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Author(s)	SUZUKI, Seisho; TSURUSAKI, Nobuo
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Opilionid Fauna of Hokkaido and Its Adjacent Areas^{1), 2)}

By

Seisho Suzuki and Nobuo Tsurusaki³⁾

17-2, Nishihakushima-cho, Naka-ku, Hiroshima-shi 730
and Zoological Institute, Hokkaido University

(With 27 Text-figures and 4 Tables)

Compared with the other regions of Japanese Islands, our knowledge with regard to the Opiliones of Hokkaido and its adjacent areas, namely, the northernmost part of Honshu, Sakhalin, and Kurile Islands has been rather poor, in spite of its importance for the understanding of the formation of opilionid fauna in all over Japanese Islands. For this reason, we have engaged since 1975 in the faunal survey of Opiliones in Hokkaido and the northernmost part of Honshu. Some of the material collected through this survey were separately studied and published by Suzuki together with the specimens from the other areas (Suzuki 1976b, 1976c, 1976d etc.). Here it seems significant and convenient for further studies of opilionid fauna in these areas to incorporate all the species hitherto found into one article.

In the present study, newly found species are described and reclassification of some species is presented. For the specific revision numerous specimens including types, most of which are deposited in the European museums were examined. As a result, 23 species (25 species and subspecies) of Opiliones were recognized to occur in these areas (19, 15, and 5 species from the northernmost area of Honshu⁴⁾, Hokkaido, and Sakhalin, respectively.

Explanations.

1) Asterisked: Newly recorded forms from Hokkaido (*) and the northernmost area of Honshu (**).

1) Supported in part by a Grant-in-Aid for Fundamental Scientific Research (No. 054195 and 254252) to S. Suzuki from the Ministry of Education, Science and Culture of Japan.

2) Studies on the taxonomy and biology of *Leiobunum curvipalpe*-group (Leiobuninae, Opiliones) II. (by N. Tsurusaki)

3) To whom reprint requests should be sent.

4) In this study "The northernmost area of Honshu" refers to three northern prefectures (Aomori, Akita, and Iwate) in Tôhoku district. (cf. Fig. 1)

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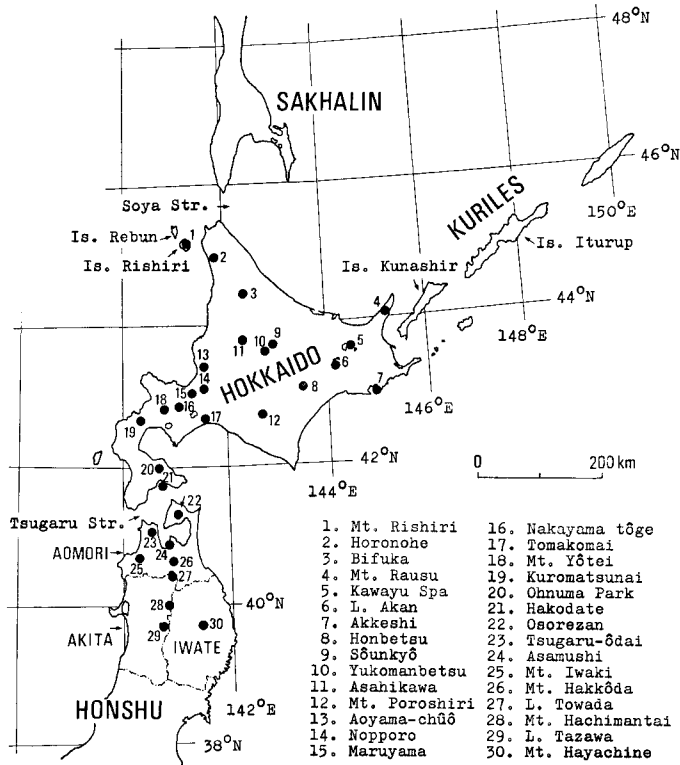


Fig. 1. Map showing Hokkaido and its adjacent areas. Provenance of principal materials used in the present study is given.

2) Synonymic lists involve only the original description and some principal papers.

3) Collecting data are given by the following order: Locality, altitude of locality if necessary, number of individuals (j=juvenile), date collected (year is given by a number of lower 2 figures: e.g. 1981=81), collected by (SS=S. Suzuki, NT=N. Tsurusaki).

4) Abbreviations: ZMB=Zoological Museum, Berlin; SMF=Senckenberg Museum, Frankfurt/Main; ZMH=Zoological Museum, Hamburg; ZLHU=Zoological Laboratory, Hiroshima University, Hiroshima; L=length, W=width; Tr=trochanter, Fe=femur, Pa=patella, Ti=tibia, Mt=metatarsus, Ta=tarsus.

Suborder Laniatores
 Superfamily Travunioidea
 Family Triaenonychidae
 Subfamily Paranonychinae

Kainonychus akamai akamai (Suzuki, 1972)

Peltonychia akamai Suzuki, 1972e, p. 38 (in part, figs. 1, 3, 5, 6, 9, 10, 13, 14). [Type-locality: Oiwake, Tabayama-mura, Yamanashi pref., Honshu]

Kainonychus akamai akamai: Suzuki, 1975, p. 72, fig. 4; 1976b, p. 184.

Distribution. Honshu (Nagano, Yamanashi, Gunma, and Iwate prefectures).

Notes. In Tôhoku district so far known from only Mt. Hachimantai, at 1580 m in alt., Iwate pref. This species is sympatric with *Mutsunonychus fuscus* at Mt. Hachimantai.

***Kainonychus akamai esoensis* Suzuki, 1975**

Peltonychia akamai: Suzuki, 1972e, p. 38 (in part, figs. 2, 4, 7, 8, 11-12).

Kainonychus akamai esoensis Suzuki, 1975, p. 74, fig. 5. [Type-locality: Mt. Poroshiri, Hokkaido]

Specimens examined. HOKKAIDO. Mt. Poroshiri, 850~860 m (5♂ 6♀ 3j, 14-VI-81, NT).

Distribution. Hokkaido (Mt. Poroshiri, above 850 m in alt.)

Notes. So far known from only type-locality.

Subfamily Kaolinonychinae

***Mutsunonychus fuscus* Suzuki, 1976**

Mutsunonychus fuscus Suzuki, 1976b, p. 178, figs. 1-25. [Type-locality: Sukayu Spa, Hakkôda area, Aomori pref., Honshu]

Specimens examined. AOMORI PREF. Tsugaru-ôdai, 40 m (1♀, 15-IX-78, NT); Asamushi, Hachiman-gû (1♀, 23-VII-81, NT); Mt. Iwaki, 1000 m (1♂, 12-IX-78, NT); Sukayu Spa, 740~900 m (1♂ 1♀, 9-IX-78, NT); Nenokuchi, L. Towada (1♂, 17-VII-77, SS). — AKITA PREF. Haruyama, L. Tazawa, 250 m (1j, 25-VIII-80, NT). — IBARAKI PREF. Mt. Yamizo, 800 m (1♀, 26-XII-79, H. Kobari). — NAGANO PREF. Otanomônudaira, Shiga-kôgen (1♂, 20-X-67, M. Shiba); Togakushi, Chûsha, 1200 m (1♀, 23-VII-80, NT).

Distribution. Honshu (Nagano, Ibaraki, Akita, and Aomori prefectures).

Notes. This species was so far known only from Aomori and Akita prefectures. However, further occurrence in Ibaraki and Nagano prefectures was recorded in this article.

Suborder Palpatores
Superfamily Caddoidea
Family Caddidae
Subfamily Caddinae

***Caddo agilis* Banks, 1892**

(Figs. 2-5)

Caddo agilis Banks, 1892, p. 249, figs. 1-6. [Type-locality: Long Island, New York, U.S.A.]; Roewer, 1912, p. 33, fig. 9 in pl. 1, figs. 3, 10, 12 in pl. 2; 1923, p. 712., figs. 889a, b; 1957, p. 331; Bishop and Crosby, 1924, p. 83, fig. 3; Bishop, 1949, p. 175, figs.

9-14; Suzuki, 1958c, p. 226, figs. 1-6; 1976d, p. 264; Gruber, 1974, p. 238, figs. 1-22a; Shear, 1975, p. 70, figs. 1-4.

Caddo glaucopsis Crosby, 1904, p. 253; Roewer, 1923, p. 713.

Specimens examined. HOKKAIDO. Mt. Poroshiri, 850 m (1j, 14-VI-81, NT); Kôryû-kôzan, Eniwa-shi (1♀, 27-VII-78, NT); Maruyama, Sapporo-shi (2♀, 4-VII-80, NT); Nopporo, Ebetsu-shi (10♀, 20-VII-78; 2♂ 150♀118j, 25-V~8-VIII-79; 60♀, 6-VII-80, NT). — AOMORI PREF. Asamushi, Hachiman-gû (1♀, 2/3-VII-82, NT).

Distribution. Japan (Hokkaido, Honshu, Shikoku), Eastern part of North America. Detailed localities are listed in Suzuki (1976d) and Shear (1974).

This species is disjunctively distributed in Japan and the eastern area of North America. Hitherto no male was found for this species except for one which was collected from Pennsylvania, U.S.A. (Gruber 1974, Suzuki 1976d). However, the junior author has found two males of this species among the numerous specimens collected from Nopporo, Hokkaido, in the course of his periodical field surveys on phenology of some opilionid species at there in 1979. A close examination revealed that these males are so perfectly equal in detail with Gruber's description (op. cit.) of the male from Pennsylvania. This supports the former specific assignment of Japanese specimens to *Caddo agilis*, which was first recorded from the northerneast area of North America (Suzuki 1958c, 1976d, etc.).

Description of these newly collected males is given below.

Measurements (in mm, for comparison measurements of females (n=10) based on Nopporo specimens are presented in parentheses).

Body L: 1.88-2.07 (2.34-2.53, \bar{x} =2.44). Cephalothorax: 0.81-0.83 (0.83-1.10, \bar{x} =0.93) L; 0.90-1.04 (1.10-1.28, \bar{x} =1.18) W. Abdomen W: 0.98-1.05 (1.12-1.32, \bar{x} =1.21). Eye tubercle: 0.60-0.62 (0.61-0.64, \bar{x} =0.628) L; 1.01-1.03 (1.03-1.07,

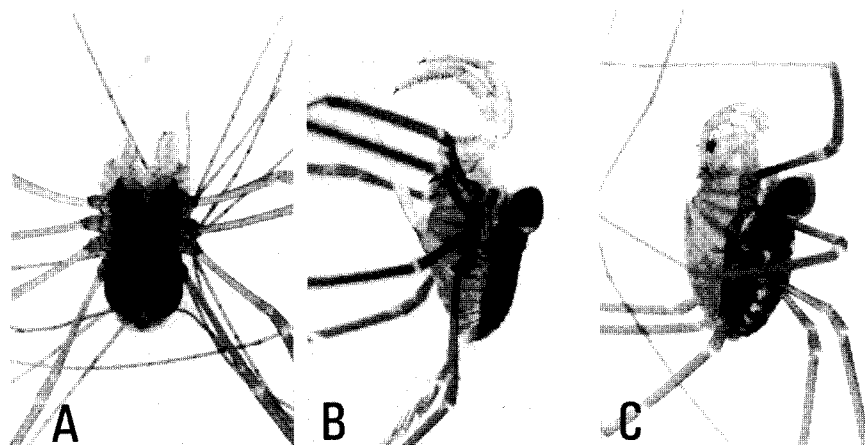


Fig. 2. *Caddo agilis* Banks. A-B) Dorsal and lateral views of male. C) Lateral view of female. (Nopporo) All \times 10.

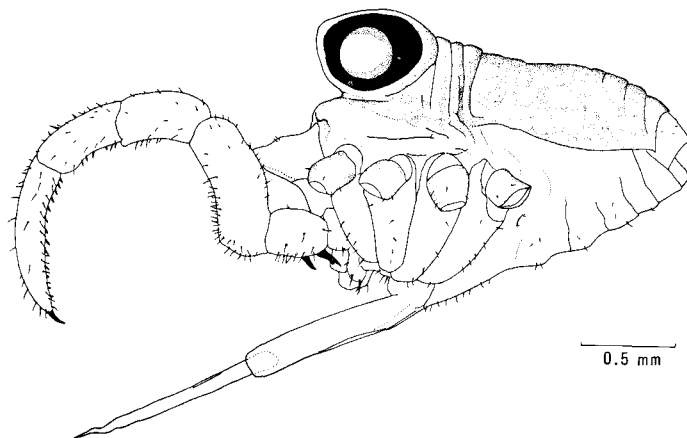


Fig. 3. *Caddo agilis* Banks, lateral view of male (Nopporo).

$\bar{x}=1.06$) W including eyes.

