

Distr.: Japan, Korea.

14. *Homidia sauteri* BÖRNER var. *depicta* BÖRNER 1909

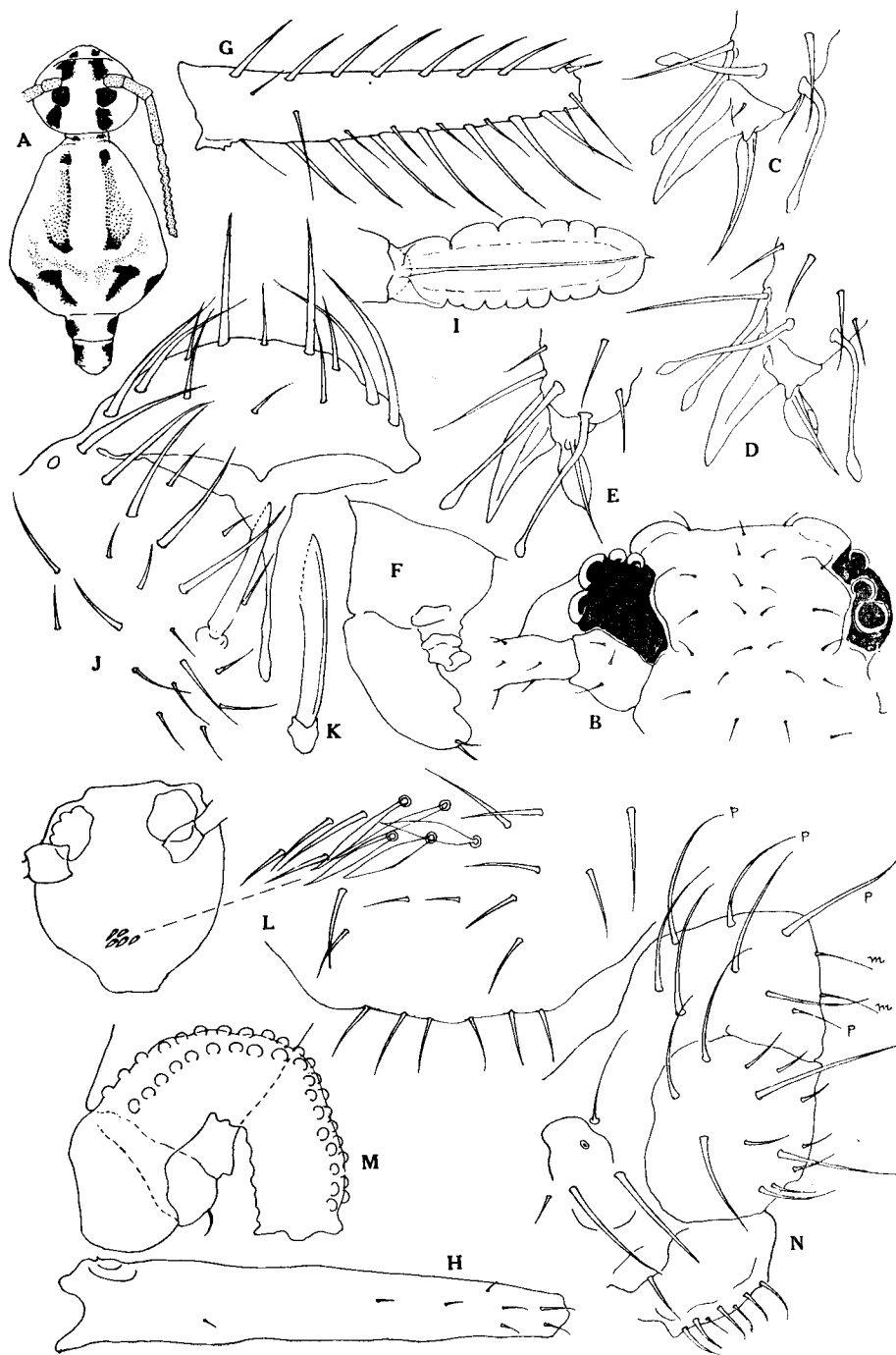
1 ex. Mt. Un-Mun, 18. VI 1961, 4 ex. Mt. Phal-Gong, 11. VIII 1961, 3 ex. He-In Temple, 2. IX 1961

Distr.: Japan, Korea.

15. *Sminthurides bifidus* MILLS 1934

2 ♀, Kum-Ho River, 10. IX 1961

Two examples coincide fairly well with the description of FOLSOM and MILLS 1938. Antennae are subsegmented. A subapical seta of hind unguiculus is either bifid or trifid. That of fore- and mid-legs are elongate, dilated. Tibiotarsal organ is two short rods and the guard seta is thick, unequally bifurcated. d./mu is 2.8. Body colour light brown dorsally and dirty gray ventrally. Exact description is



retained until male examples are obtained.

Distr.: USA, Korea (first from Asia).

16. *Heterosminthurus undulans* sp. n. Fig. 6

2♀, 2♂ Nack-Dong River, 17. IX 1961

(Female): Body length 1.5 mm. Ground colour brownish white, streaked with brown and black pigments. Antennae brownish blue all over. Head has a pair of brownish longitudinal patches running through the black eye-patch. They are extended to the large abdominal in a pair of anteriorly obscure and posteriorly distinct black longitudinal streaks, interrupted at about the middle. Laterally a small black patch is participated and the posterior half of abdominal is mottled with brown pigments. Anogenital segment laterally patched. Legs and furcula almost pale. Ant./head as 2:1. Ant. ratio as 12:35:55:95. Ant. IV annulated into 9 subsegments, each with a whorl of setae. No antennal setae are modified. Ant. III-organ is a pair of small, slender rods without groove. Labral setae 6/3, 5, 4, of which all setae of the first row are small. Distal labral margin with 2+2 transverse small tubercles. Eyes 8+8, black. Setae of the head are all simple and small. A pair of low tubercles present upon vertical area. Unguis of all legs are untoothed, broad and dorsally carinate. Unguiculus is elongated and pointed upon fore-legs, setaceous and with a broad, rounded inner and narrow outer margin upon mid- and hind-legs. Modified hairs are 3, 3, 2 in number, prominently thick and dilated on apex. Ventral tube with 1+1 seta, filament with two rows of granules. Tenaculum with tridentate rami and corpus bearing 1+1 small apical setae. No diverticula present. Furcula well developed, ratio as 5:8:3. Manubrium is ventrally nude and dorsally with 8+8 simple setae. Dentes is converging, with a trace of many transverse dorsal folds upon distal 1/3. Dental setae are laterally strong, about 1/2 times the length of mucro and thick.

dorsal: 1 ———— 1 = 2

outer: 1, 1, 1, 1, 1, 1, 1, 1, = 9

inner: 1, 1, 1, 1, 1, — = 5, thin

1, 1, 1, 1, 1, 1, 1, 1, = 8, thick

ventral: 2, 2+1, 1, 1, ——— 1 = 8, thin

Fig. 6 *Heterosminthurus undulans* sp. n.

A: Habitus, B: Vertex of head, C: Fore claw, D: Mid claw, E: Hind claw, F: Tenaculum, G: Dentes (dorsal view), H: Dentes (ventral view), I: Mucro (dorsal view), J: Anal opening, K: Appendix analis, L: Special setae of the head in male, M: ventral tube, N: Male anogenital segment (lateral view).

Mucro is broadly gutter-like, both margins are broad, hyaline and divided into 7-8 lobes by deep incisions, giving an undulating impression in dorsal view. Ventral ridge is extended to the apex and ending in a pointed needle, which is slightly projecting from the end. Mucronal pseudonychium present, narrow and with entire margin. Anogenital segment is separated saddle-like. Upper flap of anus bears 9 anal setae, all smooth and a_0 , a_2 are smaller than others. sa is shorter than sa' . Upon lateral flaps anal setae are 5, appendix analis is large, ca. 0.5 times the mucro in length, slightly curving, almost blunt and, in posterior view, faintly serrated upon distal 1/3 on inner side. All body setae are short, simple, curving and pointed. Integument smooth.

(Male): Body length 0.8 mm. Almost equal with females in morphological details. But 5 setae of the facial area are modified to broad, foliaceous form. They are located above the prelabral setae medially and arranged as 2,3. Anogenital segment is erecting, saddle-like and no special modified setae are to be seen on it.

The species is possibly identical with *D. undulatus* HAMMER 1953 of Northern Canada. However, it is described from one example with 0.5 mm. of body length. Apparently it is a young individual and considerably simple in the structure of furcula etc., compared to the description given here. *H. undulans* is also near *Bourletiella aquatica* MAYNARD 1951 of USA, but different in the form of appendix analis, mucro and anogenital setae of male. The peculiar modified facial setae of male in this species is very characteristic.

