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ON SOME SMINTHURID COLLEMBOLANS FROM HOKKAIDÔ

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All specimens on which the present study based, were collected by Mr. R. NARUMI on his trip through Hokkaidô in the summer 1954 and were generously submitted by him to the author for investigation. Here the author wishes to offer him his heartiest thanks.

Six species are here described, among which two are new to science, and the other are new to Hokkaidô.

1. *Sminthurinus aureus* (LUBBOCK, 1862) f. *bimaculatus* (AXELSON, 1902)

Syn.: *Sminthurus bimaculatus* AXELSON, 1902.

Sminthurinus aureus f. *fenestratus* BÖRNER, 1909.

Sminthurinus aureus f. *biflavopunctata* COLL. et SCHOEß., 1909.

Sminthurinus aureus f. *bimaculata* HANDSCHIN, 1929-H. UCHIDA, 1950, 1952.

Sminthurinus quadrimaculatus f. *bimaculatus* MAYNARD, 1951.

Sminthurinus bimaculatus STACH, 1956.

Locality: Jōzankei, Hokkaidô (7. VIII. 1954, R. NARUMI leg., 1 specimen taken on the pondside, no. 1868).

Distribution: Europe, Japan (Honshū), and North America.

Note: This form has been found on a moss-grown brick wall, among dead leaves, and under cypress boards of shingle-roof.

2. *Sphyrotheca multifasciata* (REUTER, 1878)

Syn.: *Sminthurus multifasciata* REUTER, 1878-SCHÖTT, 1893.

Sminthurus minnesotensis GUTHRIE, 1903-MILLS, 1934.

Sphyrotheca multifasciata BÖRNER, 1909-HANDSCHIN, 1929-STACH, 1956.

Sphirotheca minnesotensis GISIN, 1944-MAYNARD, 1951-STACH, 1956.

Locality: Jōzankei, Hokkaidô (7. VIII. 1954, R. NARUMI leg., 5 exs. collected on the pondside, no. 1867, no. 1868).

Distribution: Europe, North America, and Japan (Honshū).

Body length: 0.90-1.15 mm.

Coloration: Tan to purple-brown or bluish with many irregular transverse bands and spots of yellow. Antennae, legs, and furcula pale violet. Ventral

tube and underside paler.

Head: Ocelli 8+8 on black patches. Antennae slightly longer than half the body length; segments related in length nearly as 0.04:0.10:0.14:0.22. Ant. IV with about 10 subsegments.

Thorax: Unguis feebly tunicate and provided with a pair of basal teeth, unidentate at the middle of the inner margin; unguiculus lanceolate and provided with a slender subapical filament; tenent hair absent.

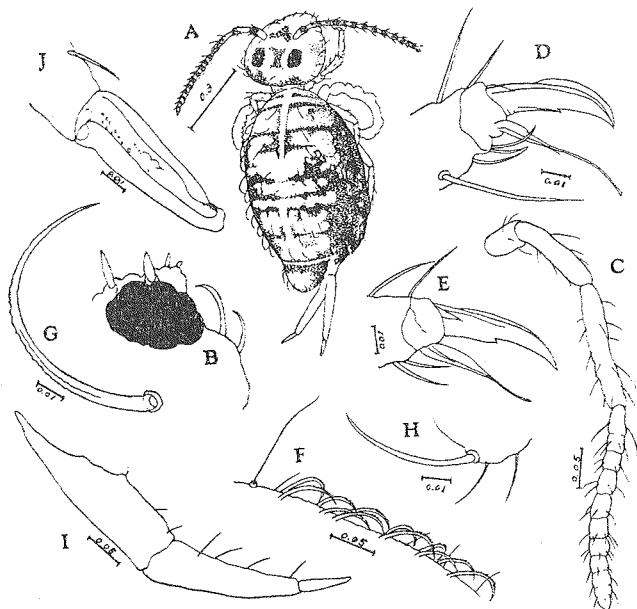


Fig. 1. *Sphyrotheca multifasciata* (REUTER)

A. Entire, dorsal aspect. B. Right eye patch and ocular tubercle. C. Antenna. D. Middle claw. E. Hind claw. F. Hairing of dorsum. G. Seta of dorsum. H. Anal appendage of female. I. Furcula, seen from left side. J. Left mucro.