Length of palp and legs (1 ♂; in parentheses ♀, mean, n=10):

	Tr	Fe	Pa	Ti	Mt	Ta	Total
Palp	0.34 (0.24)	0.59 (0.45)	0.51 (0.42)	0.53 (0.42)	—	0.91 (0.64)	2.88 (2.18)
Leg I	0.27	1.06 (1.08)	0.39	1.62	2.44	3.08	8.86
II	0.27	1.63	0.48	2.17	3.23	4.16	11.94
III	0.23	1.20	0.41	1.80	3.14	3.84	10.62
IV	0.23	1.38	0.40	2.09	3.78	5.04	12.92

Male. Body from lateral as in Figs. 2B and 3; much resembling female but with smaller and more compact abdomen, and with longer legs (cf. description of female in Suzuki 1958c). Second thoracic segment with two minute median setae as in female.

Chelicera as shown in Fig. 4A; basal segment ventrally with a blunt, hair-tipped cone, distal segment with only sparse hairs.

Palp as in Fig. 4B-C; massive and larger than in female. Trochanter hairy, hairs more numerous and stronger ventrally than dorsally, bristle-shaped. Femur, differing from female, without a medio-apical apophysis but a strong finger-like protuberance arising obliquely toward medial direction on the ventral side; hairy, especially ventrally with longer and stronger bristles. Patella, tibia and tarsus bearing thick arranged pegs on ventro-mesal surface; pegs strongly sclerotized, blackish, arising on a low ring-shaped elevation (These pegs are absent in female). In addition, these three segments with dense bristles on dorso-mesal



Fig. 4. *Caddo agilis* Banks, male. A) Chelicera. B) Mesal view of right palp. C) Lateral view of left palp. D) Seta on the dorsal surface of palp. E) Peg on the ventromesal surface of palpal tibia and tarsus. F) Mesal view of distal end of palpal tarsus. G) Tarsal claw on the left palp.

surface and sparse hairs on lateral surface. Tarsal claw large, stout, with 2 or 3 reduced denticulations below (Fig. 4F-G).

Coloration. General coloration above same as in female, but completely lacking median and lateral silver stripes. Also venter not tinged with metallic silver, only dusty yellowish white colored.

Penis (Fig. 5). Shaft, 0.96 mm L, 0.17 mm W at base; glans, 0.17 mm L, 0.09 mm W at widest portion; stylus, 0.16 mm L. Shaft relatively short but stout, widest at base and gradually narrowing toward apex, somewhat flattened dorso-ventrally at basal half; musculature limited to proximal half (Fig. 5A). Glans, at base wider than top of shaft, from dorsally not clearly distinguishable from shaft. Stylus sclerotized, elongate and tapering, dorsally at its base protruding an additional short spine. The stylus of this structure somewhat differs from that reported by Gruber (op. cit.). Namely, the stylus he studied is short and blunted at tip, and through its opening projecting a fine tube, i.e. an ejaculatory duct which was probably protruded by the pressure of a cover glass (cf. Gruber 1974, Figs. 5-6, 8). Comparison of such a stylus in Gruber's specimen with that of ours strongly suggests that the former may have been resulted from the breaking off of the distal portion of the normally tapered stylus as in our specimens.

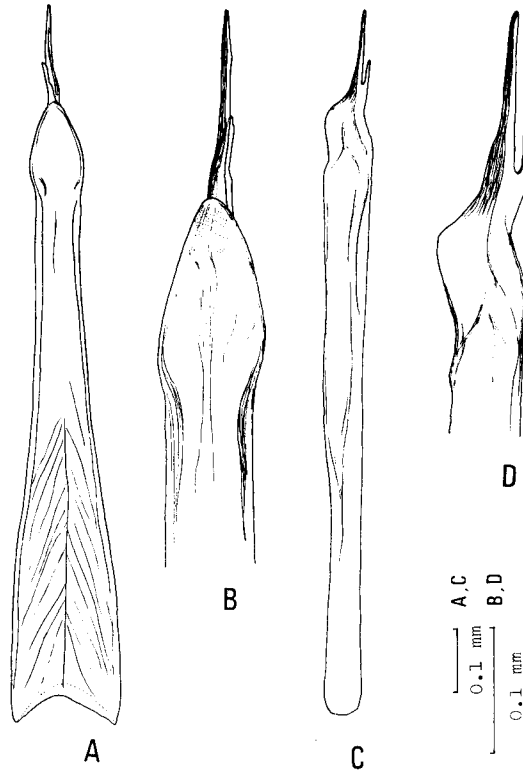


Fig. 5. *Caddo agilis* Banks, penis. A) Dorsal view. B) Ventral view of distal portion. C) Lateral view. D) Lateral view of distal portion.

Notes. The present two males here described were collected together with 19 females on July 9th, 1979, at the same time, from Nopporo Natural Forest (about 90 m alt.) near Sapporo, Hokkaido. This area consists of several kinds of deciduous broad-leaf forest and Sakhalin fir, *Abies sachalinensis*, forest. *Caddo agilis* is very abundant on tree trunks near the ground especially in the latter forest. More than 300 specimens of this species were taken from there through 1979, however, no male was found except for above two specimens (2♂, 150♀, 151 juveniles in 1979; Sex ratio, %, ♂/(♂+♀)=1.3). Therefore it seems that this species is usually parthenogenetic also in Nopporo population as in the case of the other localities where only females were collected.

***Caddo pepperella* Shear, 1975**

Caddo agilis: Suzuki, 1972a, p. 1 (in part, fig. 1).

Caddo pepperella Shear, 1975, p. 74, fig. 5. [Type-locality: Pepperell, Middlesex Co.,

Massachusetts, U.S.A.]; Suzuki, 1976d, p. 265, figs. 8-20.

Distribution. Japan (Honshu, Shikoku, Kyushu), The eastern part of North America. See Shear (1974) and Suzuki (1976d).

Superfamily Phalangoioidea
Family Phalangiidae
Subfamily Phalangiinae

* *Phalangium opilio* Linnaeus, 1761

(Figs. 6-7)

Phalangium opilio Linnaeus, 1761, Syst. Naturae, 10 ed. p. 168 [Type-locality: Sweden]; Simon, 1879, Arachn. de France, 7, p. 195; Roewer, 1923, p. 751; Bishop, 1949, p. 183, figs. 29-33; Spoek, 1963, p. 28; Martens, 1978, p. 232, figs. 406-415.

Phalangium brevicorne: Simon, 1879, Arachn. de France, 7, p. 198.

Eudasylobus unicolor Roewer, 1911b, p. 58.

Phalangium calabrianum Roewer, 1956, p. 301.

Specimens examined. HOKKAIDO. Tomakomai Experimental Forest of Hokkaido University, Tomakomai (1♀, 11-VIII-80, O. Enomoto, M. Yamamoto & S. Nakano; 1♂2j, 19-VIII-80, NT).

Occurrence of this species in Hokkaido is the first record to the Japanese opilionid fauna, so it is redescribed here.

Measurements (in mm; ♂, in parentheses ♀). Body L: 4.0 (7.0). Cephalo-thorax: 1.6 (1.5)L, 2.5 (3.4)W. Abdomen W: 2.5 (4.1).

Length of palp and legs (♂, in parentheses ♀):

	Tr	Fe	Pa	Ti	Mt	Ta	Total
Palp	0.43 (0.42)	2.63 (1.52)	1.23 (0.86)	1.58 (1.07)	—	2.92 (2.10)	8.78 (5.97)
Leg I	0.44 (0.49)	4.32 (3.93)	1.15 (1.30)	3.67 (3.42)	4.50 (3.90)	7.68 (8.00)	21.76 (20.51)
II	0.44 (0.53)	8.12 (7.62)	1.73 (1.73)	6.70 (6.30)	6.40 (6.10)	15.80 (15.20)	39.19 (37.48)
III	0.48 (0.47)	4.62 (4.34)	1.30 (1.28)	3.45 (3.40)	5.49 (4.70)	6.96 (8.60)	22.30 (22.79)
IV	0.50 (0.49)	6.62 (6.70)	1.47 (1.32)	4.83 (4.81)	8.00 (7.65)	11.68 (11.85)	33.10 (32.82)

Male (Figs. 6A-B and 7A). Carapace with numerous black-tipped denticles disposed as follows: a group in front of eye tubercle, a cluster at anterior lateral angle, a few at anterior and posterior edge of scent gland, three or four on each side of eye tubercle and a transverse row on thoracic tergites. Eye tubercle (Fig. 7F) rounded above, with a wide shallow median canal, carinae armed with a row of 6~8 pointed black-tipped tubercles. Venter smooth, clothed with black hairs, on anterior coxae hairs usually arising on a low elevation.

Chelicera (Fig. 7A-B). Proximal segment dorsally with small denticles, distal segment produced dorsally into a strong horn (This is a prominent male secondary character). Supra-cheliceral lamellae with a long, sharp pointed tubercle.

Palp (Fig. 7D). Leg-shaped, slender and long. Patella slightly produced into a small apophysis. Trochanter dorsally with small denticles, femur dorsally and laterally with sparse denticles, other segments only with short dark hairs.

Coloration. Ground color above grayish, the central figure of blackish brown developed, broad on the thoracic tergites, narrow on the abdominal area I, strongly widened on II and III and then narrowed. Eye tubercle pale, slightly darkened around eyes. Chelicera yellowish, claws black-tipped. Femur of palp light at extremities, dark brown to black between, remaining segments light; legs brown to dark brown.

Penis. Shaft 3.2 mm L, 0.4 mm W at base, glans 1.5 mm L, stylus 0.2 mm L. Of the form as shown in Fig. 7G-I, resembles closely that of Eichberg form, West Germany (cf. Martens 1978, Figs. 406-407).

Female (Fig. 6C). Generally similar to male but with larger body, second cheliceral segment not produced dorsally but normal (Fig. 7C), palp of normal size, a little thicker than in male (Fig. 7E). Seminal receptacle as in Fig. 7J.

Distribution. Europe, North America, New Zealand, Japan (Hokkaido).

Notes. It is well known that occurrence of this species in New Zealand is secondary (Forster 1962, Forster and Forster 1970, Gruber and Hunt 1973). The same is also suggested in the North American *opilio* (Martens 1978). From Hokkaido this species was captured at the open roadside of the Tomakomai Experimental Forest where timothies, red clovers, Kentucky blue grasses and others are planted. It occurs nowhere aside from this roadside. Here also, it appears of recent introduction in Hokkaido.

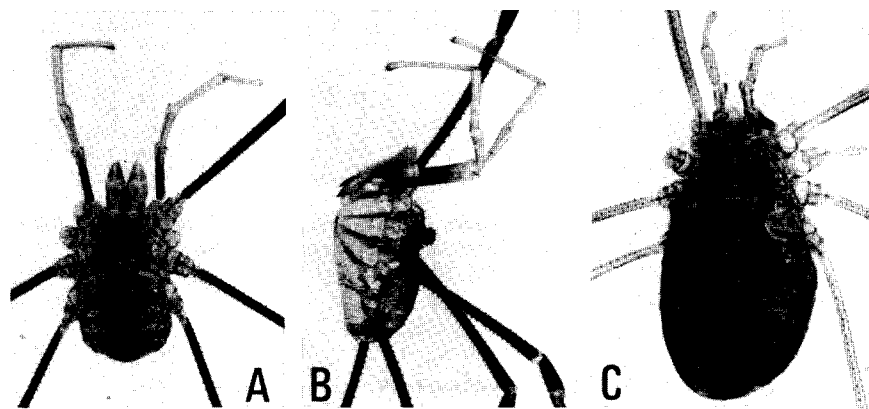


Fig. 6. *Phalangium opilio* Linnaeus. A-B) Dorsal and lateral views of male. C) Dorsal view of female. (Tomakomai) All $\times 5$.