17. *Bourletiella* (*Pseudobourletiella*) *spinata* (MACGILLIVRAY 1893) Fig. 7
2♀, Nack-Dong River, 17. IX 1961

Body length up to 2.0 mm. Colour pure green in dorsal view. Antennae and legs are reddish gray. Ant./head as 2/1. Ant. ratio as 7:18:20:45. Ant. IV divided into 17 subsegments. Ant. III-organ is a pair of short, blunt rods. Labral setae 6/5, 5, 4. The third row of setae are stronger than others and upon small sockets. Distal margin with a pair of transverse granules. No ledge is present to divide distal area from the other. Frontal setae not modified, not in symmetrical arrangement. Postantennal seta absent. Eyes 8+8, black. Upon each tibiotarsus, three of the distal setae are distally clavate, thick and reaching the middle of the unguis. The latter is dorsally broadly carinate, apically acute and with one inner tooth. Unguiculus is vestigially small upon fore- and mid-legs and larger upon hind-legs. The shape is, however, always fusiform, apically acute and with an axis. Shaft of the ventral tube has 1+1 lateral setae distally. Terminal filament of it is smooth, but with a longitudinal row of warty granules all through the length. Tenaculum with

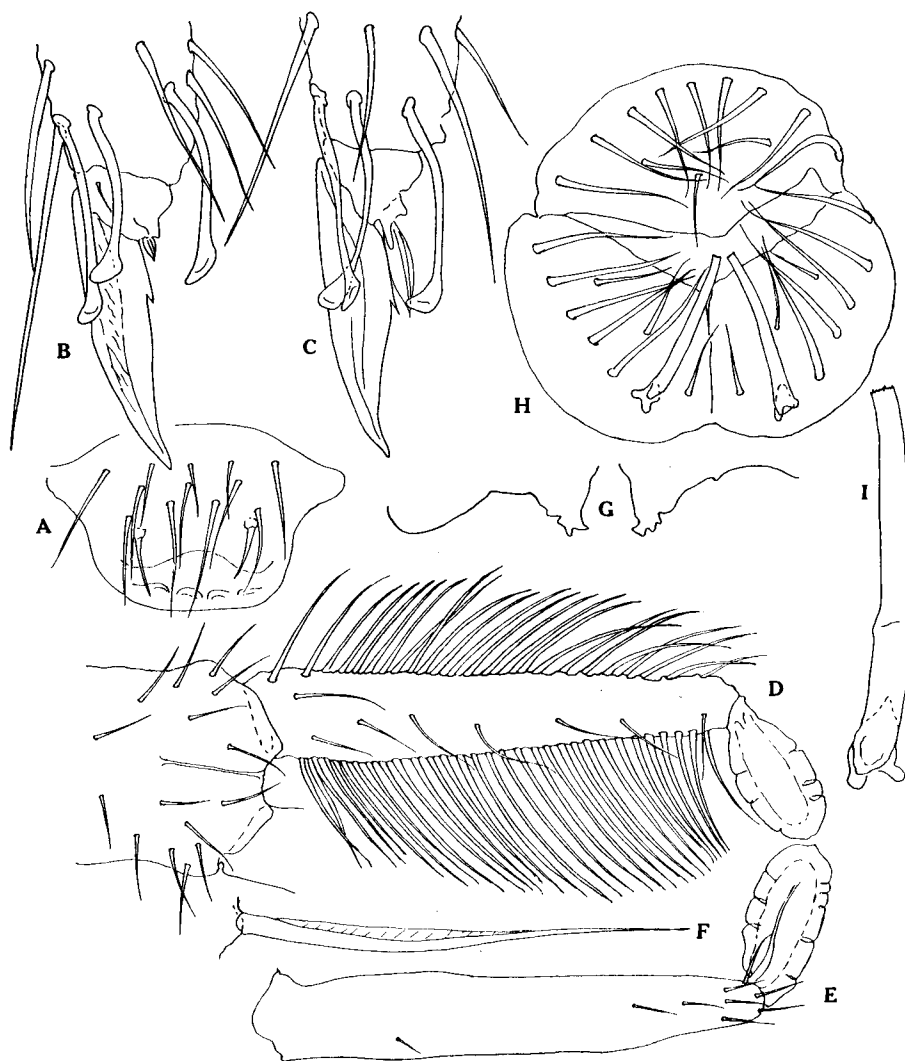


Fig. 7 *Bourletiella* (*Pseudobourletiella*) *spinata* (MacGILLIVRAY)

A: Labrum, F: Fore claw, C: Hind claw, D: Furcula (dorsal view),
 E: Furcula, (ventral view), F: One of the large lateral dental setae,
 G: Terminal thickening of manubrium, H: Anal opening of female,
 I: Appendix analis,

tridentate rami, corpus with 2 apical setae. Furcula well extended, being adapted for aquatic mode of life. Ratio as 12:30:10. Manubrium short, dorsally with 8+8 setae and a median furrow on distal half, ventrally without setae and with a pair

of tricuspidate terminal thickening well chitinized. Dentes dorsally granulated all through the length and ventrally smooth. Outer (25 in number) and inner (34) setae are very long and closely set to form a fan. Distally situated setae are slightly alate on distal side of each seta. Dorsal setae 8, small. Ventral setae 3, 3, 1, 1—1. Mucro is broadly foliaceous, apically rounded, both lamellae hyaline and slightly undulated. Ventral lamella narrow and not reaching the apex. Body setae are all smooth, not modified upon large addominal. Genital segment has dorsally three transverse rows (b-, c-, d-row) of undifferentiated setae, without having a median seta. Anal flaps have both anal and subanal setae well represented, all smooth and subequal in length. Upper anal flap has a_0 to a_4 , while lateral flap has a_1 to a_5 . Appendix analis is very long, smooth, almost rod-like and not tapering distally. Distal end of it is suddenly truncate and with minute serration. A slight node-like swelling is present at about the middle of it.

As may be seen from the description and figure, the coincidence with FOLSOM's (1934) description is very great and, although the male is not investigated, the identity is almost sure. Occurrence of this nearctic species from Korea is surprising.

Distr.: USA, Korea (first from Asia).

18. *Sminthurus viridis* LINNÉ var. *annulatus* FOLSOM 1899

5 expl. Nack-Dong River, 17. IX 1961

Distr.: Japan, Korea. The species is almost cosmopolitan.

19. *Allacma koreana* sp. n. Fig. 8

4 expl. He-In Temple, 2. IX 1961

Body length up to 1.8 mm. in ♀ and 1.5 mm. in ♂. Body colour dorsally brownish, mottled with brownish gray pigments. Upon anogenital segment the dorsal part is intensely black, while other parts are almost pale. Antennae distally darker. Legs, furcula and ventral side of the body light brown. Ant./head as 3:2. Ant. ratio as 10:26:26:50. The last segment annulated into 12 subsegments. Ant. III-organ is a pair of long rods. Ant. III and II bearing some strong, rough setae and that of ant. III is the strongest of all. Labral setae 6/3, 5, 4, of the first row the median one is long, while a pair of another are small. Setae upon head are long. Larger vertical ones are rugose and they are arranged symmetrically as in fig. D. Postantennal seta short, rounded apically and minutely ciliated on distal half. Eyes 8+8, black. Legs short: unguis broad, with or without one inner tooth, with prominent dorsal tunica and a pair of serrated pseudonychia. Unguiculus broadly lanceolate, apically pointed. Inner margin has a small corner-tooth and, besides, a prolonged

spiny process near the apical end of it. Apical bristle slightly over the unguiculus. No tenent hair. Some setae dorsally near the end of the tibiotarsus are longer than others. Hind trochanter bears one modified, hyaline seta on inner side. Furcal ratio as 14:20:9. Manubrium short, dorsal setae simple and 2+2, 5+5 in arrangement. Ventral setae none. Dentes tapering, somewhat warty dorsally. Basal part has dorsal swelling, upon which 6 setae, including a longer median one and a minute outer one are located. Outer row has 9 setae, 2-3 of the proximal group minute. Dorsal group is composed of 9-10 setae, including 3 longer setae, which are, however, never capitate. Inner row 9, somewhat more spinous than the others. Ventral setae are 3, —, 2, 2, 2, 1— — — 1. The proximal one is minute. Mucro broad, outer margin smooth, with subapical and basal swelling. Inner margin with ca. 12 rounded serrations. Apical incision prominent. An outer mucronal seta present. Ventral mucronal pseudonychium is minutely serrated. Body setae are intensely brown, suberect, 1.3 times the length of mucro, slightly blunt and rugose. Anogenital segment is appended saddle-like to the abdomen. A short before, on both sides of the median dorsal setae, a pair of small rounded area, the opening of dorsal gland are to be seen. Genital segment dorsally with 1+1 long setae upon rounded tubercles. Upper flap of anal valve has 7 anal setae, all rugose, accompanied dorsally by 1+1 s. s. and long seta G. Lateral flap has two anal setae rugose. From three subanal setae of each anal flap the median one is long, while others are converted to minute spiny ones. Appendix analis very large, gutter-like and finely serrated on distal half upon both margins. Ventrally, a little proximal to the genital orifice, a pair of rounded area, a glandular opening alike to that of the dorsal gland, are to be observed. Both of these glands are, however, absent in male examples.

This species is the near relative of *Allacma fusca* (L.) of Europe and may be divided only by the presence of minute setae of dentes in outer row. As the anogenital area of *A. fusca* is not yet clear, some other characters may be added. Presence of glandular opening near the genital orifice of ♀ is probably not confined to this species, but of generic nature. *Sminthurus purpurascens* (MacGILLIVRAY 1894) seems to be a near relative of the present species, although MAYNARD 1951 has not observed the dorsal pore.

19' *Allacma koreana* f. *leucocephala* f. n. Fig. 8, B

5 expl. He-In Temple, 2. IX 1961

Boby length 2.0 mm in ♀ and 1.5 mm in ♂. Ground colour is white, but all of the abdominal part is intensely purplish black, including anogenital segment. Head



almost pale, but with a short longitudinal patches behind each eye-field. Antennae distally bluish, legs pale. Furcula bluish on proximal half.

This is a colour variety of *A. koreana*, no morphological difference is to be observed.

20. *Ptenothrix ciliophora* sp. n. Fig. 9

3 expl. He-In Temple, 2. IX 1961

Body length 2.5 mm. Ground colour brown, with castaneous black ornaments. Head pigmented near the mouth. A median spot present. Upon large abdominal a median dorsal pale stripe on anterior half, both margins of which are narrowly brownish banded. Posterior half has a median longitudinal stripe of deep brown, with pale marginal areas on both sides of it. Abdominal papillae white. Posterior lateral corner has one large black spot. Genital segment laterally spotted in deep brown. Antennae and legs pale, with suffusion of gray. Furcula pale. Ant./head as 2:1. Ant. ratio as 1:8:10:2. Labrum with labral setae as 6/5, 3, 4, distal margin with 2+2 low, transverse ridges. Eyes black, 8+8. Unguis slender, with a dorsal pseudonychial complex and two inner teeth. Unguiculus acute, with one inner corner-tooth and its subapical filament is extended, ending in a spherule upon fore- and mid-legs and acute or obtuse upon hind legs. Modified setae of hind legs pinnate, with 6 pairs of oppositely lying rami. Tenaculum with corpus anteriores apically with 4 setae and laterally with a pair of prominent tubercles. Rami tridentate. Furcula well extended. Manubrium dorsally with 9+9 simple setae. Dentes tapering, with normal arrangement of setae. Of the outer lateral pinnate setae the last one (ou_1) is spiny, simple and slightly rugose, ou_2 serrated basally. Relative lengths of ou_{1-4} as 10:10:28:33. Mucro serrated on both margins (outer 33, inner 48) and with a mucronal pseudonychium ventrally. Apical incision is rather broad and shallow. Setae of the head is very conspicuous, beside the usual spinous setae of the vertex which are in usual arrangement in this species, some of the median group of frontal setae are converted to spinous, blunt forms, not much different from vertical ones. They are 1, 1, 2, 2, 1, 1 in number and all of

Fig. 8 *Allacma koreana* sp. n.