Abdomen: Furcula is rather stout. $Ma:De:Mu \approx 0.20:0.20:0.06$. Mucrones with almost smooth inner margin. Dental setae formula is as $A_5 B_{1-5} C_{1-2}$.

Clothing: Stout setae on the head and body pointed and roughly pubescent, and strikingly curved on the posterior part of the abdomen.

Note: The differences of coloration and the structure of mucrones and unguis between *Sphy. minnesotensis* and *Sphy. multifasciata* which GUTHRIE (1903) mentioned as the distinctive characteristics should, the writer believes, fall into the range of variation as BÖRNER (1909) guessed.

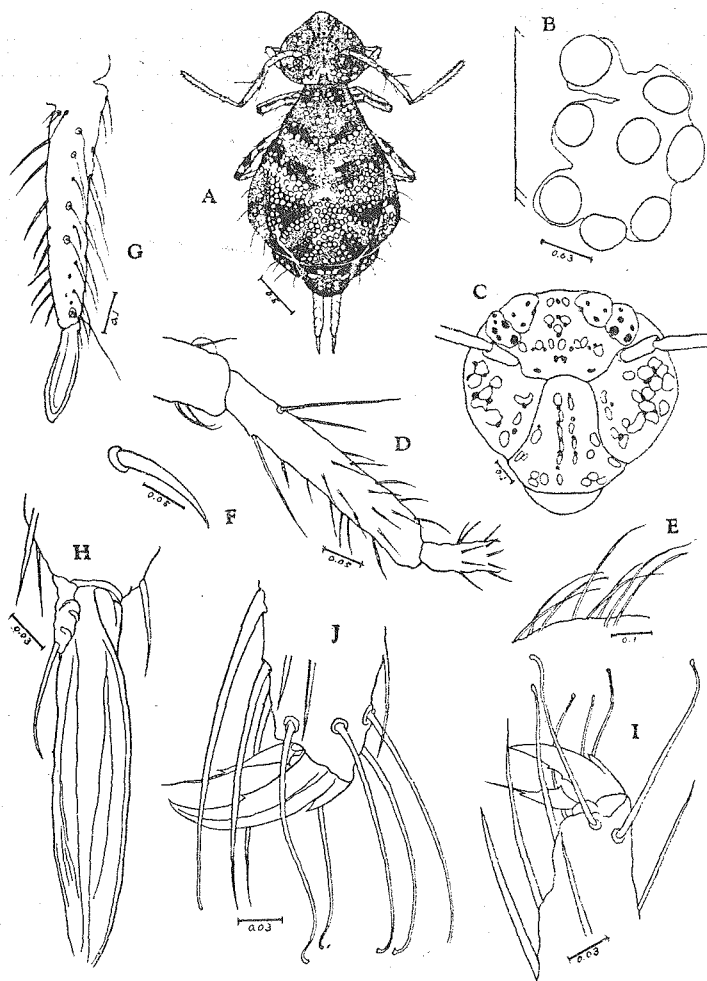


Fig. 2. *Sminthurus daisetsuzanus* sp. nov.

A. Entire, dorsal aspect. B. Right ocelli. C. Front view of head, showing white speckles and black spots. D. Third segment of antenna. E. Dorsal setae of fourth abdominal segment. F. Anal appendage of female. G. Right dens and mucro, dorsal aspect. H. Dorsal aspect of left mucro. I. Left fore foot, viewed from outside. J. Left hind foot, inner side.

3. *Sminthurus daisetsuzanus* sp. nov.

Locality: Yukomanbetsu (1100 m), Mts. Daisetsu, Hokkaidô (5. VIII. 1954, R. NARUMI leg., 16 sps. collected by beating branches and shoots of needles, cotype no. 1855).

Body length: 2.1-2.4 mm.

Coloration: General color of the body greenish brown dorsally and blackish purple ventrally. Dorsum maculated with many enamelwhite and black spots.

Head: Somewhat paler than the trunk, speckled with white and black spots as shown in fig. 2, C. Eye patches light green: ocelli 8+8, each ocellus situated on an isolated black spot of retinal pigment. Ocular tubercles conspicuously elevated, with several white and black spots. Antennae slightly shorter than the body; relative length of segments as I:II:III:IV = 0.17:0.38:0.42:1.11; ant. IV showing about twenty-five pretty well marked subdivisions. Antennae brownish, with the exception of pale distal half of ant. II and pale middle part of ant. III.