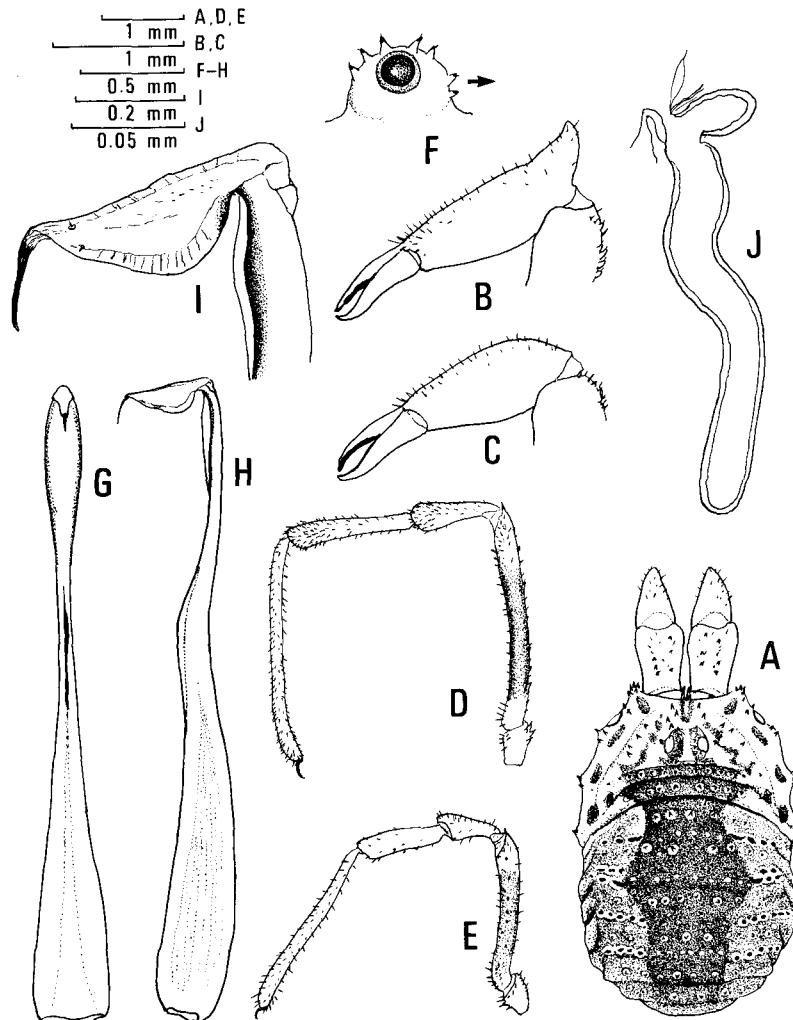


Fig. 7. *Phalangium opilio* Linnaeus. A) Dorsal view of male. B-C) Chelicera, medial, B) male, C) female. D-E) Palp, lateral, D) male, E) female. F) Eye tubercle, male, right side. G-H) Penis, G) dorsal, H) lateral. I) Glans, lateral. J) Seminal receptacle. (Tomakomai)

***Euphalangium albofasciatum* (Kulczyński, 1901)**

Phalangium Nordenskiöldi var. *albofasciatum* Kulczyński, 1901, In: Zichy, Dritte Asiat. Forsch., v. 2, p. 351. [Type-locality: Ulan Bator, Mongolia]

Euphalangium nordenskiöldi var. *albofasciatum*: Roewer, 1911b, p. 34.

- Euphalangium albofasciatum*: Roewer, 1923, p. 764; 1956, p. 260; Schenkel, 1963, p. 484; Starega, 1964, p. 399, figs. 14-17.
Opilio sachaliensis Suzuki, 1941, p. 245, figs. 8-13; 1956, p. 97, figs. 1-7.
Opilio kurilus Roewer, 1956, p. 289, figs. 131-133.
Opilio sachalinus Roewer, 1956, p. 295, figs. 153-155.

Distribution. Sakhalin, Kurile Islands (Is. Kunashir, Is. Iturup), Mongolia, North Korea.

Subfamily Oligolophinae

Oligolophus aspersus (Karsch, 1881)

(Fig. 8)

- Lacinius aspersus* Karsch, 1881, p. 35. [2 juv. syntypes from Japan, detailed locality unknown, Hilgendorf leg., in ZMB (2742), examined]; Roewer, 1911a, p. 599.
Oligolophus aspersus: Roewer, 1912, p. 54; 1923, p. 722; 1957, p. 326; Suzuki, 1939, p. 738, fig. 2; 1941, p. 244; 1949, p. 18; 1972e, p. 38.
Nelima melanodorsum Roewer, 1911a, p. 595. [Male holotype from Kyoto, Japan, Sauter leg., in ZMB (12706), examined]; 1923, p. 917; 1957, p. 351. NEW SYNONYMY.
Mitopus striatipes Roewer, 1957, p. 325. [Male holotype and 2♂, 1♀ paratypes from Jesso (=Hokkaido), Japan, collector unknown, in SMF (R II 9255/123), and 5 juv. (not 5♂, ♀), Hakodate, Japan, collector unknown, in SMF (R II 9257/124), examined] NEW SYNONYMY.

Specimens examined. IS. ITURUP. Mt. Hitokappu (1♀, 13-VIII-1933, R. Yosii); Kamuikotan-numa (1♀, 20-VIII-1933, R. Yosii).—HOKKAIDO. Is. Rebun, Kitousu (1j, 4-VIII-66, M. Ohno); Is. Rishiri (2j, 27-VII-56, O. Sato); Is. Rishiri, Himenuma (1♀ 2j, 3-VIII-64, M. Kawakatsu & T. Yamada); Horonohe, 20~60 m (6♂ 3♀, 17-IX-79, NT). Shiretoko: Mt. Rausu (2j, 28-VII-75, SS & NT); Iwaobetsu Spa (9j, 29-VII-75, NT); L. Shiretoko-goko (17j, 27-VII-75, SS & NT). Abashiri, Futatsuiwa (2♂, 27-IX-56, H. Fujimoto); Bihoro-tôge (1♂ 2♀, 3-IX-57, SS); Kawayu Spa (1♀, 11-VIII-55, O. Sato; 1♂, 3-IX-57, SS); L. Mashû (3j, 21-VII-64, T. Aya); L. Akan (1♂ 1♀, 3-IX-57, SS; 1♀, 10-VIII-80, S. Kubota); Akan~Mashû-ko (9♂ 6♀, 3-IX-57, SS); Akkeshi, Marine Biol. Station, Hokkaido Univ. (16♂ 4♀ 1j, 1-IX-57, SS); Honbetsu (1j, 4-VIII-78, H. Katakura); L. Shikaribetsu (2♂ 2j, 3-VIII-78, H. Katakura). Daisetsu: Sôunkyô (1♂, 4-IX-57, SS; 4♂ 4♀, 4-IX-71, H. Sako); Mt. Kurodake (1j, 12-VII-71, H. Sako); Aizankei Spa (1j, 26-VII-49, T. Imamura); Tenninkyô (1♀ 3j, 25-VII-75, SS & NT). Shiokari-tôge, Kamikawa-gun, 240~280 m (11♂, 17-IX-79, NT); Mt. Poroshiri (1j, 14-VI-81, NT); Maoui-kyûryô, Yuni-chô (2♀, 20-VIII-78, NT); Aoyama-chûdô, Tôbetsu-chô, 70 m (4♂, 31-VII-78; 1♂ 12♀ 4j, 11-VIII-79, NT); Ishikari 5-sen, Ishikari-chô (4j, 2-VI-78; 7j, 19-VII-78; 2♀ 9j, 29-VII-78; 4j, 7-VII-79, NT); Nopporo, Ebetsu-shi (26♂ 6♀ 6j, 20-VII~27-IX-78; 136♂ 66♀ 177j, 14-V~25-X-79, NT); Mizuho-ike, Nopporo (1♀, 29-VIII-78, NT). Sapporo: (1♂, 9-VIII-55, T. Yaginuma); Campus of Hokkaido Univ. (1j, 22-VI-78; 1♀, 27-VII-78, M. Yamamoto); Botanical Garden (5♂, 26-VIII-64, T. Aya); Maruyama (25♂ 5♀, 27~31-VIII-57, SS; 2♀, 3-VIII-59, M. Azuma; 44♂ 11♀ 57j, 16-VI~25-IX-78; 221♂ 123♀ 317j, 10-V~17-X-79, NT); Mt. Sankaku (1♂ 2♀, VIII-66, M. Kawakatsu); Kobetsuzawa (4♀ 2j, 22-VII-78, H. Katakura & H. Himomizu); Mt. Moiwa (1♂ 2♀, 18-VIII-66, SS; 1♂ 3♀ 14j, 26-VII-78, NT); Tsukisamu (13♂ 5♀ 3j, 3-VII~11-IX-78, T. Kimura); Misumai (1j, 27-VII-78, H. Watabe); Mt. Hakken (3♂, 16-VIII-79, NT); Jôzankei (2♂ 1♀, 25-VIII-78, NT); Mt. Muine (2♀, 11-VIII-64, T. Aya); Nakayama-tôge (3♀ 3j, 24-VII-78, NT); Yunosawa (17♀ 5j, 27-VII-78, NT); Takino, 260 m (1♀

1j, 10-VIII-79, NT); Ashiribetsu Fall (1 ♂, 10-IX-70, M. Kawakatsu; 2 ♀, 10-VIII-79, NT). Hiroshima-chō: Ōmagari (1 ♂, 29-VIII-78, NT); Todoyama (8 ♂ 3 ♀, 29-VIII-78, NT). Kōryū-kōzan, Eniwa-shi (4 ♀ 4j, 27-VII-78, NT & H. Katakura). L. Shikotsu: Poropina (27 ♂ 11 ♀, 24-VIII-79, NT); Maruyama (20 ♂ 7 ♀, 24-VIII-79, NT). Tomakomai Experimental Forest, Hokkaido Univ. (3j, 14-VI-78; 1j, 10-VIII-79, M. Yamamoto; 4 ♂ 35 ♀ 4j, 4-VIII-78; 12 ♂ 6 ♀, 19-VIII-80, NT; 1 ♀, 12-VIII-80, S. Nakano); Ishikari-ōhama (2 ♀ 1j, 29-VII-80, NT). Otaru: Katsuraoka-chō (5 ♂ 1 ♀, 18-VIII-78, NT); Shioya (6 ♂ 3 ♀ 4j, 18-VIII-78, NT). Shiribetsu, Kimobetsu-chō (7 ♂ 1 ♀, 26-VIII-78, NT); Mt. Yōtei, 320~1200 m (7 ♂ 6 ♀, 25-IX-81, NT, S. Nakano & S. Sasaki). Niseko-chō: Yōtei (10 ♂ 1 ♀, 26-VIII-78, NT); Kondō (1 ♂, 26-VIII-78, NT). Utasai, Kuromatsunai-chō 23 ♂ 3 ♀, 7-IX-79, NT); Ōnuma Park (32 ♂ 29 ♀, 6/7-IX-78, NT). — AOMORI PREF. Osorezan (2j, 4-VIII-80, M. Shiba); Tsugaru-ōdai, 40~50 m (5 ♂ 2 ♀, 15-IX-78, NT); Mt. Iwaki, 430~1400 m (60 ♂ 36 ♀, 11/12-IX-78, NT); Sukayu Spa, 740~900 m (1 ♂ 4 ♀ 7j, 2-VIII-75; 22 ♂ 23 ♀, 9-IX-78, NT; 2 ♂ 1 ♀, 22/23-IX-75, SS); Mt. Hakkōda (1j, 29-VII-81, H. Okada); Oirase, Ishigedo~Nenokuchi (7j, 4-VIII-75; 15 ♂ 16 ♀, 10-IX-78, NT). L. Towada: Yasumiya, 400 m (2 ♀ 2j, 3-VIII-75, NT; 1 ♂ 1 ♀, 24-IX-75, I. Goto). — AKITA PREF. L. Towada: Hakka camping site, 405 m (3 ♀, 4-VIII-75, NT); Oide-en (2 ♂ 1 ♀, 17-VIII/7-IX-75, I. Goto; 5j, 17-VII-77, SS). Mt. Hachimantai: (2j, 27-VII-81, H. Okada); Ōnuma, 940 m (8 ♂ 5 ♀ 4j, 5/6-VIII-75, NT); Goshokake Spa (1 ♂, 26-IX-75, SS). — IWATE PREF. Mt. Hayachine: Dake, Hayachine-jinja (1 ♀, 23-VIII-80, NT; 3j, 24-VII-81, H. Okada); Dake~Kawarabō, 700~1050 m (2 ♂ 4 ♀, 24-VIII-80, NT).

This species was originally described by Karsch (1881) under the name *Lacinius aspersus* based on two juvenile specimens from Japan. His description was supplemented by Roewer (1911a) based on further two specimens taken from Hokkaido. In 1912 it was moved to the genus *Oligolophus* by Roewer.

On the other hand, Roewer (1911a) created *Nelima melanodorsum* on the basis of a single male captured in Kyoto. Examination of the holotype (ZMB 12706) revealed that a trident, although rather poorly developed, is present at the median front edge of the carapace and the tarsal claw of the palp is completely smooth. These and all other external characters accord well with that of *Oligolophus aspersus*. In addition, the penis structure is almost equal to that of *O. aspersus*. Thus it is no doubt that *Nelima melanodorsum* is synonymized with *Oligolophus aspersus*.

Furthermore, Roewer (1957) described *Mitopus striatipes* from Hokkaido. The type series deposited in the SMF consist of male holotype and 2 ♂, 1 ♀ paratypes (R II 9255/123) and 5 juveniles (not 5 ♂ ♀) (R II 9257/124). After examining all these specimens it became evident that in all morphological characters as well as the penis structure they accord fairly well with *Oligolophus aspersus*. Therefore *Mitopus striatipes* is considered to be a synonym of *Oligolophus aspersus*.