A, B: Habitus, C: Antenna, D: Head, E; F: Hind claw, G: Dentes (lateral view), H: Mucro, I: Dorsal view of the posterior end of abdomen, showing a pair of glandular opening, J: Ventral view of the posterior end of abdomen, showing a pair of genital glandular opening, K: Anal opening with appendix analis.

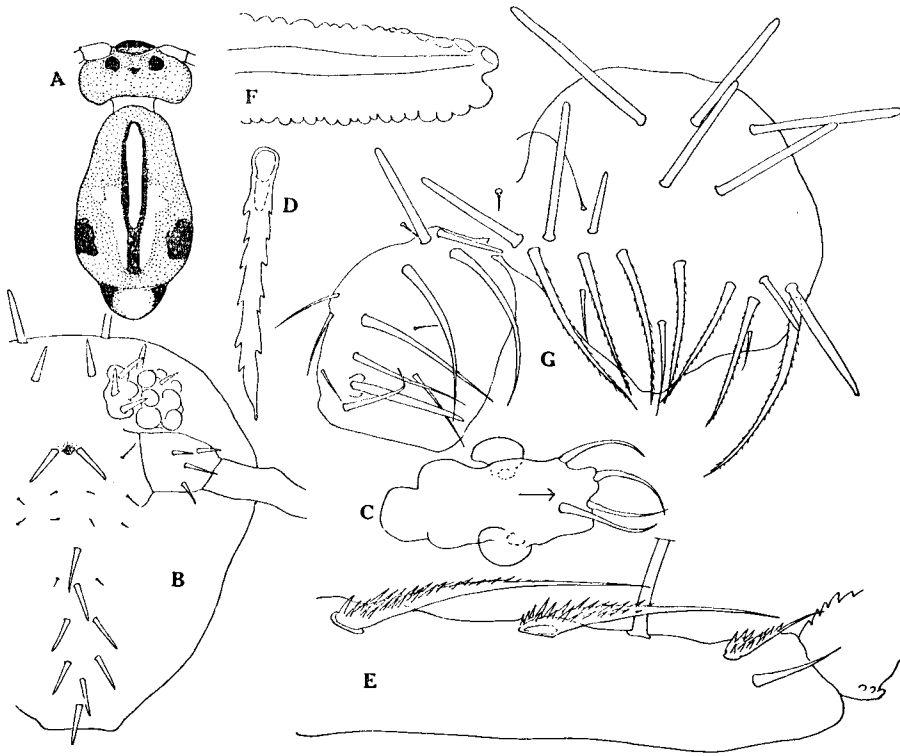


Fig. 9 *Ptenothrix ciliophora* sp. n.

A: Habitus, B: Setae of the head, C: Tenaculum in frontal view,
D: Modified seta of hind legs, E: Outer lateral row of dental setae,
F: End of mucro, G: Female anogenital segment.

them are equally long. Some setae of ant. I, II are also more or less spiny and thick. Dorsal abdominal setae 5+5, blunt, rather long, being 2.5 times the length of mucro. Posterior abdominal setae short, numerous and spinous. Anogenital setae are also peculiar: M, M' and N are blunt and long. G blunt. H, T, L, L' are as long as N. In upper anal flap all anal setae are minutely ciliated, while subanal setae are all smooth and sa is larger than sa' . Upon lateral flap anal setae (a_3 and a_1 at least) are smooth. sa_1 small. sa_2 subequal to sa_3 . Appendix analis is slender, blunt and slightly longer than sa_3 .

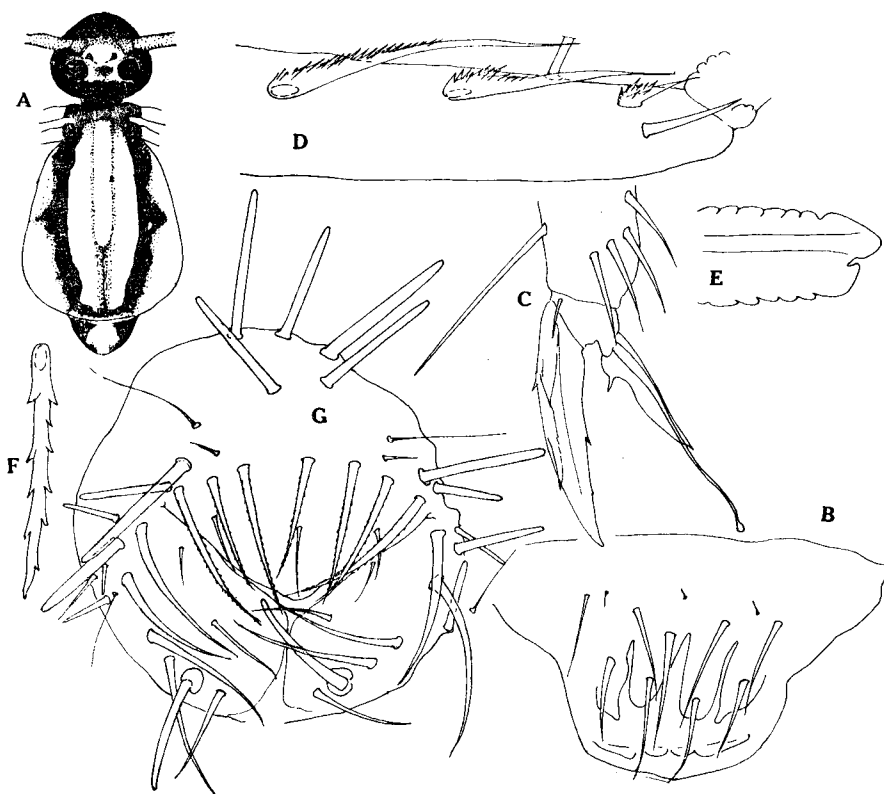
This new species is characterised morphologically by ciliated anal setae and blunt G seta. Body pattern is relatively uniform within examples at hand.

Distr.: Endemic to Korea.

21. *Ptenothrix saxatilis* sp. n. Fig. 10

5 expl. He-In Temple, 21. X 1961

Body length 1.8-2.0 mm. Ground colour brownish white, but pigmented black. Antennae reddish gray all over. Head uniformly black, except a median pale area between eyes. Neck and coxae of all legs black. Large abdominal with a pair of slender longitudinal dorsal stripes upon proximal two thirds, which are united to one median stripe posteriorly. Both sides of the stripe is broadly pale and the lateral side of the pale area is broadly adorned with black band. Abdominal papilla either black or pale. Anogenital segment laterally pigmented. Ventral side of the body, legs except coxae and furcula are pale. Head with usual arrangement of setae. Facial setae thick as in *P. ciliophora*. Labral setae 6/5, 3, 4. Eyes 8+8,

Fig. 10 *Ptenothrix saxatilis* sp. n.

A: Habitus, B: Labrum, C: Hind claw, D: Outer lateral row of dental setae, E: End of mucro, F: Modified setae of hind legs, G: Female anogenital segment.

black. Ant./head as 2:1. Ant. ratio as 7:38:40:12. Ant. II with some spiny setae. Ant. III annulated on distal 2/3 and ant. IV with 3 intermittent subsegments. Unguis dorsally with reduced pseudonychia and ventrally with two inner teeth. Unguiculus acute, with one inner tooth and the axial filament is knobbed at the end in all legs. Modified setae of hind legs are with ca. 6 rami. Tenaculum normal for the genus, corpus anteriores with 4 apical setae. Ventral tube has 1+1 setae, distal tubule warty. Furca in ratio as 7:16:5. Manubrium ventrally nude, dorsally with 9+9 setae. Dental setae typical in number. Of feathered setae of the outer row ou_1 is long and smooth. Ratio of ou_{1-4} as 10:8:24:30. Mucro serrated on both sides (outer 39, inner 45), apically with a narrow deep incision. Large abdominal setae 5+5, ca. 0.6 times the length of mucro. Of anogenital segment M-seta /mucro as 0.6. All anal setae of the upper flap indistinctly ciliated, while those of lateral flap are almost smooth. G-seta is short, spiny. H very long, as long as M. T.L are blunt. Subanal setae are all well developed, sa and sa_2 longer than sa' and sa_1 . Appendix analis spiny, slightly curving and longer than sa_3 .

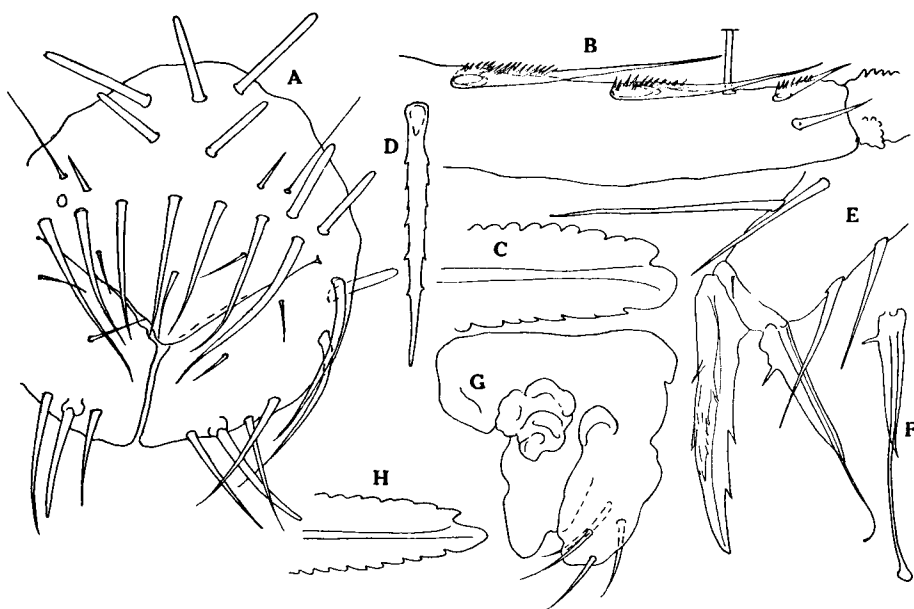
With its ciliated anal setae, the species is near *P. ciliophora* sp. n. in morphological details, but G-seta is spiny instead of blunt and mucro is apically with another form of incision.