Thorax: Legs densely bristly and mostly brownish; the proximal and middle parts of tibia paler. Superior claw stout, broad basally and slightly curved at the apex, unidentate and provided with one basal tooth. Inferior claw slender and lanceolate, with short, subapical filament. Five or six long tenent hairs present, not overhanging superior claw but standing out on tibiotarsus.

Abdomen: Oblong-ovate, sparsely clothed with long and feeble setae which are interspersed with long sensory setae on the posterior back. The upper side of the trunk is of a dark greenish brown; four pairs of wedge-shaped dark greenish brown bands converge towards the postero-dorsal part from the pleural side of the body and interspaces between these bands are marbled with many enamelwhite and black spots. Anogenital segment margined by dark brown and maculated with white and black speckles. Furcula almost as long as body, bristly, with segments related as Ma:De:Mu = 0.30:0.65:0.26; manubrium dark brown and mucrodens paler; mucro spoon-like in shape and provided with a mucronal seta on its outer basal part. Dental setae formula usually as $A_{1-10} B_{1,6,8,10,11} b_{2-5}, E_{7,9} b'_{9,10} D_{1-10}$; setae on dorso-median row are eleven in number, five of which are long sensory hairs.

Clothing: Body sparsely covered with short hairs and some long clubbed sensory bristles especially on the posterior dorsum.

Remarks: Although the present species resembles *Sminthurus viridis* in general body form, coloration, and the structure of the foot-claw, it differs markedly from the latter in the possession of (1) eight isolated black ocelli on each bluish green eye patch, (2) five long outstanding bristles on the tibiotarsus, and (3) the unique body color owing to the combined effect of many black and enamelwhite spots.

4. *Sminthurus viridis* (L., 1758) f. *irroratus* (REUTER, 1900)

Syn.: *Sminthurus viridis* f. *irrorata* LINNANIEMI, 1912-HADSCHIN, 1925.

S. v. f. irrorata H. UCHIDA, 1954.

Locality: Kurodake (1900 m), Mts. Daisetsu, Hokkaidō (5 VIII. 1954, R. NARUMI, 1 sp. taken among the association of *Vaccinium Vitis-Idaea* L., no 1863 a).

Distribution: Europe (Finland) and Japan (Honshū).

Note: In Japan this form has been up to this time recorded from Mts. Hakkōda and other places of Aomori Pref. But it seems not to be limited to the northern part of Japan, because other two specimens have since been obtained from central Japan, Mt. Tateyama (2900 m), Toyama Pref. (2. VIII. 1953 R. NARUMI leg., 2 sps. under *Pinus pumila* REGEL, no. 1819). The present form seems to be the typical boreal and alpine form of *S. viridis*.

5. *Ptenothrix vinnula* sp. nov.

Locality: Jōzankei, Hokkaidō (7. VIII. 1954, R. NARUMI leg., 6 sps. taken on the pondside, cotype no. 1865).

Coloration: Dark reddish brown in the older specimens, and vineceous in younger ones, ornamented with flesh-colored markings on the dorsum. These markings are commonly as shown in fig. 3, A; antero-dorsal markings are almost invariable regardless of age of individuals; rectangular pale part on the posterior dorsum is apt to become obscure. Dorsal tubercles dark brown. Lateral side of the body speckled with irregular pale dots. Head slightly paler than the body; median dark brown stripe running down from the vertex to the clypeus. Eye patches black, encircled with pale parts. Ventral side of the body and ventral tube paler. Ant. I reddish brown and the other segments of antenna dark purple. Subcoxa, coxa, trochanter, and femur tinged by dark brown laterally at their extremities; tibiotarsus dark purple.

Head: Antennae about the length of the body; ant. III showing about six distinct bead-like subsegments on its distal half, not including those fused into the large clubbed end.

Thorax: Legs bristly. Unguis slender and acuminate, with one outer tooth, two inner ones, and a pair of basal teeth; unguiculus a little longer than half as long as unguis, straight, and acuminate, bearing a subterminal knobbed filament and a basal spine; tenent hairs absent.