Notes. The chelicera of the male (Fig. 8B), differing from the descriptions of Roewer (1912, 1923), is provided with a row of small teeth laterally on the second segment (number of teeth differs 2~7) and a small apophysis dorsally at base of the movable finger (Fig. 8C). These armaments are considered to be male secondary characters. Also, the palpal tarsus of the male bears a longitudinal zone of numerous small tubercles on the ventro-medial surface. Penis (Fig. 8D-F) and seminal receptacle (Fig. 8G) are first illustrated. Penis: shaft 3.5 mm L, 0.3 mm

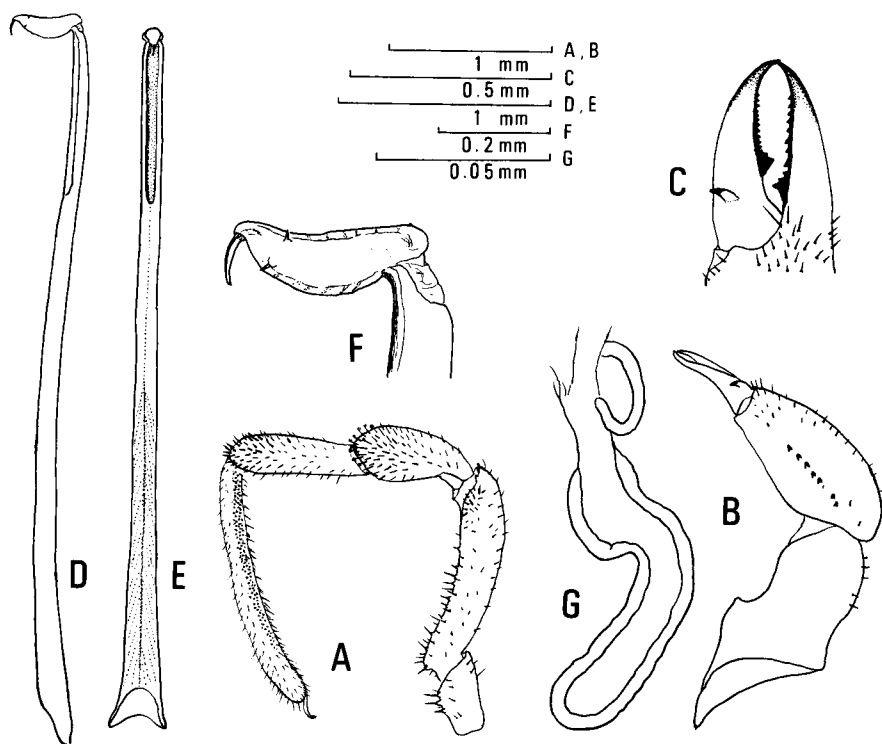


Fig. 8. *Oligolophus aspersus* (Karsch). A) Palp, medial, male. B) Chelicera, lateral, male. C) Cheliceral fingers, frontal, male. D-E) Penis, D) lateral, E) dorsal. F) Glans, lateral. G) Seminal receptacle. (A-F, Sapporo; G, Sôunkyô)

W at base, glans 0.4 mm L, stylus 0.1 mm L. Shaft slender and long, slightly widened proximally, flattened dorso-ventrally, dorsally with a distinct distal furrow.

Distribution. Sakhalin, Is. Iturup, Japan (Hokkaido, Honshu, Shikoku, Kyushu).

Mitopus morio (Fabricius, 1779)

(Figs. 9-10)

Phalangium morio Fabricius, 1779, Reise nach Norwegen, p. 341. [Type-locality: Norway]

Mitopus morio: Thorell, 1876, Ann. Mus. Civ. Genova, 8, p. 17; Roewer, 1923, p. 718;

Suzuki, 1939, p. 735, fig. 1; 1941, p. 240, figs. 1-7; 1949, p. 17; 1972e, p. 38;

Martens, 1978, p. 346, figs. 657-669.

Specimens examined. HOKKAIDO. Is. Rishiri: (1♀, 27-VIII-56, O. Sato); Mt. Rishiri (1♂ 1♀, 26-VIII-78, H. Hinomizu). Daisetsu: Sôunkyô, 640 m (2j, 11-VII-47, T. Imamura; 2j, 12-VII-71, H. Sako); Mt. Kurodake (6♂ 5♀, 4-VIII-71; 5♂ 2♀, 26-VIII-71,

H. Sako); Mt. Hokkai-dake, 2140 m (15 ♂ 1 ♀, 8-VIII-48, T. Imamura); Mt. Hokuchin-dake (1 ♂ 1 ♀, 7-VIII-57, M. Azuma); Mt. Asahi-dake, Sugataminoike (13j, 23-VII-75, SS & NT); Yukomanbetsu Spa (1 ♀, 8-VIII-49, T. Imamura); R. Kwaunnai, 600~800 m (6j, 2-VII-79, NT). Mt. Ashibetsu, 1720 m (1 ♂, 19-IX-82, NT).

Notes. This species distributes very widely in the Holarctic region and is well known that the body size, leg length, and coloration are subject to a great geographic variation. The specimens from Hokkaido (Mt. Kurodake, Daisetsu) were measured as follows: body L (♂, in parentheses ♀) 4.4-6.3 (7.0) mm; leg II L: Fe 6.0-7.9 (5.0), Pa 1.6 (1.5), Ti 4.8-5.9 (4.2), Mt 6.5-7.8 (5.2), Ta 11.5-12.6 (11.0) mm. The marking of the body as shown in Fig. 9. Penis (Fig. 10A-D) and seminal receptacle (Fig. 10E) almost similar to those published by many authors in European and North American specimens (cf. Bishop 1949, figs. 32-33; Šilhavý 1956, figs. 335-338, 345; Spöck 1963, figs. 8g-h; Starega 1976, figs. 49-51; Martens 1978, figs. 657-658, 662, etc.). Penis: Shaft 2.5-2.6 mm L, 0.3 mm W at base, glans 0.4 mm L, stylus 0.2 mm L.

Distribution. Europe, Greenland, Iceland, Svalbard, North America, Siberia to Kamchatka, Manchuria, Sakhalin, Japan (Hokkaido, Honshu: In Honshu it is limited to the mountainous region of Chûbu district with higher altitude than ca. 2000 m).

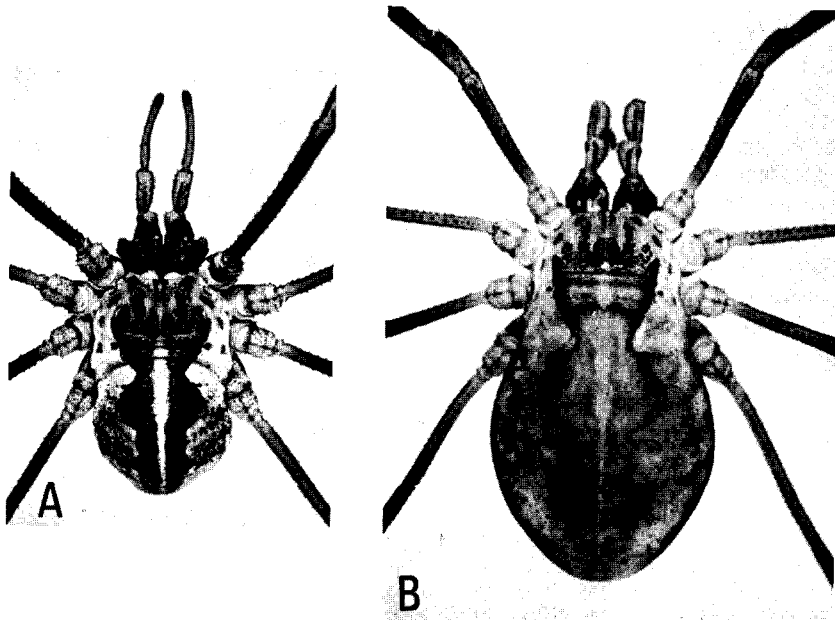


Fig. 9. *Mitopus morio* (Fabricius). A) Male, B) female. (Mt. Kurodake, Daisetsu) All $\times 7$.

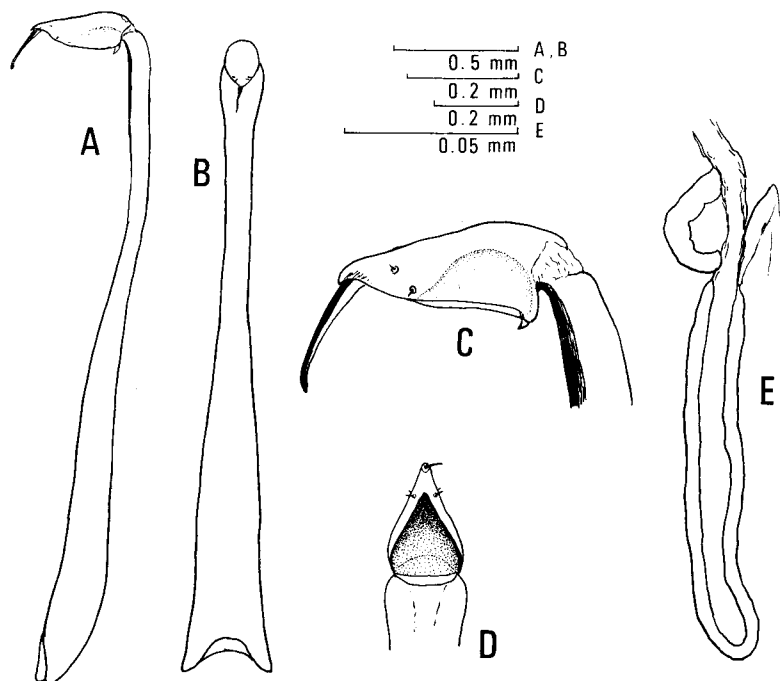


Fig. 10. *Mitopus morio* (Fabricius). A-B Penis, A) lateral, B) dorsal. C-D) Glans, C) lateral, D) underside. E) Seminal receptacle. (Daisetsu)

Family Gagrellidae
Subfamily Gagrellinae
Gagrellula montana Sato et Suzuki, 1938

Gagrellula montana Sato et Suzuki, 1938, p. 385, figs. 9-10. [Type-locality: Shiroumajiri, Mt. Shirouma, Nagano pref., Honshu]; Suzuki, 1939, p. 742, fig. 4; 1958a, p. 68; 1960, p. 25, fig. 9 in col. pl. 11; Roewer, 1954, p. 269; Tsurusaki, 1982b, figs. 2-4.

Specimens examined. AOMORI PREF. Osorezan, 220~260 m (12♂6♀, 14-IX-78, NT); Asamushi, Hachimangû, 20~80 m (2♂1♀, 8-IX-78; 1♂3♀6j, 8-VII-80; 2♂1♀, 8-VIII-80; 4♂2♀2j, 23-VII-81, NT). Mt. Hakkôda: Sukayu Spa, 740~900 m (12♂13♀3j, 31-VII~2-VIII-75; 31♂17♀, 9-IX-78, NT; 3♂1♀, 22/23-IX-75, SS); Sukayu~Mt. Ôdake, 1010 m (1♂10j, 1-VIII-75, NT). Oirase, Ishigedo~Nenokuchi (2j, 5-VII-75, I. Goto; 8♂3♀, 4-VIII-75; 1♂, 10-IX-78; 3♀5j, 11-VII-82, NT); Yasumiya, L. Towada, 400 m (1♂1♀, 21-VII-75; 1♂, 24-VII-77, I. Goto). — AKITA PREF. L. Towada: Hakka, 405 m (4♂, 4-VIII-75; 2j, 10-VII-82, NT); Oide-en, 400 m (5♂2♀, 4~18-VIII-75, I. Goto; 3♂10♀14j, 17-VII-77, SS). Mt. Hachimantai: Ônuma, 940 m (3♂4♀, 5/6-VIII-75, NT); Ônuma~Mt. Hachimantai, 1000~1100 m (3♀, 6-VIII-75). Tazawakokôgen Spa, 640 m (6♂, 26-VIII-80, NT); Haruyama, L. Tazawa, 250~270 m (10♂2♀, 1 intersex, 25-VIII-80, NT). — IWATE PREF. Mt. Hayachine: Dake, 520~560 m (3♂1♀,

23-VIII-80, NT; 2♂ 6♀, 24-VII-81, H. Okada); Dake~Kawarabô, 700~1300 m (16♂ 5♀, 24-VIII-80, NT).

Distribution. Honshu (Chûbu, Kantô, and Tôhoku districts).

** *Melanopa grandis* Roewer, 1910

Melanopa grandis Roewer, 1910, p. 27. [Type-locality: Japan]; 1923, p. 936; 1955, p. 105; Suzuki, 1960, p. 25, fig. 7 in col. pl. 12; 1965b, p. 355, 1 fig.; 1972b, p. 65, figs. 1-3; Tsurusaki, 1982b, figs. 5-7.