Distr.: Endemic to Korea.

22. *Ptenothrix monochroma* sp. n. Fig. 11

2 expl. Mt. Phal-Gong, 11. VIII 1961, 2 expl. Mt. Un-Mun, 18. VI 1961, 5 expl. He-In Temple, 21. X 1961

Body length 2.0 mm. Colour uniformly light brown upon head and abdomen. Antennae, legs and furcula entirely white, with the exception of brownish ant. I, II. Ant./head as 3:1. Ant. ratio as 8:45:55:10. Distal half of ant. III subsegmented. Ant. IV with two intermittent subsegments. Ant. III-organ and other sensory elements normal. Labral setae 6/5, 5, 4 and the distal margin with 2+2 transverse ridges. Eyes 8+8, black. Setae of the vertical region are spinous, somewhat rugose and arranged in normal way. Facial setae as in precedent species. Unguis slender, with two inner teeth and rudimentary dorsal pseudonychial complex. Tunica absent. Unguiculus acute, narrow and with one inner process. Subaxial filament is long and apically swollen upon fore- and mid- legs, not so upon hind legs. Ventral tube has 1+1 lateral seta upon shaft and terminal tubule is warty. Tenaculum with tridentate rami, corpus anteriores with 4 setae apically and a lateral lobe basally. Modified setae of hind legs are apically blunt, with some 6 pairs of oppositely located rami. Furcula well developed, ratio as 14:32:11. Manu-

Fig. 11 *Ptenothrix monochroma* sp. n.

A: Female anogenital segment, B: Outer lateral row of dental setae,
 C: End of mucro, D: Modified seta of hind legs, E: Hind claw,
 F: Unguiculus of mid-legs, G: Tenaculum, H: End of mucro in *Pt. corynephora* BÖRNER.

brium is ventrally nude and dorsally with 9+9 setae in normal arrangement. Dentes typically beset with setae. Outer lateral feathered setae are as in fig. B and ou_{1-4} are as 10:10:25:30. Dorsal and ventral row of setae all smooth. Mucro minutely serrated on both sides (outer 47, inner 36) and the distal end is truncate, incised. Anterior half of dorsum with 5+5 large blunt setae, but they do not exceed 0.6 times the length of mucro. Upon anal region G—seta is setaceous, while H.T.L are blunt. a_3 of the upper anal flap is larger than others and sa, sa' are all well represented. Appendix analis is slightly larger than sa_3 . Both M, M' and N are blunt, but shorter than a_0 .

This new species is characterised by longer a_3 upon upper anal flap as well as by the shortness of M and N. In this respect it is near *P. corynephora* BÖRNER 1909, but distal end of mucro is truncate in this species (fig. C) and protruded in the cited one (fig. H). It is also near *P. unicolor* (HARVEY 1893) and *P. setosa* KRAUSBAUER 1902) in body colour, but in these species the first outer lateral seta, of dentes (ou_1) is definitely serrated, while it is smooth in the present form.

Distr.: Endemic for Korea.

* * * * *

Intensive studies of the genus *Ptenothrix* BÖRNER 1906 has been undertaken by DENIS 1948, UCHIDA 1953, YOSHI 1954 and, above all, by STACH 1957. The last author has successfully pointed out the importance of chaetal studies of vertex, dentes and the female anogenital parts. In connection with his results I feel it necessary to systematise each setae of these parts and to nominate each seta, so that they may be easily described and understood.

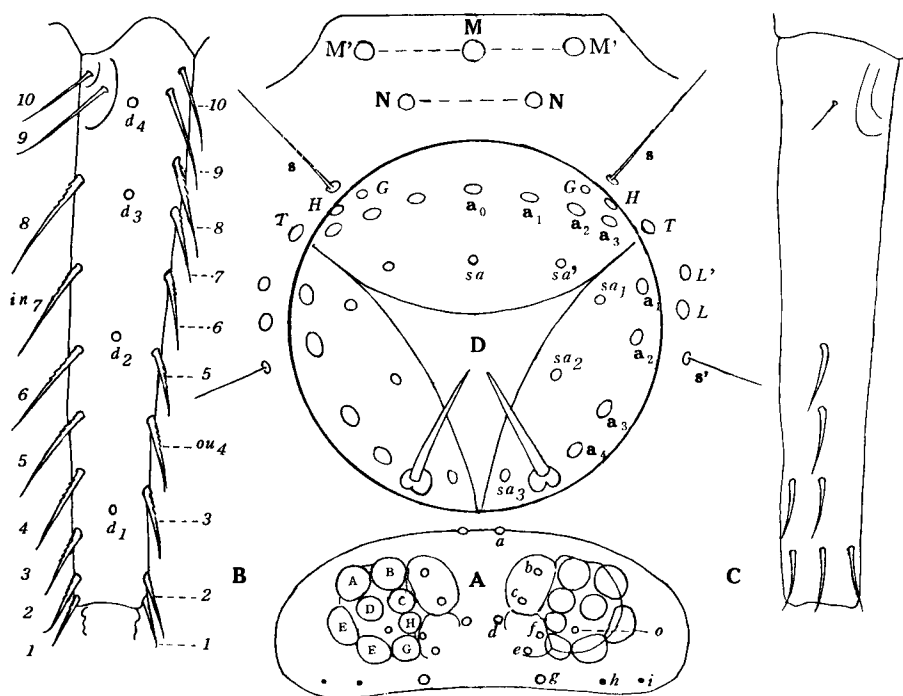


Fig. 12 Disposition of setae in *Ptenothrix*.

A: Head (dorsal view), B: Dentes (dorsal view), C: Dentes (ventral view), D: Female anogenital segment.

In fig. 12 D the typical diagram of the anogenital chaetotaxy is illustrated. In all *Ptenothrix*, whose anogenital region is known to us, abd. V and VI are not demarcated. Anterior part directly adjacent to the larger abdominal part is dorsally beset with 5 setae arranged in two transverse rows. An anterior row is composed of 3 setae which may be named as *M* (median) and *M'* (paired lateral). The posterior row is composed of a pair of setae *N*. All of them are usually robust, large and rounded on apex, so that they are called macrochaetes. Anal orifice is surrounded by three anal flaps, a dorsal and a pair of lateral. Dorsal flap bears a row of 7 anal setae including a median (a_0) and three pairs (a_{1-3}). Sometimes this a_0 can

take different shape and form compared to other anal setae (cf. *Pt. ciliata*, Stach 1957 Pl. VIII fig. 5). Interior to these anal setae there are 3 setae.....a median (*sa*) and a pair of lateral (*sa'*), all of which may be called subanal setae. Three these subanal setae may be subequal or the median one larger (*Pt. atra*) or lateral one larger. Upon lateral flap there are 4 anal setae (a_{1-4}) stretching downwards to appendix analis. Usually they are same in nature, but rarely (*Pt. ciliata*, *Pt. vittata*) a_{1-2} may behave in different manner from $a_{3,4}$. Interior to these anal setae three subanal setae (sa_{1-3}) are present. sa_3 is usually laterad appendix analis and larger than others. Beside these setae, which are relatively easily to be detected in frontal view, there are some others surrounding the anal setae. Dorsally on both sides of the dorsal flap there is a pair of long, needle-shaped s-setae (*s*). Within the dorsal flap near a_2 and a_3 there exist two setae (*G* and *H*), which may often be macrochaetes. *H* is always large, while *G* is blunt and large in some species (*P. atra*, *setosa*, *leucostrigata*, *reticulata* etc.), setaceous and obscure in others and absent in some other species (*P. vittata*, *mongolica*, *ciliata*). Hence the name *G* (Ghost seta). The fissure between dorsal and lateral flap is ending in one seta *T* (terminal seta), which may be macrochaeta or not. Beside them s-seta is accompanied by one small seta (*H'*), which is never large macrochaetes. Down to the side of lateral flaps at the niveau of a_1 and a_2 , but outside of the anal flap there is an another seta *L* (lateral seta), which may be macrochaetes in some species. An another seta quite near to *L* may be designated as *L'* and a needle-seaped seta *S'* is present near by.

Chaetal arrangement of the head is as fig.12 A in typical case by which vertical area is beset with 7 pairs (*a-g*) of large, macrochaetes and 2 small ones. Facial area has some setae converted to macrochaetes and their arrangement is often specific for each species (cf. fig.9 B, fig.15 B, fig.17 C). Eyes are always 8+8, black and the *area ocularis* bears one seta (o) in it.

Antennae are not much differentiated and whether ant. III and IV are subsegmented or not is not always very important, because there may be transient forms. Unguis and unguiculus are almost in a constant feature (cf. YOSH 1954) and whether the subapical filament of the unguiculus is apically swollen or not is, so long as I have observed in Japanese species, not always a reliable character (cf. YOSH 1954). Ventral tube is long, with a pair of lateral and distal setae. Terminal tubes are intensely granulated. Tenaculum has anterior and posterior process and the former has 4 apical setae and a pair of basal swelling (fig.9 C). Rami tenaculi always tridentate. Larger abdominal part bears two sorts of setae, an anterior larger and posterior smaller setae. Anterior setae are usually long, stout and 5+5 in number

arranging in W-shape in lateral view. Posterior setae are numerous and smaller (fig. 13 K). Beside them 3 pairs of slender needle-like setae (s.s.) are laterally to be seen. One of them is upon large lateral tubercle at about the middle of the trunk. Furcula is well developed. Manubrium is ventrally without setae, with a median furrow on distal half. Dorsal side of manubrium is with ca. 10 pairs of smooth setae in a fixed arrangement (fig. 14 I). Dental chaetotaxy is already treated in YOSHII 1955, STACH 1957. Typically their number is outer 10, dorsal 4, inner 10 and ventral 3, 2, 1, 1, — — — 1. These arrangement may be illustrated in fig. 12 B, C. Outer and inner row of setae are often serrated with the exception of two proximal ones, which are usually smooth setae. As was pointed out by Stach 1957, relative length and shape of distal four setae of outer row is significant for the diagnosis of each species, but the best way is to investigate all of them so that there might be some abnormalities among them. In *Dicyrtomina* reduction of setae may occur. Mucro is gutter-like, both sides intensely serrated. Apical end is either truncate, cuspidate and with or without intrusion. Basal mucronal pseudonychium is usually present.