Abdomen: Dentes about 2.8 times as long as mucrones, provided with four sensory hairs and many barbellated setae; dental setae formula is as $A_{1-8} a'_{9,10} B_{1-4} C_{1-8} c'_9 E_1 e_{10}$; mucrones oblong lanceolate, serrate upon both edges.

Measurements:

Ind.	Body length	Head diagonal	Antenna	Furcula
A	2.45	1.00	2.59 I:II:III:IV=0.21: 1.05:1.10:0.23	1.63 Ma:De:Mu=0.43: 0.97:0.23
B	2.72		2.29 I:II:III:IV=0.16: 0.96:0.97:0.20	1.09 Ma:De:Mu=0.26: 0.83:0.30
C	1.95	0.85		0.97 Ma:De:Mu=0.20: 0.57:0.20

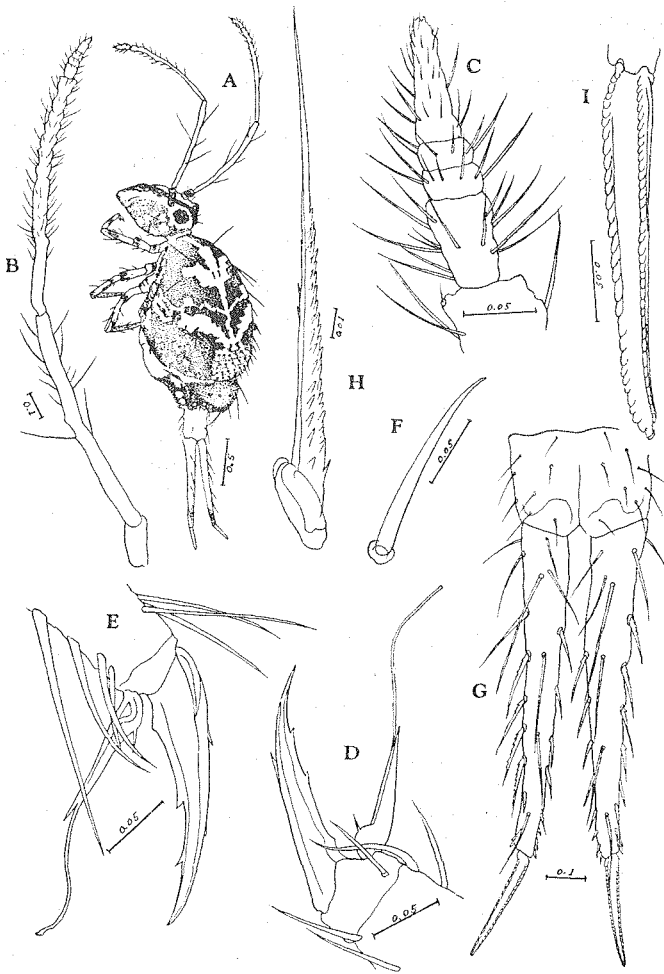


Fig. 3. *Ptenothrix vinnula* sp. nov.

A. Entire, dorsal view. B. Right antenna. C. Terminal segment of antenna. D. Fore claw. E. Hind claw. F. Anal appendage of female. G. Furcula, dorsal aspect. H. Dental seta, C. I. Right mucro.

Clothing: Very stiff and coarse; bristles long and spine-like on the anterior dorsum.

Remarks: In the structural details, the present species, while conforming in general with those of *Ptenothrix marmorata*, differs markedly from the latter in having not very vigorously serrated dental setae. Moreover, it shows differences from *Pt. marmorata* by the possession of (1) the reddish brown ground color of the body (blackish purple in *Pt. marm.*), (2) the dorsal fleshcolored patterns (light yellow in *Pt. marm.*), and (3) each dorsal transverse tripe fused to a median longitudinal stripe at an acute angle (nearly right angle in *Pt. marm.*).