Specimens examined. AOMORI PREF. Asamushi: Marine Biological Station of Tôhoku Univ. (3♂ 2♀, 8-IX-78, NT); Hachimangû, 20~80 m (1♂, 8-IX-78; 1j, 23-VII-81, NT; 1j, 21-VII-81, SS).

Distribution. Japan (Honshu, Shikoku, Kyushu), Korea.

** *Metagagrella tenuipes yezoensis* (Suzuki, 1949)

(Fig. 11A-C, E-F)

Gagrella japonica yezoensis Suzuki, 1949, p. 22, figs. 8-17. [Type-locality: Hokkaido]; 1960, p. 25; 1965b, p. 354.

Gagrella japonica japonica: Suzuki, 1958a, p. 68, figs. 3-4.

Specimens examined. HOKKAIDO. Abashiri, Genseikaen (1♀, 2-X-72, H. Akama); L. Akan (2♂, 11/12-VIII-59, M. Azuma; 2♂ 1♀, 2-X-72, H. Akama). Sapporo: (1j, 9-VIII-55, T. Yaginuma); Campus of Hokkaido Univ. (1♀ 2j, 2-VIII-59, M. Azuma; 1♂, 17-VIII-78, M. Yamamoto; 1♂, 5-X-79; 2♂, 18-IX-81, NT); Botanical Garden (17♂ 27♀, 21-VIII-64; 3♂ 8♀, 26-VIII-64, T. Aya; 7♂ 1♀, 13-IX-77; 11j, 4-VII-78; 3♀, 15-IX-79, NT); Maruyama (5♂ 9♀, 27/31-VIII-57, SS; 8♂ 3♀, 4-IX~25-IX-78; 63♂ 42♀ 134j, 7-VI~26-X-79, NT). Tomakomai Experimental Forest, Hokkaido Univ. (2♂ 8♀, 19-VIII-80, NT). Otaru: Shioya Tunnel (13♂ 34♀, 27-VIII-64, T. Aya); Oshoro (3j, 8-VII-78, NT; 1♂ 1♀, 9-IX-78, S. Sasaki). Ônuma Park, 130 m (4♂ 1♀ 4j, 26-VIII-57, SS; 8♂ 1♀, 6-IX-78, NT). — AOMORI PREF. Osorezan, 210 m (1♂ 1♀, 14-IX-78, NT); Asamushi Marine Biological Station of Tôhoku Univ., 20 m (1♂ 1♀, 13/14-IX-78, M. Sato). Hakkôda area: Kayanochaya (4j, 31-VII-75, NT); Sukayu Spa, 900 m (1♀, 9-IX-78, NT). Yakeyama (3♂ 3♀, 10-IX-78, NT); L. Towada, Yasumiya, 402 m (1♂ 1♀ 25j, 4-VIII-75, NT; 1♂ 4♀ 9j, 10~24-VIII-75, I. Goto).

Notes. This species was originally described as a subspecies of *Gagrella japonica* Roewer, which is widely distributed in Honshu, Shikoku, and Kyushu, based on the numerous specimens from the several localities in Hokkaido. However, lately, *G. japonica* proved to be a synonym of *Psathyropus tenuipes* L. Koch and subsequently be replaced under *Metagagrella* (cf. Suzuki 1973). In accordance with this revision, this subspecies is renamed as *M. tenuipes yezoensis*.

Although the records of this subspecies are so far confined to only in Hokkaido, Suzuki (1958a) stated that specimens of *M. t. tenuipes* (= *G. j. japonica*) taken from Shimokita Peninsula show much similarity with *M. t. yezoensis* in Hokkaido in external characters. In the present study, the newly collected material from the northernmost of Honshu were thoroughly reexamined; as a result, it became evident that all the specimens from several localities in Aomori pref. show far closer affinities

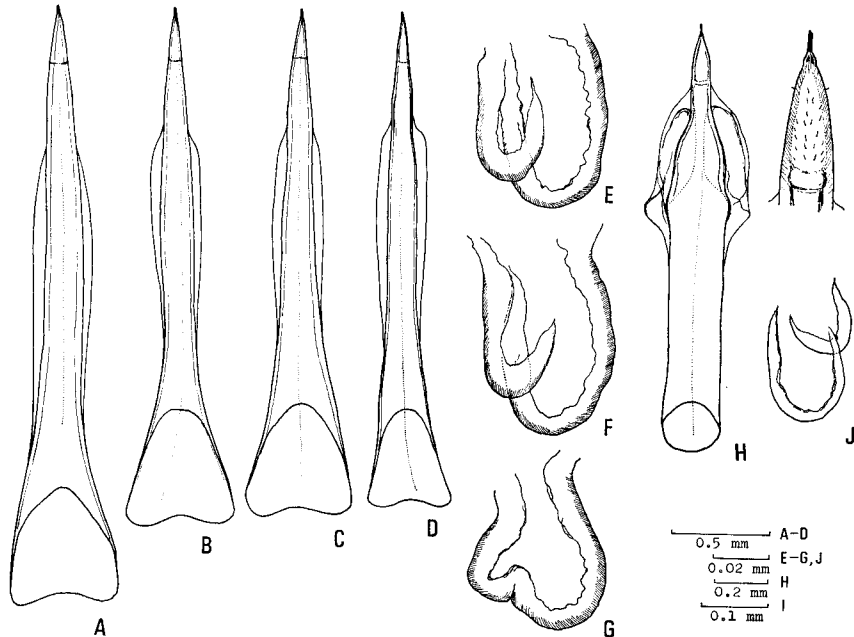


Fig. 11A-G. *Metagagrella tenuipes*, A-C, E-F: ssp. *yezoensis* (Suzuki), D, G: ssp. *tenuipes* (L. Koch). A-D) Ventral view of penis. E-G) Seminal receptacle. (A, E: Maruyama, B: Ônuma, C, F: Yakeyama, D, G: Is. Nakajima, Ehime pref.)

Fig. 11H-J. *Paraumbogrella fuzitai* Suzuki. H) Ventral view of penis. I) The same, ventral view of distal portion. J) Seminal receptacle. (H-I, Tomakomai; J, Campus of Hokkaido Univ., Sapporo)

with the Hokkaido specimens than with the specimens from southward populations of Honshu in the external structure (especially size of spine on the dorsal scutum, armaments on the frontal margin of cephalothorax), genital morphology, coloration, and some ecological characters. Therefore, in this paper, the specimens from Aomori pref. are treated as *M. t. yezoensis*.

The penes and seminal receptacles of several specimens from different localities are illustrated in Fig. 11A-G. Penis has a pair of distinct wings along the lateral sides, though it was overlooked in the original description of this subspecies. Seminal receptacle seems to be different between the both subspecies as far as the comparison of those of Maruyama, Yakeyama, and Is. Nakajima specimens is concerned. The details of geographic variations of this species including both subspecies and their distribution will be dealt with in another paper.

Distribution. Hokkaido, Honshu (Aomori pref.).

***Systemocentrus japonicus* Hirst, 1911**

Systemocentrus japonicus Hirst, 1911, p. 625. [Type-locality: Hakone, Japan]; Roewer, 1923, p. 929; 1955, p. 120; Suzuki, 1960, p. 25, fig. 6 in pl. 12; 1965b, p. 355, 1 fig.; Suzuki and Ohruai, 1972, p. 48; Suzuki and Tsurusaki, 1981, p. 274, figs. 1-2.

Distribution. Honshu, Shikoku, Kyushu. In Tōhoku district so far known from only two localities: Hakka, L. Towada, Akita pref. and Mt. Hayama, Yamagata pref. (See Suzuki and Tsurusaki 1981).

*** *Paraumbogrella huzitai* Suzuki, 1963**

(Fig. 11H-J)

Paraumbogrella huzitai Suzuki, 1963, p. 97, figs. 1-3. [Type-locality: Fukui pref., Honshu]; 1965b, p. 355, 1 fig.; Suzuki and Ohruai, 1972, p. 48.

Specimens examined. HOKKAIDO. Campus of Hokkaido Univ., Sapporo (6j, ?-VIII-78, M. Yamamoto; 5♂5♀, 22-IX-78; 7♂4♀, 25-X-78; 285♂256♀463j, 19-IV~4-XI-79; 3♀1j, 18-IX-81, NT); Tomakomai Experimental Forest, Hokkaido Univ. (3♂2♀28j, 3-VIII-78, M. Yamamoto & NT; 1♂, 18-VI-80, NT). — AOMORI PREF. Osorezan (1j, ?-VII-78, K. Sōma); Asamushi, Hachimangū, 20~80 m (1♂3♀, 21-VII-81, SS).

Notes. The specimens from Hokkaido agree well in general structure with those from various localities of Honshu. Penis and seminal receptacle of Hokkaido specimens are as shown in Fig. 11H-J.

Distribution. Hokkaido, Honshu (eastward from Fukui pref.).

Subfamily Leiobuninae

***Leiobunum japonicum japonicum* Müller, 1914**

Leiobunum japonicum Müller, 1914, p. 627. [Type-locality: Japan]; Roewer, 1923, p. 894; Suzuki, 1949, p. 18; 1958a, p. 67, figs. 1-2.

Leiobunum japonicum: Roewer, 1957, p. 343; Suzuki, 1960, p. 22, fig. 11 in pl. 11; 1965b, p. 352, 1 fig.

Leiobunum japonicum japonicum: Suzuki, 1976c, p. 204, figs. 161-167.

Specimens examined. HOKKAIDO. Ishikari 5-sen, Ishikari-chō (1♀, 29-VII-78, NT); Nopporo, Ebetsu-shi (1♂, 12-IX-79, NT). Sapporo: Campus of Hokkaido Univ. (1♂, 27-VII-78; 1♂, ?-VIII-78, M. Yamamoto; 1j, 6-VI-79; 2j, 22-VI-79, NT); Maruyama (8♂7♀11j, 16-VI~25-IX-78; 128♂96♀163j, 7-VI~17-X-79, NT); Tsukisamu (11♂5♀, 3-VIII~2-X-78, T. Kimura); Misumai (3♂4♀, 27-VII-78, H. Watabe). Tomakomai Experimental Forest, Hokkaido Univ. (1♀, 4-VIII-78; 2♀, 19-VIII-80, NT); Katsuraoka, Otaru (4♂4♀, 18-VIII-78, NT); Ōnuma Park (37♂32♀, 6/7-IX-78, NT); Mt. Hakodate, Hakodate (1♂1♀, 16-IX-78, NT). — AOMORI PREF. Tsugaru-ōdai (4♂, 15-IX-78, NT). Asamushi: Is. Yunoshima (1♂1♀, 7-VIII-78, M. Sato & M. Nakata; 2j, 22/26-VII-79, M. Sato); Marine Biol. Station of Tōhoku Univ. (15♂5♀, 8-IX-78, NT); Hachiman-gū (16♂25♀, 8-IX-78, NT). Mt. Iwaki, Dake Spa, 430 m (2♂3♀, 11/12-IX-78, NT); Oirase (1♀, 10-IX-78, NT). — AKITA PREF. L. Tazawa, Haruyama

(15 ♂ 2♀, 25-VIII-80, NT). — IWATE PREF. Mt. Hayachine, Dake, Hayachine-jinja (2♀, 23-VIII-80, NT)

Distribution. Japan (Hokkaido, Honshu, Shikoku, Kyushu), Korea.

Three species of *Leiobunum curvipalpe*-group¹⁾:
L. platypenis, *L. globosum*, and *L. tohokuense*

Up to the present, 15 species of this group have been described from Japan by Roewer (1910), Suzuki (1953, 1957, 1966b, and 1976c), and Tsurusaki (1982a) but the classification is rather difficult because they show much similarities in external characters. Females are particularly difficult to distinguish, being usually impossible to identify without associating males.

From Tôhoku district, northern Honshu, the following three species have been recorded as the members of this group: *Leiobunum platypenis*, *L. globosum*, and *L. tohokuense* (Suzuki 1976c). On the other hand, Suzuki (1976c) pointed out that specimens of this group taken from Hokkaido show a close affinity with *L. globosum* or *L. tohokuense* but failed in specific assignation, because no male had been obtained in spite of more than 40 specimens had been collected from there. However, taking account of practical reason, he treated these specimens as a separate species and provisionally named *L. esoense* (Suzuki 1976c).

In the course of further surveys on opilionid fauna of Hokkaido since 1978, the junior author has newly collected some males which are clearly identified as two different species, *L. globosum* and *L. platypenis*, with numerous females of *L. esoense*. Further, a close examination revealed that even females, at least with regard to *L. globosum*, *platypenis*, and *tohokuense*, can be distinguished from each other by some hitherto neglected characters. As a result, it became evident that specimens hitherto treated as *L. esoense* correspond to females of two species, *L. globosum* and *platypenis*.

Diagnostic characters of males and females of these three species are mentioned separately below.

Male.