The genus *Ptenothrix* BÖRNER 1906 must be separated from *Dicyrtoma* etc. by the shape of modified setae of hind tibiotarsus. They are feathered in *Ptenothrix* (s. lat.) in contrast to others by which they are blunt setae.

Ptenothrix denticulata (FOLSOM 1899) Fig. 13

10 expl. Campus of the Kyoto University, 11. X 1961

Body length ca. 1.5 mm. Ground colour whitish. Antennae reddish blue throughout their length. Head with a prominent transverse band upon vertex. Some smaller patches are arranged symmetrically upon lower parts to form a kind of network upon facial area. Trunk with a pair of submedian longitudinal patches upon anterior half. Two pairs of transverse bands are located laterally and the distal one is connected by a U-form of pattern dorsally. Distal margin with three large patches. Anogenital segment laterally pigmented. Anal flaps pale. Legs are heavily banded with purplish colour. Each tibiotarsus has three of such bands. Furcula almost pale. Ant. ratio as 5:24:32:10. Ant. III with 5-6 subsegments on distal half. Ant. IV has 2-3 intermittent subsegments. Vertical setae of the head rather blunt and short (fig. B). o-seta blunt. Labrum with 3+3 prelabral setae. Labral setae 5, 5, 4, where the median 3 setae of the first row are small. Lateral setae of the third row are thicker. 3 intrudings of the integumentary ledges are attaining the niveau of the second row of setae. Distal margin has 2+2 low, insignificant transverse ridges. Unguis slender, with obscure pseudonychium dorsally

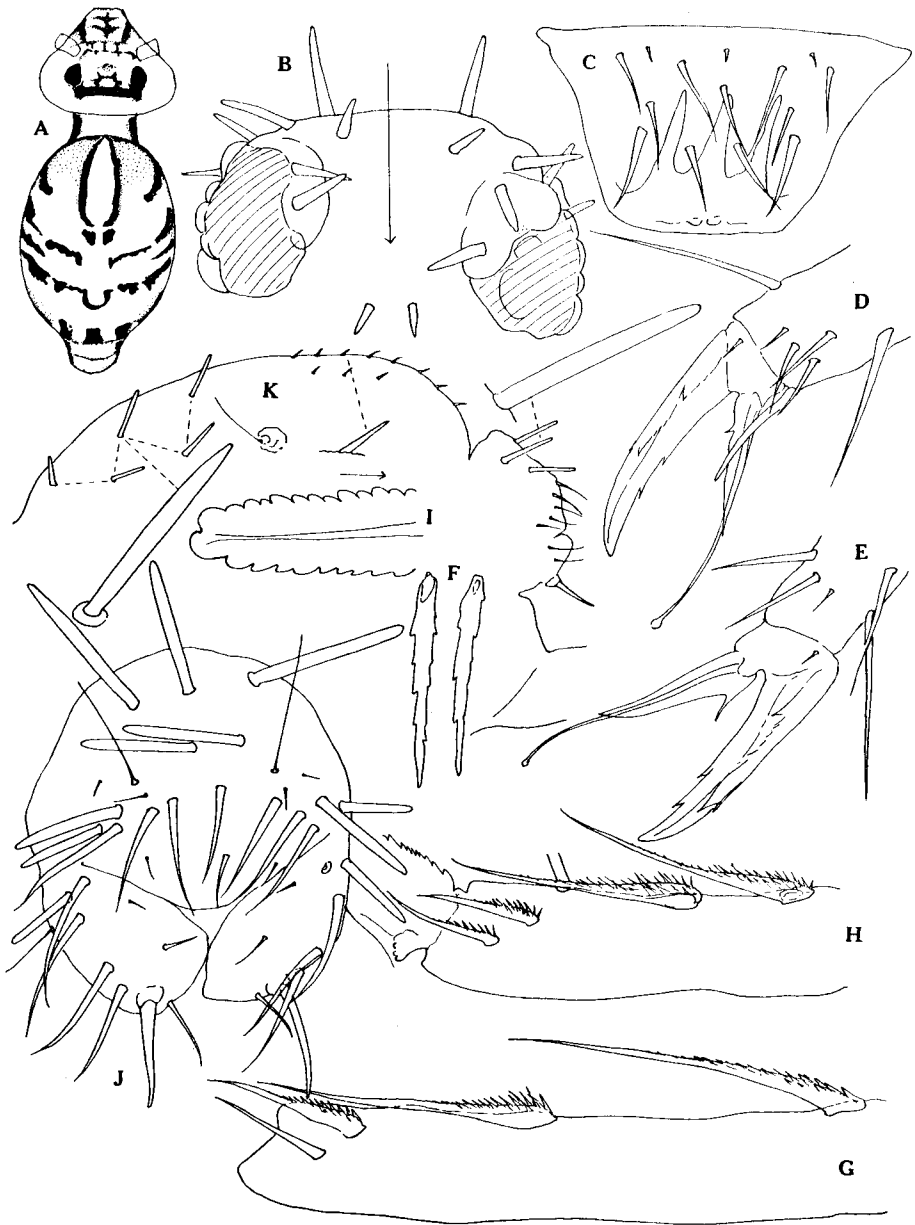


Fig. 13 *Plenothrix denticulata* (FOLSOM)

A: Habitus, B: Setae of vertex, C: Labrum, D: Fore-claw, E: Hind claw, F: Modified setae of hind legs, G: Outer lateral row of dental setae, H: Inner lateral row of dental setae, I: End of mucro, J: Female anogenital segment, K: Disposition of setae upon dorsum (lateral view).

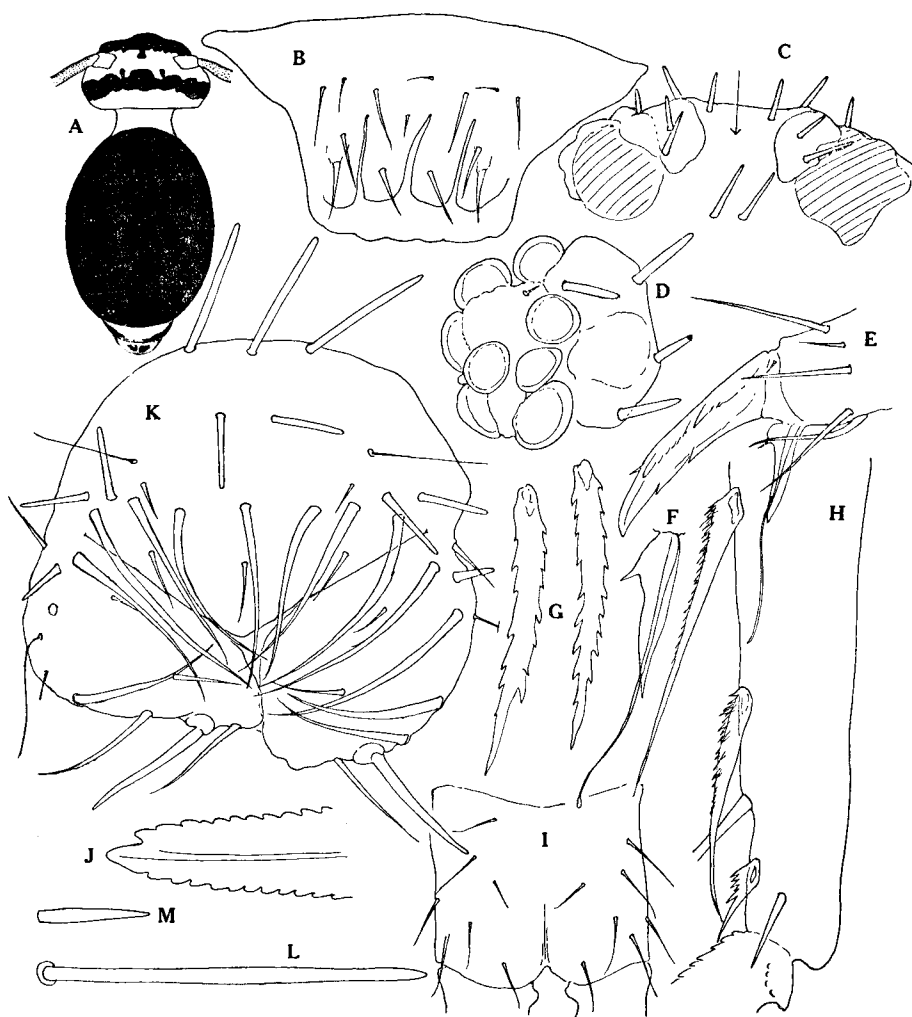
and with 2 inner teeth upon all legs. Unguiculus is lanceolate, acutely ending and with a inner tooth, which is more prominent upon hind legs. An axial filament is longer upon fore legs than upon hind legs and always ending in a small knob. Fore legs have posteriorly a curved s-seta as usual for the genus. Modified setae of the hind tibiotarsus are sparsely serrated and blunt on apex. Furcula with usual arrangement of setae. Of the outer row of dental setae ou_1 is long and smooth, ou_2 is longer than ou_1 and distinctly feathered upon basal half. ou_{1-4} as 10:13:22:28. Of the inner row in_1 is already serrated. in_{1-4} as in fig. H. Mucro is finely serrated on both sides (outer 31, inner 38), apically with a slight notch and with prominent pseudonychium. Anterior setae of the trunk (fig. K) 5+5, long and apically blunt. Their length is ca. $2/3$ the length of mucro. Posterior ones are smaller, numerous and pointed on apex. Anogenital segment of female (fig. J) has well developed dorsal setae (M, M', N). All anal setae are smooth and subequal in length. sa_0 and sa_2 slightly larger than sa_1 and sa' , but much smaller than a_0 . G-seta feeble, pointed apically. H, T, L setae are all blunt. Appendix analis is elongate, 1.7 times the sa_3 in length, smooth and not rounded on apex.