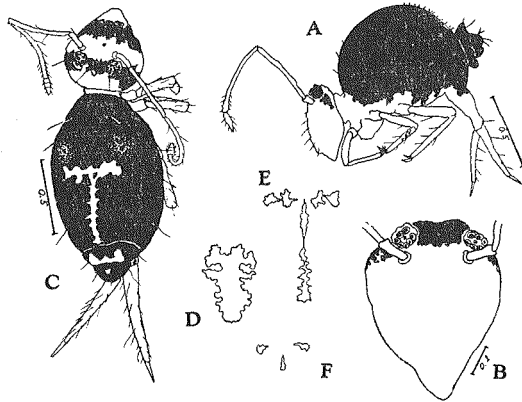


Fig. 4. Variation of color pattern of *Ptenothrix corynophora*

A. Entire insect, which may be taken for the principal form, devoiding of a transverse blackish blue band on frons and any dorsal pale markings. Lateral aspect. B. Ditto. Front view of head. C. Entire insect, showing a frontal blackish band and a T-shaped pale marking on the dorsum. Dorsal aspect. D, E, and F show the tendency of variation of dorsal pale markings.

6. *Ptenothrix corynophora* Börner, 1909

Locality: Nopporo, Ishikari Province, Hokkaidō (8. X. 1952, R. NARUMI leg., 9 sps. caught from under dead leaves, no. 1690); Yukomanbetsu (1100 m). Mts. Daisetsu, Hokkaidō (5. VIII. 1954, R. NARUMI leg., 31 sps. taken by beating bush, no. 1856); Jōzankei, Ishikari Prov., Hokkaidō (7. VIII. 1954, R. N. leg., 3 sps. collected by sweeping bush of pondside no. 1867 a).

Distribution: Endemic to Japan. Hitherto it has only been recorded from Honshū, occurring under various surroundings enough to supply it food materials and moisture.

Body length: 0.84-1.53 mm.

Coloration: Ground color white to cream yellow; dorsum and anogenital segment entirely dark indigo blue; living examples beautiful purplish black with slight metallic shimmer. Ant. IV, III, and distal half of II violet, becoming darker towards the end. Head pale yellow, usually with two broad indigo blue bands transversally; one of those is on the vertex, connecting two eye patches and the other sparsely maculated with white, transverses the middle of the head. Sternum, ventral tube, and furcula paler. Legs paler, washed with violet. Younger individuals almost always pale yellow, with a little indication of pigment.

Head: Distal half of ant. III divided into seven (six in BÖRNER's original description) subsegments, whose distal one is enlarged and bears a peculiar sensory organs.

Thorax: Unguis slender, tapering, abruptly curved at its apex, with two inner teeth (2/4, 3/4) and two pairs of minute lateral teeth; unguiculus about half as long, lanceolate, unidentate on inner lamella, provided with a long whip-like subapical filament whose end is unknobbed.

Abdomen: Furcula elongated. Dental seta formula: $E_1 A_{1-6} a_{7,8} a'_1 B_{1-4} C_{1-4} c_{5-7}$. A- and C- Setae rather simple, feebly serrated or spinulated on their proximal halves. Mucrones slender, almost straight on ventral side; inner teeth about 35 and outer ones 28. Anal appendage 0.10 mm in length, approximately equal in length to the hind unguis.

Clothing: Body sparsely covered with curving bristles, rather short, longer ones appearing on the anterior dorsum, and anogenital segment.

Measurements:

Ind.	Body length	Head diagonal	Antenna	Furcula
A	1.53	0.72	1.33 I:II:III:IV=0.10: 0.50:0.63:0.10	0.99 Ma:De:Mu=0.27: 0.54:0.18
B	1.26	0.53	1.21 I:II:III:IV=0.10: 0.50:0.51:0.10	0.85 Ma:De:Mu=0.25: 0.46:0.14

Notes: As understood from the results of measurements quoted above, this insect has a large head, whose diagonal almost attains to half the length of the body. With the exception of the body color, the present species is closely related to *Ptenothrix denticulata* in the essential characteristics. In minute details, however, as BÖRNER (1909) also pointed out, it is different from the latter, by having (1) more slender and more stiffed macrochaetae on vertex and frons, (2) not such rough body hair, and (3) the smaller size of the body. Moreover, the present species puts one in mind of *Pt. pulchellus* HANDSCHIN (1926) from Java, in bearing a broad indigo blue band transversally on the forehead, but it is separable from the Javanese species, in general body color and the absence of pigmented rings on the tibio-tarsus.

General color pattern, however, is considerably variable; a longitudinal

pale part of irregular form is often found on the back of trunk; broad indigo blue band on the forehead tends to diminish and, in the extreme case, disappears entirely.

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