The specific characters of *Leiobunum curvipalpe*-group have been well discussed by Suzuki (1953, 1957, 1976a, and 1976c). Compiling previous contributions and present reexamination, the diagnostic characters among males of *L. globosum*, *platypenis*, and *tohokuense* are summarized in Table 1 and Fig. 12. They are easily identified by the structure of palp, penis, and labrum. The shape of labrum first adopted by Suzuki (1976c) for specific character of the genus *Leiobunum*, is greatly useful for the separation of three species concerned. T- and L-shaped labrum of *L. globosum* and *platypenis*, respectively are unique, while the labrum of *L. tohokuense* is of club-shape being similar to most of other species of the group.

1) Usage of this species group name follows Suzuki (1976c).

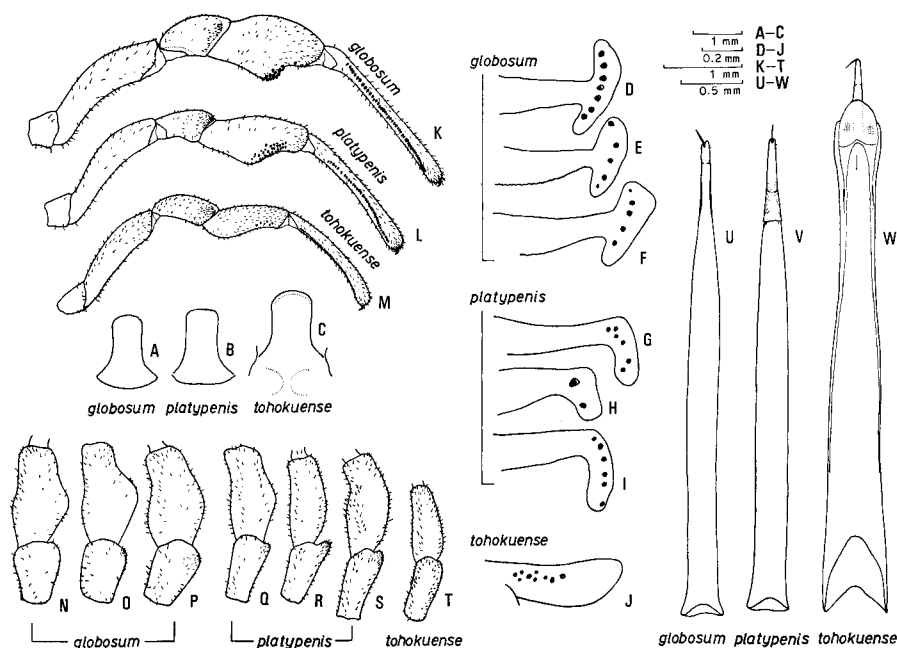


Fig. 12. Diagnostic characters in male among *Leibunum globosum*, *L. platypenis*, and *L. tohokuense*. A-C) Genital operculum. D-J) Lateral view of labrum. K-M) Mesal view of palp. N-T) Palpal patella and tibia, dorsal. U-W) Ventral view of penis. (A-C, I, J, M, S, T, W: Oirase/D, N, U: Nopporo/E, P: Sukayu/F, G, K, L, O, Q, V: Aoyama-chûô/H, R: Mt. Hakken)

Table 1. Diagnostic characters in male among *Leibunum globosum*, *L. platypenis*, and *L. tohokuense*

Characters (cf. Fig. 12)	<i>globosum</i>	<i>platypenis</i>	<i>tohokuense</i>
I. Posterior margin of genital operculum (A-C)	Distinct	Distinct	Obscure
II. Labrum (D-J)	T-shaped	L-shaped	Club-shaped
III. Palp (K-T)	Tibia extremely swollen at middle. Patella much widened. Tarsus elongated, with one accessory row of teeth	Tibia thickened at middle. Patella somewhat slender. Tarsus elongated, extremely curved, without an accessory row of teeth	Tarsus relatively short
IV. Penis (U-W)	Alate part small. Glans relatively small, asymmetrical at apex	Alate part small. Glans enlarged, symmetrical	Shaft and alate part enlarged

Further, the shape of genital operculum, a new character, is useful for the separation between *L. tohokuense* and the other two.

Female.

1) Genital operculum (Fig. 13): In female, as in the same case in male, the shape of genital operculum is the most useful diagnostic character between *L. tohokuense* and the other two. In *L. tohokuense* posterior margin of the genital operculum is somewhat obscure and sharply rounded postward, while in both *L. globosum* and *platypenis* it is distinct and moderately rounded.

2) Labrum (Fig. 14): *L. platypenis* is outstanding by the possession of apically widened labrum. In other species labrum is normal, i.e. gradually narrowed toward the apex. Apex seems to be more sharply angulated in *globosum* than in *tohokuense*. This is only one reliable character distinguishing females of *platypenis* and *globosum*.

3) Palpal patella (Fig. 15): *L. globosum* has a relatively short patella. In the remaining two species having relatively longer patella, the apophysis is generally more developed in *platypenis* than in *tohokuense*. For statistical comparison, measurements were undertaken on the palpal patella length (PPL1) and palpal patella length including apophysis (PPL2) by using an ocular micrometer and dissection microscope. Relation between them measured with the following six populations

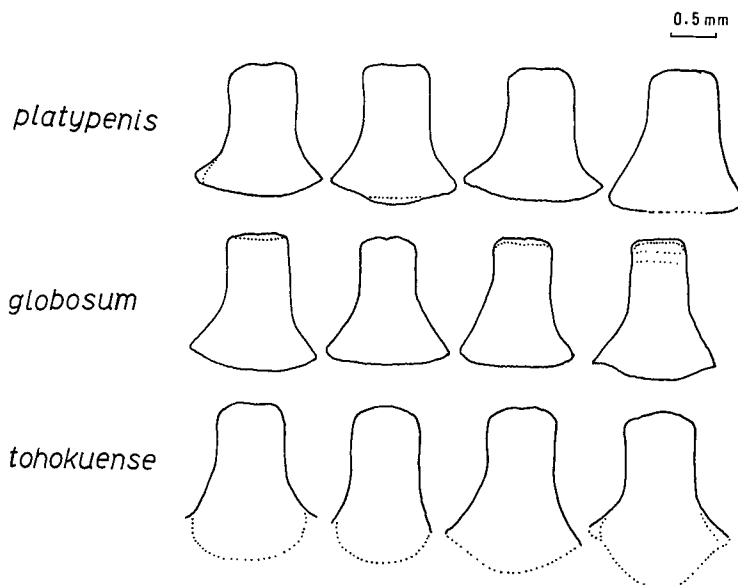


Fig. 13. Female genital operculum of *Leiobunum platypenis*, *L. globosum*, and *L. tohokuense*. (Oirase and Sukayu, Aomori pref.)

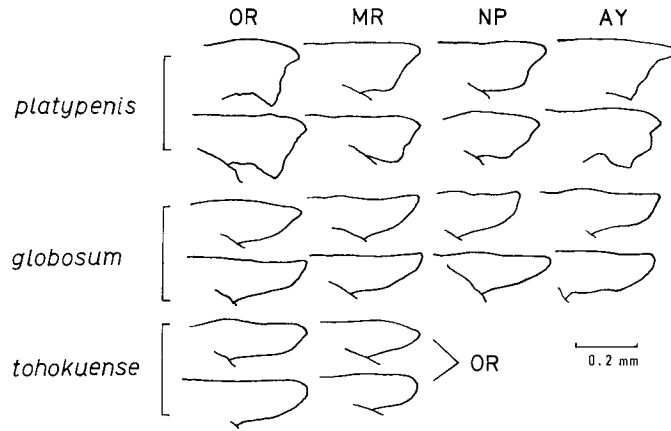


Fig. 14. Female labrum of *Leibunum platypenis*, *L. globosum*, and *L. tohokuense* (lateral view). (OR: Oirase, MR: Maruyama, NP: Nopporo, AY: Aoyama-chûô)

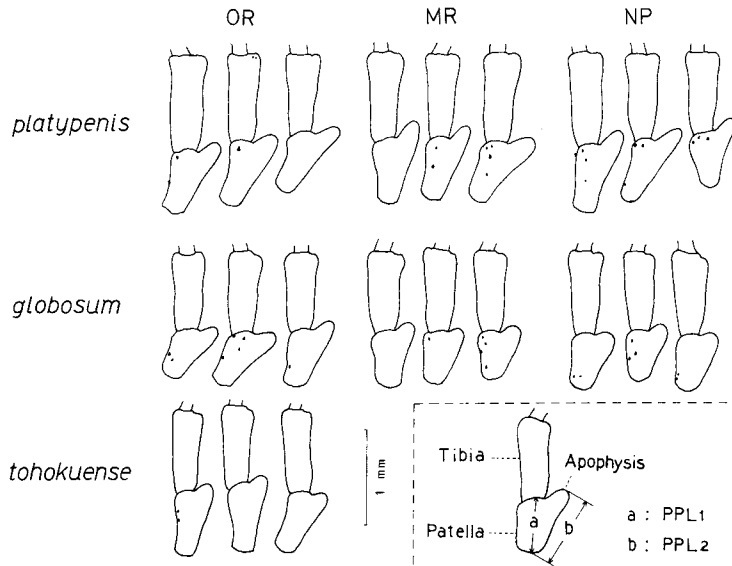


Fig. 15. Female palpal patella and tibia of *Leibunum platypenis*, *L. globosum*, and *L. tohokuense* (dorsal view). (OR: Oirase, MR: Maruyama, NP: Nopporo, PPL1=Palpal patella length, PPL2=Palpal patella length including apophysis)

is given in Fig. 16: Noppero, Maruyama, Kuromatsunai, Ohnuma (Hokkaido), and Sukayu, Oirase (Aomori pref.). Among these localities, *tohokuense* is distributed only in Oirase. The means, ranges, and SD are given in Table 2. *L. platypenis* is relatively larger than *globosum* in both length. The ranges of *platypenis* and *globosum* nearly segregate and their allomorphic trends are somewhat different as far as three northern populations are concerned. *L. tohokuense* is intermediate between *platypenis* and *globosum* in PPL2 but generally shows a larger value of PPL1 than the other two. Therefore the size and proportion of patella are useful to some extent.

4) Seminal receptacle (Fig. 17): Seminal receptacles of these three species are similar with each other in the basic structures. However, generally main ampulla is more elongated in *platypenis* and *globosum* than in *tohokuense*.

5) Numbers of ventromesal teeth on palpal tarsus: Usually females of *Leiobunum* species have no teeth on the palpal tarsus. However, females of

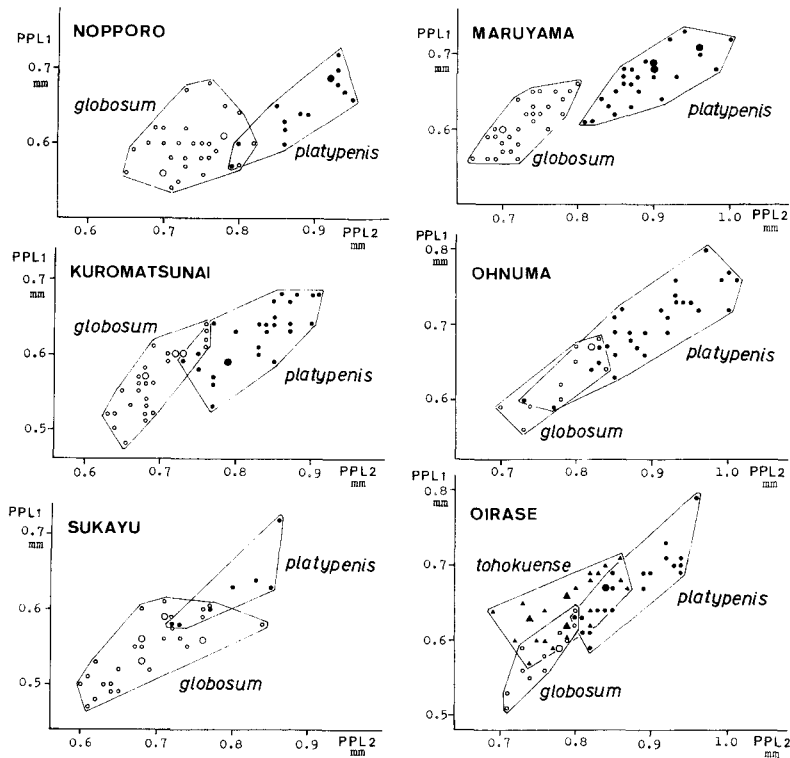


Fig. 16. Relation of patella length (PPL1) to palpal patella length including apophysis (PPL2) in *Leiobunum platypenis*, *L. globosum*, and *L. tohokuense*. PPL1 and PPL2 as shown in Fig. 15.

Table 2. Length (mm) of PPL1 and PPL2 of various samples of *Leiobunum globosum* (Lg), *L. platypenis* (Lp), and *L. tohokuense* (Lt). Further explanations in text.