The species is first described from Tokio to which my specimens from Kyoto coincide fairly well with respect to body pattern, knobbed axial filament of unguiculus and outer row of dental setae. The most characteristic of the species is that ou_1 is slender, smooth, while ou_2 is longer than that and intensely feathered. Later the species is redescribed by YOSHII 1954 from Ozé, but it is an another from nearly related to *P. marmorata* (PACKARD) in body pattern and it has different shape of frontal setae and dental feathered setae. Variability in pigments of the trunk is relatively large (cf. *catenata* BÖRNER 1909), but the framework of pigments on facial area seems to be fairly constant.

Ptenothrix corynephora BÖRNER 1909 Fig. 14

13 expl. Oze, Gumma, Japan

Body length 1.8 mm. Ground colour white, head with two purplish transverse bands one at the niveau of eyes and an another about the middle. These two bands are connected laterally to form a circuit. Larger abdominal part totally purplish black. Anogenital segment laterally pigmented and with a pair of small patch dorsally, but paler than in the former. Ventral side pale. Antennae bluish altogether, the basal part paler. Legs slightly dark distally. Furcula lightly bluish upon distal portions. Ant./head as 2:1. Ant. ratio 2:12:14:3. Ant. III, IV with 7,3 intermittent subsegments respectively. Labral setae as in *P. denticulata*, but all of them are relatively smaller in this species. Vertical area with rather slender

Fig. 14 *Ptenothrix corynephora* BÖRNER

A: Habitus, B: Labrum, C: Setae of vertex, D: Eyes and interorbital tubercle, E: Fore claw, F: Hind unguiculus, G: Modified setae of hind legs, H: Outer lateral row of dental setae, I: Dorsal setae of manubrium, J: End of mucro, K: Female anogenital segment, L, M: Large anterior and short posterior seta of dorsum.

setae, but their disposition is principally the same with others. Ocular seta (o-seta) is minute. Interorbital tubercle is not well developed. Setae of the large abdominal part is also more slender than in *denticulata*, 5+5 anterior setae are blunt and posterior ones are numerous and pointed. Unguis with two inner teeth and a pair of obscure pseudonychia dorsally. Unguiculus is lanceolate, acute, with one inner

tooth and its axial filament is usually ending in a faint knob upon hind-legs, but pointed in fore- and mid-legs. Modified setae of hind tibiotarsus are densely serrated. Ventral tube with 1+1 lateral and 1+1 terminal setae. Furcula with typical arrangement of setae. Manubrium is ventrally nude, with a median distal furrow. Dorsally there are more than 7 (perhaps 10) pairs of simple setae symmetrically arranged (fig. I). Of dental feathered setae ou_1 is smooth and setaceous, while ou_2 coarsely denticulated upon basal part. ou_{1-4} is as 10:10:30:40. Those of the inner row are not different from *P. denticulata*. Mucro is finely serrated on both sides (outer 26, inner 42), apically with a notch and an outer lobe is narrowly protruding. Basal pseudonychium finely serrated. Dorsal setae of anogenital segment in female with rather short and small M, M' and N. All blunt. N is shorter than the median anal seta (a_0). Anal setae smooth. sa is subequal to sa' . G-seta is pointed, while H, T, L are all blunt. H subequal to T. Upon lateral flaps sa_1 is smaller than sa_2 , appendix analis is very slender, smooth and almost pointed on apex.

The species is variable with respect to its colour pattern of the body. The typical species described by BÖRNER 1909 seems to have an anogenital segment totally black and antennae pigmented only upon distal half. But the form illustrated by KINOSHITA and UCHIDA 1951 coincides well with the present example. Morphologically it is very well defined by narrower vertical setae, small o-seta and, above all, by N-seta being shorter than anal setae. Apical notch of the mucro is also conspicuous.

In the body pattern it comes near *P. frontalis* (BANKS 1903) sensu MAYNARD 1951 of Washington DC in USA.

Ptenothrix janthina YOSII sp. n. Fig. 15

syn. nov. *Ptenothrix setosa*: nec KRAUSBAUER, BÖRNER 1909, YOSII 1954

4 expl. Kyoto, 15. V 1958 R. YOSII leg.

2 expl. Katsuoji, Osaka, 20. XII 1952 S. UÉNO leg.

2 expl. Ozé, Gumma, 5. IX 1952 R. YOSII leg.

Body length ca. 1.8 mm. Colour uniformly light brown. Antennae dark all over, but deeper distally. Head with an obscure median patch of dark brown. Body with dark irregular mottlings on dorsal side. Legs slightly violet, furcula pale. Ant./head as 2:1. Ant. ratio 10:28:35:10. Ant. III and IV with 7, 2 sub-segments. Labral setae 6/5, 5, 4 as usual of the genus. Facial setae 1, 1, 2, 2, 1, 1 and the first pair of setae are larger than the second pair (cf. fig. 15 B) in contrast to other species here described (cf. fig. 9 B). Frontal setae are all very large, acute apically and with oblique longitudinal striae. Eyes 8+8, black. o-seta spiny.

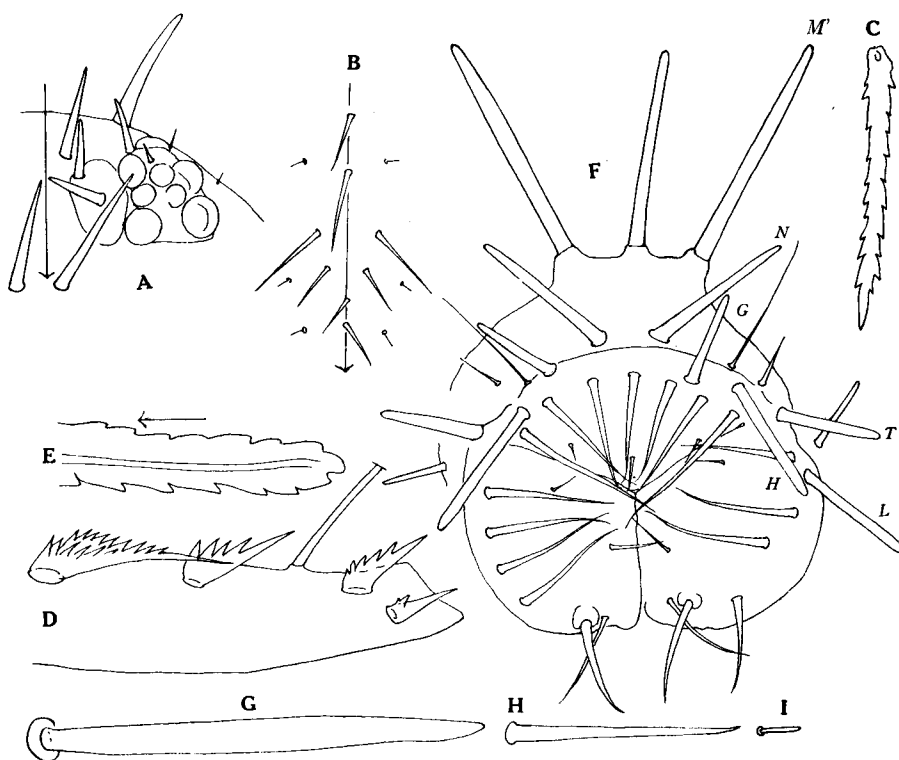


Fig. 15 *Plenothrix janthina* YOSII sp. n.

A: Setae of vertex, B: Setae of facial area, C: Modified seta of hind legs, D: Outer lateral row of dental setae, E: End of mucro, F: Female anogenital segment, G: H, I: Anterior, posterior and short setae of dorsum,

Unguis long, with very obscure pseudonygium (cf. YOSII 1954 abb. 37, p. 826) and two inner teeth. Unguiculus is elongate, apically acute and with one corner tooth on inner side. Axial filament is surpassing unguis and never distally swollen in all legs. Modified setae of hind legs are strongly feathered and apically blunt. Some large setae of legs are rugose. Ventral tube and tenaculum as usual. Furca in ratio as 3:6:2. Manubrium is dorsally with 10 pairs of setae in symmetrical arrangement. Dental setae are also typically arranged for the genus. Dorsal setae often slightly ciliated especially upon d_1 and d_2 . Outer row of dental setae strongly feathered, ou_1 spiny and with a trace of cuspidate rami. $ou_{2,3}$ with strong dentation, ou_4 distally elongated. Thus the ratio of ou_{1-4} is as 10:13:17:27. $ou_{5,9}$ almost smooth, rarely with a trace of ciliation. Inner row not different from outer ones. Setae of the body very well developed, anterior dorsal setae are 5+5, very

large, ca. 1.5 times the length of mucro, rugose on surface and blunt on apex (fig. G). Posterior dorsal setae are setaceous, ca. $2/3$ the anterior setae and apically acute (fig. H). Posteriorly quite near the anogenital segment, there are many very small, blunt setulae (fig. I). Anogenital segment of female is conspicuous having 3 proximal setae (M, M') very large and upon heavy sockets or papillae. N-setae are also large. All anal setae are smooth and subequal. Subanal setae are small and the median one (sa) larger than the lateral (sa'). Appendix analis is feebly developed, not larger than adjacent anal setae, slender and apically pointed. G-seta blunt and large, H-seta still larger, L and L' blunt. H' setaceous and small. All larger setae are rugose.

The species is once identified as *P. setosa* KRAUSBAUER by BÖRNER 1909 and YOSHII 1954. However, STACH 1957 has pointed out the difference in body setae and regarded it an independent species. *P. janthina* is surely to be separated from it by larger anterior body setae and genital setae. Characteristic facial setae are very interesting.