	Loc.	Spec.	n	max.	min.	\bar{x}	SD
PPL1	NP	Lg	30	0.68	0.54	0.60	0.033
		Lp	15	0.72	0.57	0.65	0.042
	MR	Lg	30	0.66	0.56	0.61	0.031
		Lp	30	0.73	0.61	0.67	0.032
	KR	Lg	31	0.64	0.48	0.56	0.041
		Lp	27	0.68	0.53	0.62	0.041
	ON	Lg	11	0.68	0.56	0.63	0.041
		Lp	30	0.80	0.59	0.70	0.056
	SK	Lg	33	0.61	0.47	0.55	0.041
		Lp	7	0.72	0.58	0.63	0.048
	OR	Lg	13	0.64	0.51	0.58	0.036
		Lp	22	0.79	0.59	0.67	0.046
		Lt	26	0.71	0.57	0.64	0.037
	PPL2	NP	Lg	30	0.82	0.65	0.74
Lp			15	0.95	0.79	0.89	0.050
MR		Lg	30	0.80	0.66	0.73	0.036
		Lp	30	1.00	0.81	0.89	0.047
KR		Lg	31	0.76	0.63	0.69	0.037
		Lp	27	0.91	0.73	0.83	0.051
ON		Lg	11	0.84	0.70	0.79	0.045
		Lp	30	1.01	0.73	0.89	0.068
SK		Lg	33	0.85	0.70	0.77	0.045
		Lp	7	0.86	0.72	0.79	0.056
OR		Lg	13	0.80	0.71	0.76	0.032
		Lp	22	0.96	0.80	0.87	0.051
		Lt	26	0.87	0.69	0.79	0.047

platypenis often have some teeth on the ventromesal surface of tarsus. *L. tohokuense* and *globosum* usually bear no such teeth, though in *globosum* rarely present one or two (Fig. 18). In *platypenis* the number of such teeth varies both within and among populations. As given in Fig. 18, in *platypenis* the number of teeth tends to be larger in the northern populations (Nopporo, Maruyama) than in the southern ones.

6) Marking pattern on the abdomen (Fig. 19): Concerning the coloration of females, the following two types are generally separable within each species belonging to *L. curvipalpe*-group: ground color above grayish white to whitish yellow with dark brown markings (=female type) and ground color grayish yellow with yellowish brown markings (=male type) (see Suzuki 1976c). Also females of *platypenis*, *globosum*, and *tohokuense* can be roughly divided into these two types.

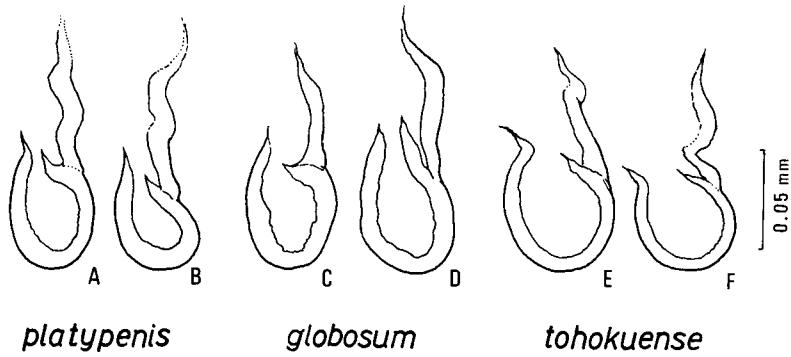


Fig. 17. Seminal receptacle of *Leiboldum platypenis*, *L. globosum*, and *L. tohokuense* (A-D: Nopporo, E: Asamushi, F: Mt. Iwaki)

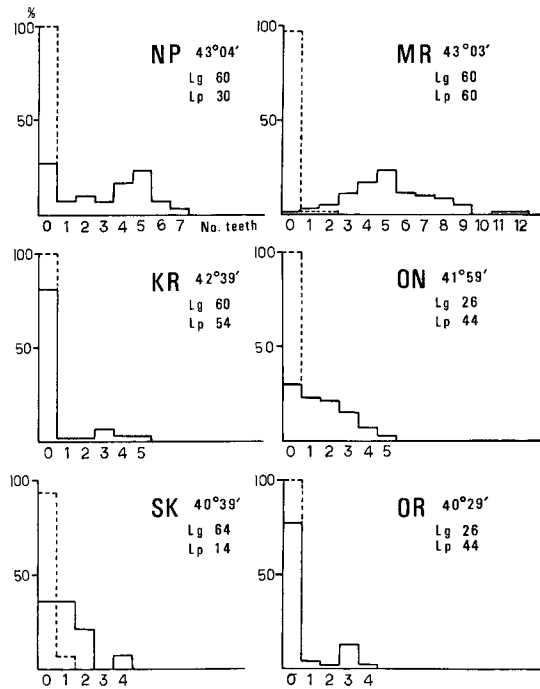


Fig. 18. Frequency distribution of number of ventromesal teeth on female palpal tarsus in six populations. Solid line: *Leiboldum platypenis* (Lp). Broken line: *L. globosum* (Lg). North latitude and number of tarsus examined in each populations are given in the figures. NP: Nopporo, MR: Maruyama, KR: Kuromatsunai, ON: Ohnuma, SK: Sukayu, OR: Oirase.

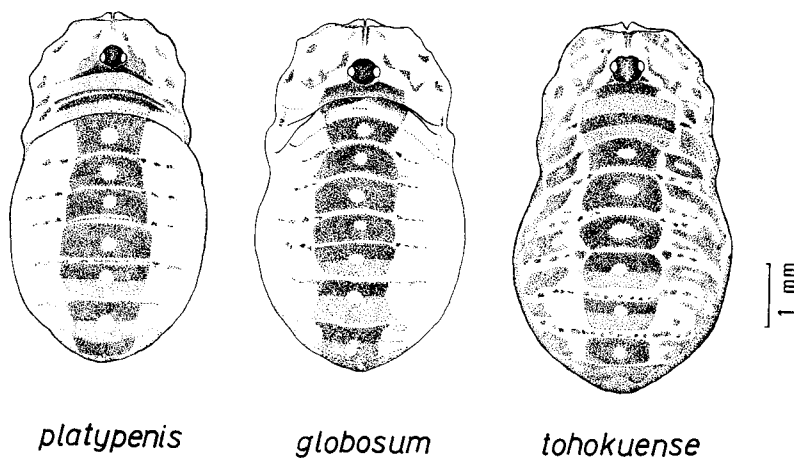


Fig. 19. Dorsal view of female body in *Leibunum platypenis* (Kuromatsunai), *L. globosum* (Mt. Hayachine), and *L. tohokuense* (Mt. Haguro, Yamagata pref.).

However, irrespective of this dimorphism in color, basic marking pattern on the female abdomen of *tohokuense* somewhat differs from the other two. Namely, in *tohokuense* both sides of abdomen are irregularly spotted with dark brown (female type) or yellowish brown (male type), while in both *platypenis* and *globosum* these are not spotted. This character seems to be fairly stable and useful.

As stated above, specimens described as *L. esoense* in Suzuki (1976c) proved to be a mixture of *platypenis* and *globosum*. In accordance with this revision the figures of labri presented in original paper (Suzuki 1976c, p. 189) are amended as follows: Figs. 90–91 are for *globosum*; Figs. 92–93 for *platypenis*. In that paper, several similar misidentifications of females were also detected with regard to the specimens from Tôhoku district. That is, labri presented in Figs. 78, 79 which referred to *tohokuense* and Fig. 88 referred to *globosum* are apparently correspond to that of *platypenis*. In the present study specimens used in the previous study (Suzuki, op. cit.) were thoroughly reexamined. These specimens correctly re-identified are listed below with newly collected ones.

* *Leibunum platypenis* Suzuki, 1953

(Figs. 12–19)

Leibunum platypenis Suzuki, 1953, p. 192 (in part, figs. 8–10 except for fig. 9L). [Type-locality: Kisofukushima, Nagano pref., Honshu]

Leibunum platypenis: Suzuki, 1976c, p. 216, figs. 80–83, 189–190, 319–320.

Leibunum esoense Suzuki, 1976c, p. 245 (in part, figs. 92–93, 285–286). [Female holotype and 4♀ paratypes from Maruyama, Sapporo, Japan, S. Suzuki leg., in ZLHU were reexamined and it found that they are composed of *L. platypenis* (holotype and 2 paratypes) and *L. globosum* Suzuki (2 paratypes)] NEW SYNONYMY.

Leiobunum tohokuense: Suzuki, 1976c, p. 230 (in part, figs. 78-79).

Leiobunum globosum: Suzuki, 1976c, p. 219 (in part, fig. 88).

Specimens examined. HOKKAIDO. L. Akan (1♀, 5-VII-54, T. Yaginuma; 4♀, 3-IX-57, SS; 1♀, 12-VIII-59, M. Azuma); Akkeshi, Marine Biol. Station, Hokkaido Univ. (2♀, 1-IX-57, SS); Shiokari-tôge, Kamikawa-gun, 240~280 m (2♀, 17-IX-79, NT); Mt. Sankaku, Yûbari-shi (2♀, 20-VIII-78, NT); Higashiyama, Iwamizawa-shi (23♀, 20-VIII-78, NT); Maoi-kyûryô, Yuni-chô (49♀, 20-VIII-78, NT); Aoyama-chûô, Tôbetsu-chô (1♂ 1♀, 23-VIII-78; 1♀, 31-VIII-79; 5♀, 11-VIII-79, NT); Ishikari 5-sen, Ishikari-chô (12♀, 19-VII-78; 3♀, 29-VII-78; 3♀ 12j, 7-VII~18-VII-79, NT); Nopporo, Ebetsu-shi (11♀, 20-VII~4-IX-78; 10♀ 7j, 5-VII~12-IX-79; 2j, 10/16-VII-80, NT). Sapporo: Botanical Garden (1♀, 2-IX-78, NT); Maruyama (3♀, 27-VIII-57, SS; 284♀ 56j, 30-VI~25-IX-78; 221♀ 86j, 18-VI~3-X-79; 11♀ 33j, 4~15-VII-80, NT); Kobetsuzawa (6♀, 22-VII-78, H. Katakura & H. Hinomizu); Tsukisamu (4♀ 6j, 3-VII~8-IX-78, T. Kimura); Mt. Moiwa (48♀, 26-VII-78, NT); Tsunejizawa (1j, 27-VI-78, H. Ubukata); Misumai (2♀, 27-VII-78, H. Watabe); Mt. Hakken (13♀, 24-VII-78; 2♀, 25-VIII-78; 1♂ 6♀, 16-VIII-79, NT); Jôzankei (2♀, 25-VIII-78, NT); Nakayama-tôge (5♀, 24-VII-78, NT); Takino (1♀, 10-VIII-79, NT); Ashiribetsu Fall (1♀, 10-VIII-79, NT); Yunosawa (32♀, 27-VII-78, NT). Kôryû-kôzan, Eniwa-shi (2♀, 27-VII-78, NT & H. Katakura). L. Shikotsu: Poropinaï (47♀, 24-VIII-79, NT); Maruyama (44♀, 24-VIII-79, NT). Tomakomai Experimental Forest, Hokkaido Univ. (54♀, 1~4-VIII-78; 2♂ 28♀, 19-VIII-80, NT); Ishikari-ôhama (5♀, 29-VII-78, NT). Otaru: Katsuraoka (12♀, 18-VIII-78, NT); Shioya (19♀, 18-VIII-78, NT). Shiribetsu, Kimobetsu-chô (5♀, 26-VIII-78, NT); Mt. Yôtei, 320 m (1♀, NT, S. Nakano & S. Sasaki). Niseko-chô: Kondô (1♀, 26-VIII-78, NT); Yôtei (4♀, 26-VIII-78, NT). Utsai, Kuromatsunai-chô (27♀, 7-IX-79, NT); Ohnuma Park (85♀, 6/7-IX-78, NT). — AOMORI PREF. Osorezan (1♀, 16-VIII-57, Y. Kitazawa). Asamushi: Is. Yunoshima (4♀, 22/26-VII-79, M. Sato); Hachiman-gû, 20~80 m (38♀ 11j, 8-VII-80; 12♀, 8-VIII-80; 5♀, 23-VII-81; 46j, 2/3-VII-82, NT). Mt. Iwaki, 700~1050 m (1♀, 12-IX-78, NT). Hakkôda: Sukayu Spa, 740~900 m (9♀, 1/2-VIII-75; 7♀, 9-IX-78, NT; 1♀, 22/23-IX-75, SS); Yachi Spa, 900 m (1♀, 4-IX-75, I. Goto). Oirase, Ishigedo~Nenokuchi (1♂ 29♀, 10-IX-78, NT). L. Towada: Nenokuchi (1♀, 6-IX-57, SS; 1♂, 4-VIII-75; 6j, 11-VII-82, NT); Yasumiya (1♀, 4-VIII-75; 6j, 10-VII-82, NT). — AKITA PREF. L. Towada: Hakka, 405 m (4♀, 4-VIII-75; 40♀ 36j, 10-VII-82, NT); Oide-en (1♂ 6♀, 18-VII-75, I. Goto; 13♀ 3j, 17-VII-77, SS); Tazawako-kôgen Spa, 640 m (1♀, 26-VIII-80, NT); Haruyama, L. Tazawa (1♂ 3♀, 25-VIII-80, NT).