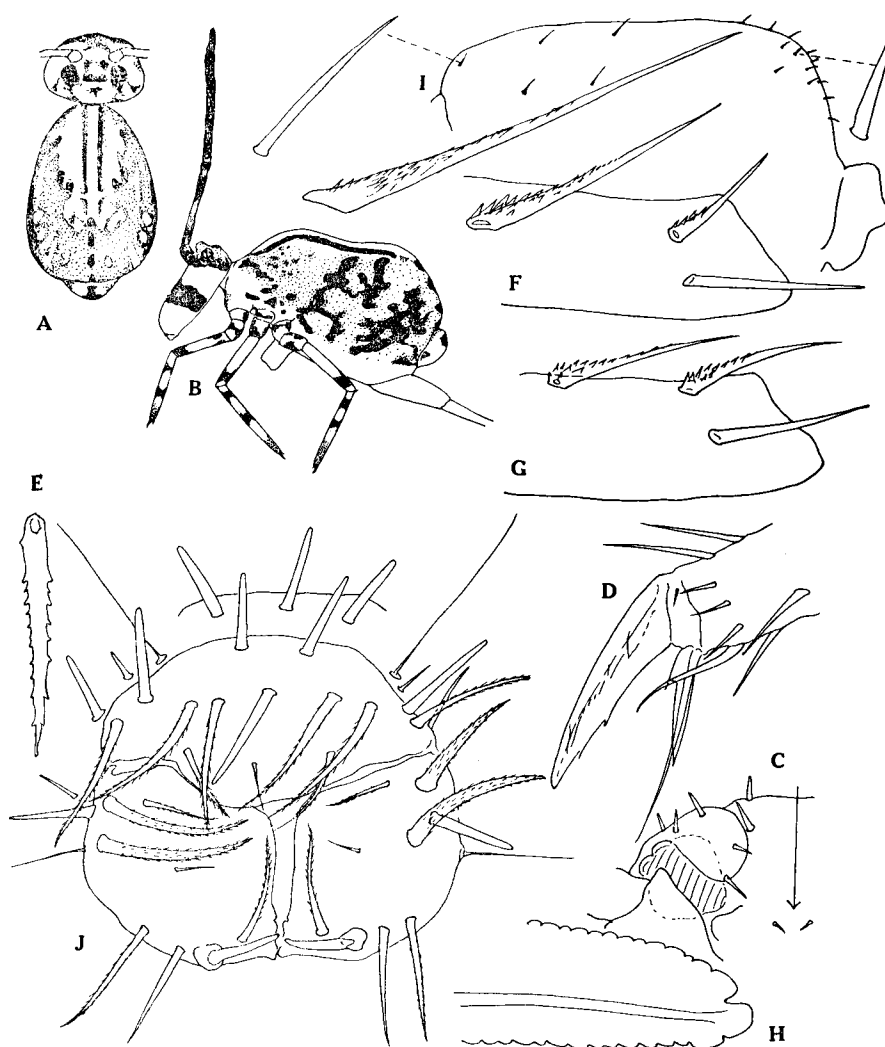
P. janthina is also nearly related to *P. unicolor* (HARVEY) of USA. On examining one female from Corvallis, Oregon, which may be attributed to this species, however, it has been found that *P. unicolor* is very near to *janthina* in body colour, facial and vertical setae, in the form and arrangement of lateral dental setae etc. But the anterior body setae are smaller, being subequal to mucro in length. Upon anogenital segment sa-seta of upper anal flap is relatively large and only slightly shorter than the median anal seta (a_0). In the latter character, *P. unicolor* is to be separated both from the European *P. setosa* and Japanese *janthina*.

Ptenothrix vittata (FOLSOM 1896) Fig. 16

syn. nov. *Ptenothrix fasciatus*: WOMERSLEY 1932

many expl. Green house in Osaka,

Body length up to 2.0 mm. Ground colour dark brown to brown red. Antennae pigmented black upon distal half and near the basis. Head with remarkable transverse bands on area facialis and below the antennae. Vertex with irregular patches. Larger abdomen with a white median band on proximal half, fringed by a pair of black, longitudinal, narrow streaks. Both sides of the streaks are somewhat unpigmented. Upon posterior half, 2-3 dotted median spots medially present. Laterally it is so irregularly pigmented with blackish dark pigments as in fig. B. Legs with beautiful purple bands, one upon femora and 3-4 upon each tibiotarsus. Furcula distally pigmented upon mucro and distally upon dentes. Ant./head as 2:1. Ant. ratio as 10:53:56:12. Ant. III, IV have each 6,2 subsegments. Eyes black, vertical setae spinose, but rather small. Facial setae as 1, 1, 1, 2, 1, 1, 1, 3. Unguis

Fig. 16 *Plenothrix vittata* (FOLSOM)

A, B: Habitus, C: Setae of vertex, D: Fore claw, E: Modified seta of hind legs, F: Outer lateral row of dental setae, G: Inner lateral row of dental setae, H: End of mucro, I: Setae of the dorsum (lateral view), J: Female anogenital segment.

with dorsal pseudonychia and 2 inner teeth. Unguiculus lanceolate, very narrow upon fore-legs and broad upon others. An inner tooth always present. Axial filament is apically pointed and surpassing unguis upon fore-legs and not so upon others. Tibiotarsal modified setae of hind-legs are feathered and apically blunt.

Furcula in ratio as 4:11:3. Dental setae typically arranged. Outer row has distal four setae in ratio as 6:4:9:15. ou_1 is slender and smooth. ou_2 shorter and serrated basally. ou_{4-8} ciliated and often with slight serration basally. $ou_{9,10}$ very faintly ciliated. Inner row has distal four setae in ratio as 55:55:65:95. in_1 slender and simple, in_{2-6} are basally serrated, $in_{7,8}$ rugose and in_{9-10} practically smooth. Mucro is apically deeply notched and dentated on both sides (outer 27, inner 42). Abdomen anteriorly with 5+5 short, slender setae. Those of the posterior half are numerous, spiny, erecting and about half the length of the anterior setae. Anogenital setae very conspicuously modified. M, M', N are all macrochaetes and subequal in length. a_0 is also turned to blunt, smooth macrochaetes, while a_{1-3} are ciliated. sa-seta simple, while sa' are ciliated. G-seta absent, H very long, T and L smaller, but all are macrochaetes. Upon lateral flaps $a_{1,2}$ are larger than $a_{3,4}$. Formers are ciliated, while a_3 is faintly ciliated and a_4 is smooth. sa_1 is ciliated and larger than sa_2 , which is simple seta. sa_3 is again ciliated and slightly larger than sa_1 . Appendix analis is blunt, very short and conical, about half of sa_3 in length.

The species is known to occur in green house of USA. I have encountered this species only in green house. The Japanese examples coincide well with Folsom's figure and description in colouration, antennae etc. Anogenital chaetotaxy is very peculiar and appendix analis is very short. This type of anal opening is already known in *P. ciliata* STACH, 1957. Absence of G-seta seems to be the general character of the *ciliata*-group of *Ptenothrix* as well as in *Papirioides*.

Pt. fasciata WOMERSLEY 1932, which is reported from the green house of Perth, Australia, is, to judge from his figure, probably identical with the present species, although the lateral view shows a little different pattern of the pigment.

Ptenothrix mongolica YOSHII 1954 Fig. 17

The species is described rather incompletely by one female specimen from Ura-nol, Outer Mongolia, taken in 27. IX 1939 by Prof. M. MORISHITA. From the type specimen, which is devoid of large abdominal part, following supplementary notes are given.

Body length 1.2 mm. Colouration brown yellow all over. Antennae beautifully coloured to reddish purple upon proximal half of ant. III, distal part of ant. III and all of ant. IV. Ant. II with a light reddish-gray pigmented patch at about the middle. Head unpigmented. Dorsal side of the large abdominal part is, according to my previous observation, reddish brown. Legs are all lightly purplish gray. Furca pale, ant./head as 17/10. ant. III and IV not subsegmented. Ant. III-organ normal. Vertical setae of the head (fig. B) poorly developed, conical and somewhat blunt on apex. Eyes 8+8, poorly pigmented and each omma is almost isolated.

Fig. 17 *Plenothrix mongolica* YOSII

A: Head and antenna, B: Setae of vertical area, C: Setae of facial area, D: Fore claw, E: Modified setae of hind legs, F: Outer lateral row of dental setae, G: End of mucro, H: Female anogenital segment.

Infraorbital tubercle conspicuous. o-seta spinose. Facial setae are larger than a-seta of vertex, subequal in length and arranged as 1, 1, 2, 1, 1, 3 (Fig. C), thus contrasting to the usual case of their arrangement. Labral structure as usual.

Unguis slender, dorsal pseudonychia poorly developed and almost unperceptible in some cases. Two inner teeth are very large. Unguiculus acute, lanceolate and with a inner tooth. Axial filament is not attaining the end of unguis, setaceous and not swollen to the end upon all legs. Larger tibiotarsal setae are blunt and verrucose. Modified setae of hind tibiotarsus is feathered in a queer manner and each corner is rounded. Furcula in ratio as 3:4:1. The dental chaetotaxy is not typical of the genus. Dorsal, ventral and outer row of setae are in normal arrangement, but inner row is devoid of one seta, it being composed of only 9 setae upon both rami of furcula. To judge from the arrangement, it is seemingly in_6 , which is absent, as the distance of in_{5-6} is wider than that between other setae. As I have only one example of the species, it is uncertain, whether the fact is of specific character or only a teratological case. Outer row of setae are intensely feathered. ou_{1-4} are as 10:7:16:18. ou_1 is almost smooth, slightly rugose basally. ou_2 is shorter than that with some dentation basally. $ou_{3,4,5}$ are densely feathered basally. $ou_{7,8}$ only ciliated and $ou_{9,10}$ are smooth. As one seta is absent, they are as: in_1 smooth, in_2 subequal to in_1 but dentated, in_{3-5} densely feathered basally, $in_{6,7}$ ciliated. $in_{8,9}$ smooth. Mucro is weakly serrated on both sides (outer 24, inner 39) and apical notch is very small. Pseudonychium with serrated margin. Body setae are not observed. Female ano-genital segment has relatively short dorsal setae: M, M', N, all blunt. Of the upper flap of anus a_0 is seemingly blunt and smooth (the seta is cut shortly before the end), while a_{1-3} are all ciliated on distal half. sa almost smooth, while sa' are intensely feathered. G-seta is absent. H large and blunt. T is large but acute apically. H' setaceous. Upon lateral flaps a_{1-4} are all ciliated on distal half. sa_1 is ciliated, sa_2 almost smooth, sa_3 is longer than other subanal setae and intensely feathered on one side. Appendix analis is blunt, short, apically rounded and shorter than sa_3 .

Thus *P. mongolica* is a member of *ciliata*-group and is characterised by special form of modified tibiotarsal setae, feathered sa_3 , deficient inner row of dental setae and special arrangement of facial blunt setae of the head. Body colouration seems to be also characteristic.

Papirioides jacobsoni FOLSOM 1924 Fig. 18

1♂, 1♀, 1 juv. Uh-Lai, Formosa, 24. X 1960 R. YOSHII leg.

1♀ Miyaura, Yakushima, 19. X 1955 R. YOSHII leg.

Body length 2.3 mm. Ground colour yellowish white. Antennae banded medially and distally upon ant. II, III. The last segment pale. Head bluish ventrally. Trunk with many spots on anterior half, with irregular streaks on both sides, all in deep

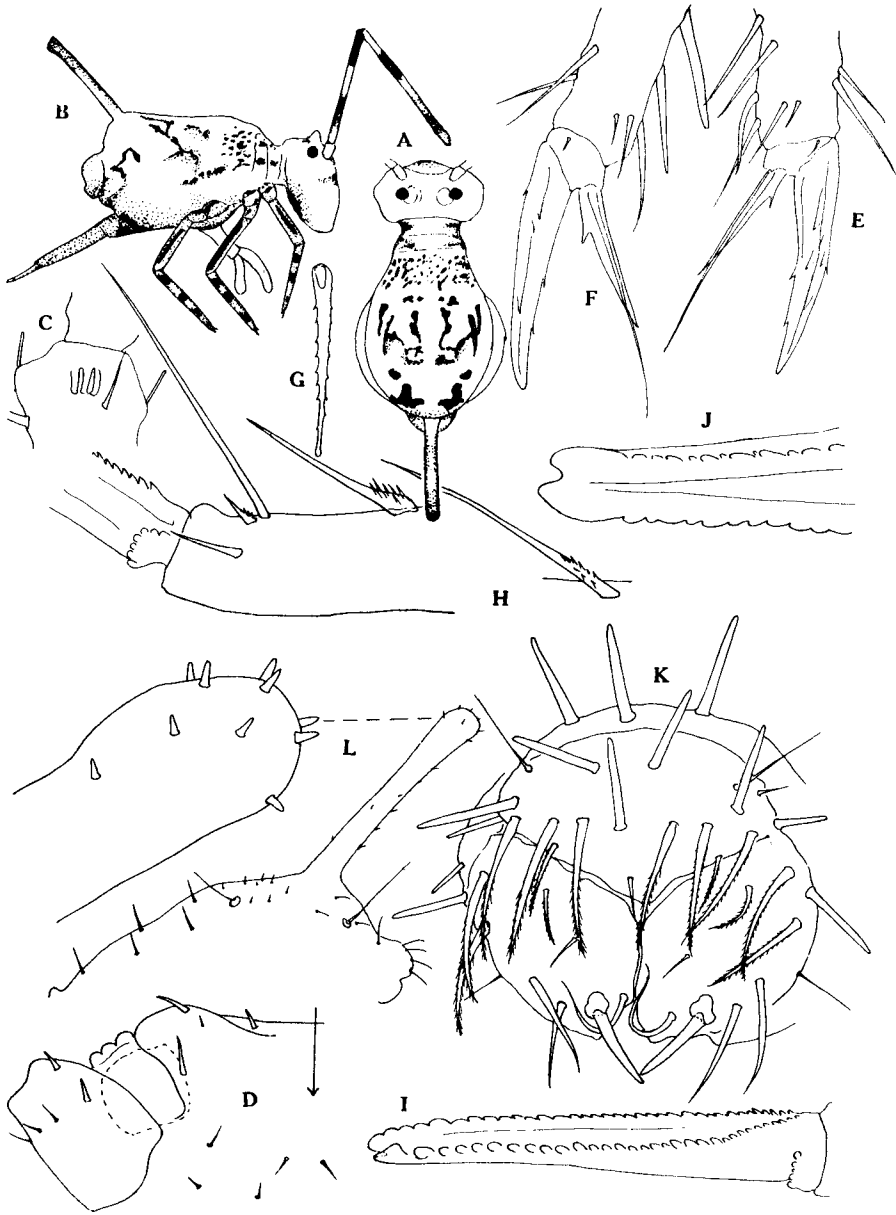


Fig. 18 *Papirioides jacobsoni* FOLSOM

A, B: Habitus, C: Ant. III-organ, D: Setae of vertex, E: Fore-claw, F: Hind claw, G: Modified setae of hind legs, H: Outer lateral row of dental setae (ou_1-4), I: Mucro (lateral view), J: Mucronal end (dorsal view), K: Female anogenital segment, L: Lateral view of dorsum, apex of penduncle strongly magnified,

blue to black. Ventral side of the trunk, furcula and anogenital part darkly pigmented. Ventral tube deep blue. Dorsal peduncle of the trunk distally and posteriorly pigmented. Legs with longitudinal streak upon femur and 3-4 bands upon each tibiotarsus. Antennae long, ant/head as 33/10. Ant. ratio as 6:50:50:9. Distal 1/3 of ant. III as well as ant. IV incompletely annulated, but not subsegmented. Ant. III-organ is two rods lying in a groove and with one small seta. Eyes black, rather poorly developed. Interorbital tubercles well represented and hanging over the eye-field. Vertical setae all poorly developed (fig. D). Facial setae 1, 1, 2, 1, 1, 3 as in *P. mongolica*. Labrum usual. Legs with spinose setae. Unguis straight, with two inner teeth and obscure dorsal pseudonychium. Unguiculus straight, long, pointed and with one inner basal tooth. Axial filament is apically pointed and surpassing the unguis upon all legs. Modified tibiotarsal setae of hind legs apically blunt and sparsely serrated. Furcula in ratio as 17:36:11. Dental setae arranged typically as in *Ptenothrix*. Of the outer row of dental setae ou_1 is simple and long, ou_2 is minute and serrated. ou_3 basally serrated. $ou_{4,5}$ are long setae, serrated at the basis. ou_{6-8} all long smooth setae as well as $ou_{9,10}$. Ratio of ou_{1-4} are as 10:5:22:32. Inner lateral row of dental setae is somewhat different and in_1 is smooth, in_2 is slightly shorter and serrated densely, in_{3-8} are all serrated at the basis, $in_{9,10}$ are smooth. Mucro denticulated on both margins (outer 35, inner 32) and distally with a broad, prominent intrusion. Basal pseudonychium well crenulated. Anterior setae of the trunk 5+5, weak and simple. Posterior setae short, spiny and numerous. Some setae near anogenital part are longer but simple. Dorsal peduncle of the trunk is almost straight, stick-like in outline and 5 times the length of the mucro. Its surface is beset with short, spiny setae and weak, simple setae. Apical part is denser with the formers. Chaetal nature of anogenital segment in female is alike to the *ciliata*-group of *Ptenothrix*. Dorsal setae M, M', N are all blunt, not very long and robust. Upon dorsal anal flap a_0 is blunt and smooth, while a_{1-3} are coarsely ciliated distally. sa is simple, while sa' is slightly larger and unilaterally ciliated. Lateral flap has 2 anal setae ($a_{1,2}$) ciliated, while $a_{3,4}$ are only rugose. sa_1 is ciliated, sa_2 smooth, sa_3 is smooth and long. Appendix analis is blunt, robust and as long as sa_3 .

All my examples are relatively uniform in colour pattern and coincide well with the Sumatran material. The remarkable peduncle of dorsum is seemingly club-shaped and short in younger one. Anogenital chaetotaxy and facial setae show the near relationship of this species to *ciliata*-group of *Ptenothrix*.

Distr.: Sumatra, Formosa, Japan.

P. S.

In the majority of *Ptenothrix* species the labral setae are 6/5, 5, 4 and the median three setae of the first row are minute (Fig. 13, C), while they are 6/5, 3, 4 in two Korean species: *P. ciliophora*, *saxatilis*, as reproduced in Fig. 10, B. This difference is probably group-specific.

Crossodonthina koreana YOSHII et LEE and *Ptenothrix monochroma* YOSHII et LEE are found recently from Japan (Awashima, Pref. Niigata, S. HIGUMA coll.).

Cited Literatures

- BÖRNER, C. 1909. Japans Collembolenfauna, Sb. Ges. Naturf. Fr. 1909: 99-135.
- FOLSOM, J. W. 1896. Two new Species of Papius. Canad. Entom. **28**: 119-121.
-, 1899. Japanese Collembola II. Proc. Amer. Acad. Art Sci. **34**: 261-274.
-, 1924. East Indian Collembola. Bull. Mus. Comp. Zool. Cambridge **65**: 505-517.
-, 1934. Redescription of North American Sminthuridae. Iowa State Coll. Journ. Sci. **8**: 461-512.
- FOLSOM, J. W. et H. B. Mills, 1938. Contributions to the Knowledge of the genus Sminthrides. Bull. Mus. Comp. Zool. Harvard **82**: 231-274.
- HAMMER, H. 1953. The Microfauna of Northern Canada, Pt. II, Collembola. Acta Arctica, **6**: 108 pp.
- MAYNARD, E. A. 1951. A Monograph of the Collembola or Springtails of New York State. Ithaca, 339 pp.
- MILLS, H. B. 1934. A Monograph of the Collembola of Iowa. Ames, 1934.
- UCHIDA, H. 1953. On three new Species of Sminthuridae etc. Annot. Zool. Jap. **26**: 1-13.
- STACH, J. 1956. The Apterygotan Fauna of Poland etc. *Sminthuridae*. Krakow, 1956, 289 pp.
-, 1955. Klucze do Oznaczania Owadow Polski, "Collembola". Warszawa, 1955, 215 pp.
-, 1957. The Apterygotan Fauna of Poland etc. *Dicytomidae*, Krakow, 1957, 113 pp.
- WOMERSLEY, H. 1939. Primitive Insects of South Australia, Collembola, Adelaide, 1939. 332 pp.
- YOSHII, R. 1942. Japanische Entomobryinen. Arch. f. Naturgesch. **10**: 476-495.
-, 1949. Einige Collembolen aus Aussenmongolei. Rep. Kansai ent. Soc. **14**: 33-34.
-, 1954. Springschwänze des Ozé-Naturschutzgebietes. (in) Sci. Res. Ozegahara Moor, Tokyo, 777-830.
-, 1956. Monographie der Höhlencollembolen Japans. Contr. Biol. Lab. Kyoto Univ. no. 3, 109 pp. 50 pls.