Distribution. Hokkaido, Honshu (from Tôhoku to Chûbu districts).

Notes. Among the *Leiobunum curvipalpe*-group, this species has a widest distributional range, occurring from Hokkaido to Nagano pref., central Honshu. In principle the species of *L. curvipalpe*-group are allopatrically distributed (Suzuki 1976c). However, this species and the following species, *L. globosum* are widely sympatric in Hokkaido and Tôhoku district. Further, both species are also sympatric with *L. tohokuense* in the latter area.

* *Leiobunum globosum* Suzuki, 1976

(Figs. 12-19)

Leiobunum platypenis: Suzuki, 1953, p. 192 (in part, fig. 9L).

Leiobunum globosum Suzuki, 1976c, p. 219 (in part, figs. 84-87, 89, 120, 191-198, 203-208, 321-324). [Male holotype and 2♂, 5♀ paratypes from Nenokuchi, Towada, Aomori pref., N. Tsurusaki leg., in ZLHU, examined]; 1980, p. 111.

Leiobunum tohokuense: Suzuki, 1976c, p. 230 (in part).

Leiobunum esoense: Suzuki, 1976c, p. 245 (in part, figs. 90-91. The two female paratypes of *L. esoense* Suzuki belong to *L. globosum*).

Specimens examined. HOKKAIDO. Is. Rebun, Kitousu (1♀, 4-VIII-66, M. Ohno); Is. Rishiri, Himenuma (1♀, 3-VIII-64, M. Kawakatsu, T. Yamada). Shiretoko: Mt. Rausu (1j, 28-VII-75, SS, NT); Iwaobetsu Spa (1j, 29-VII-75, NT); L. Shiretokogoko (9j, 27-VII-75, SS, NT). Bihoro-tôge (1♀, 5-IX-57, SS); Sunayu Spa, L. Akan (1♀, 3-IX-57, SS); Akkeshi, Marine Biol. Station, Hokkaido Univ. (8♀, 1-IX-57, SS); Honbetsu, Nakagawagun (1♀, 4-VIII-78, H. Katakura); Kanno Spa, Shikaribetsukyô (2♀, 3-VIII-78, H. Katakura); Tomuraushi Spa, Kamikawa-gun (1♀, 3-VIII-78, H. Katakura). Daisetsu: Sôunkyô (1♀, 3-IX-71, H. Sako; 1♀, 4-IX-57, SS); Mt. Kurodake, 1200 m (1♀, 8-VIII-49, T. Imamura); Aizankei Spa, 900 m (1♀, 20-VII-49, T. Imamura); Yukomanbetsu (3j, 24-VII-75, SS, NT); Tenninkyô (1♀, 25-VII-75, SS, NT). Higashiyama, Iwamizawa-shi (99♀, 20-VIII-78, NT); Maoui-kyûryô, Yuni-chô (12♀, 20-VIII-78, NT); Bokusanai, Atsuta-gun (2♀, 23-VIII-78, NT); Aoyama-chûdô (4♂ 4♀, 23-VIII-78; 1♂ 1♀, 31-VIII-78; 5♂ 20♀, 4 gynanders, 11-VIII-79, NT); Ishikari 5-sen, Ishikari-chô (53♀, 19-VII-78; 7♀, 29-VII-78; 74♀ 43j, 7~18-VII-79, NT); Nopporo, Ebetsu-shi (20♂ 298♀ 1j, 20-VII~4-IX-78; 23♂ 455♀ 152j, 13-VI~2-X-79; 10♂ 35♀ 128j, 6~17-VII-80, NT; 1j, 20-VI-78, S. Nakano). Sapporo: Shimo-nopporo (1♀, 29-VIII-78, NT); Maruyama (2♀, 27-VIII-57, SS; 23♀ 1j, 5-VII~25-IX-78; 28♀ 3j, 26-VI~26-IX-79; 3j, 4-VII-80; 2♀ 2j, 7-VII-80, NT); Tsukisamu (1j, 3-VII-78; 1♀, 28-VII-78; 1♀, 8-IX-78, T. Kimura); Mt. Moiwai (3♀, 26-VII-78, NT); Misumai (1♀, 27-VII-78, H. Watabe); Mt. Hakken (4♂ 6♀, 24-VII-78; 1♂ 1♀, 25-VIII-78; 1♂ 5♀, 16-VIII-79, NT); Jôzankei (7♀, 25-VIII-78, NT); Nakayama-tôge (43♀, 24-VII-78, NT); Yunosawa (23♀, 27-VII-78, NT). Kôryû-kôzan, Eniwa-shi (2♀, 27-VII-78, H. Katakura & NT). L. Shikotsu: Poropinaï (2♀, 24-VIII-79, NT); Maruyama (13♀, 24-VIII-79, NT). Tomakomai Experimental Forest, Hokkaido Univ. (103♀, 1~4-VIII-78; 6♀, 19-VIII-80, NT); Ishikari-ôhama (46♀, 29-VII-78, NT); Shioya, Otaru (22♀, 18-VIII-78, NT); Shiribetsu, Kimobetsu-chô (12♀, 26-VIII-78, NT); Mt. Yôtei, 870~1200 m (5♀, 25-IX-81, NT, S. Nakano & S. Sasaki); Yôtei, Niseko-chô (15♀, 26-VIII-78, NT); Utsai, Kuromatsunai-chô (4♂ 31♀, 7-IX-79, NT); Ohnuma Park (11♀, 6/7-IX-78, NT); Mt. Hakodate, Hakodate (1♀, 16-X-78, NT). — AOMORI PREF. Osorezan (3♀, 14-IX-78, NT); Tsugaru-ôdai (1♀, 15-IX-78, NT); Mt. Iwaki, 430~1050 m (6♀, 11/12-IX-78, NT). Mt. Hakkôda: (1♀, 29-VII-81, H. Okada); Sukayu Spa, 740~1010 m (1♀, 5-IX-57; 2♀, 22/23-IX-75, SS; 3♂ 58♀ 1j, 31-VII~2-VIII-75; 1♂ 33♀, 9-IX-78; 8j, 11-VII-82, NT). Oirase, Ishigedo~Nenokuchi (14♀, 10-IX-78, NT). L. Towada: Nenokuchi, 400 m (3♂ 7♀, 1 gynander, 4-VIII-75; 3♂ 17♀ 4j, 11-VII-82, NT); Yasumiya (3♀, 10-VII-82, NT). — AKITA PREF. L. Towada: Hakka, 405 m (1♂ 2♀, 4-VIII-75, I. Goto & NT); Oide-en, 400 m (1♀, 17-VII-75; 1♂ 5♀, 1 gynander, 18-VII-75; 1♀, 7-IX-75, I. Goto; 3♀, 1 gynander, 17-VII-77, SS). Mt. Hachimantai: (4♀, 27-VII-81, H. Okada); Ônuma, 940 m (1♂, 5-VIII-75; 3♀, 1 gynander, 6-VIII-75, NT); Ônuma~Mt. Hachimantai, 1000~1100 m (3♀, 7-VIII-75, NT). Tazawako-kôgen Spa, 630 m (1♀, 26-VIII-80, NT). — IWATE PREF. Mt. Hayachine: Dake, 520~560 m (1♀, 24-VII-81, H. Okada); Dake~Kawarabô, 600~1050 m (6♀, 24-VIII-80, NT).

Distribution. Hokkaido, Honshu (Tôhoku district).

Leiobunum tohokuense Suzuki, 1976

(Figs. 13–18, 20)

Leiobunum curvipalpe: Suzuki, 1958a, p. 67.*Leiobunum tohokuense* Suzuki, 1976c, p. 230 (in part, figs. 74–77, 231–238, 338–339).[Male holotype and 15 ♂, 16 ♀ (except for 5 ♀) paratypes from Nenokuchi, Towada, Aomori pref., N. Tsurusaki leg., in ZLHU were reexamined and found to be erroneously included 2 females of *L. globosum* in the paratypes]

Specimens examined. AOMORI PREF. Osorezan (1 ♂ 1 ♀, 20–VIII–57, Y. Kitazawa; 25 ♂, 14–IX–78, NT); Tsugaru-ôdai (14 ♂ 2 ♀, 15–IX–78, NT). Asamushi: Is. Yunoshima, 0~182 m (14 ♂ 3 ♀, 7–VIII–78, M. Sato, M. Nakata; 13 ♂, 22/26–VII–79, M. Sato); Hachimangû, 20~80 m (63 ♂ 4 ♀, 8–IX–78; 3 ♂ 4 ♀ 3j, 8–VII–80; 106 ♂ 12 ♀, 8–VIII–80; 3 ♂ 1j, 23–VII–81; 14j, 2/3–VII–82, NT). Mt. Iwaki, 430~1050 m (56 ♂ 4 ♀, 11/12–IX–78, NT); Oirase, Ishigedo~Nenokuchi (38 ♂ 30 ♀, 10–IX–78, NT). L. Towada: Nenokuchi, 400 m (16 ♂ 9 ♀, 4–VIII–75; 6j, 11–VII–82, NT); Yasumiya, 403~470 m (1 ♂ 1 ♀, 21–VII–75; 1 ♂, 7–IX–75; 2 ♂, 24–IX–75; 2 ♂ 1 ♀, 24–VII–77, I. Goto; 9 ♂ 2 ♀, 3–VIII–75; 4 ♀ 29j, 10–VII–82, NT). — AKITA PREF. L. Towada: Hakka, 405 m (2 ♂, 4–VIII–75; 2 ♀ 32j, 10–VII–82, NT); Oide-en (4 ♂ 5 ♀, 18–VII–75, I. Goto; 3 ♂ 1 ♀ 3j, 17–VII–77, SS). Mt. Hachimantai: (2 ♂, 27–VII–81, H. Okada); Ônuma, 940 m (8 ♂ 4 ♀ 1j, 6–VIII–75, NT); Hachiman-numa, ca. 1580 m (1 ♂, 27–IX–75, SS). Mt. Komagatake, 1450 m (1 ♂, 26–VIII–80, NT); L. Tazawa, 250~270 m (52 ♂ 6 ♀, 25–VIII–80, NT). — IWATE PREF. Mt. Hayachine: Dake, 520~560 m (4 ♂ 1 ♀, 23–VIII–80, NT; 1 ♀, 24–VII–81, H. Okada); Dake~Kawarabô, 600~1050 m (20 ♂ 1 ♀, 24–VIII–80, NT).

Distribution. Honshu (limited to Tôhoku district).*Nelima saghalina* Roewer, 1957*Nelima saghalina* Roewer, 1957, p. 349. [Male holotype from Sakhalin, collector unknown, in SMF (R II/2878/55), examined]*Distribution.* Sakhalin.*Nelima genufusca genufusca* (Karsch, 1881)

(Figs. 20A–B, 21–22)

Mitopus genufuscus Karsch, 1881, p.35. [One female holotype from Japan, Hilgendorf leg., in ZMB (2691), examined]*Nelima genufusca*: Roewer, 1910, p. 252, fig. 3 in T. 6; 1923, p. 917, fig. 1063; 1938, p. 8; Suzuki, 1939, p. 740; 1941, p. 247; 1949, p. 18 (in part); 1958a, p. 67 (in part); 1960, p. 22 (in part), fig. 8 in pl. 11; 1965b, p. 353, 1 fig. (in part); 1966a, p. 7 (in part); 1972c, p. 443; 1972e, p. 38.*Nelima genufusca genufusca*: Suzuki, 1950, p. 49; Roewer, 1957, p. 346; Starega, 1965, p. 8, fig. 2.

Specimens examined. HOKKAIDO. Horonohe, 20~60 m (6 ♂ 2 ♀, 17–IX–79, NT); Bifuka, 140 m (2 ♂ 1 ♀, 17–IX–79, NT); Kawayu Spa (1 ♂, 3–IX–57, SS); Bihoro-tôge (1 ♂, 3–IX–57, SS); L. Akan (2 ♂ 2 ♀, 3–IX–57, SS); Akan~L. Mashû (11 ♂ 7 ♀, 3–IX–57, SS); Akkeshi, Marine Biol. Station, Hokkaido Univ. (2 ♂ 41 ♀ 1j, 1–IX–57, SS); Sôunkyô (4 ♂ 2 ♀, 4–IX–57, SS); 13 ♂ 15 ♀, 3–IX–71, H. Sako; Shiokari-tôge, Kamikawa-gun (1 ♂ 1 ♀, 17–IX–79, NT); Obihiro-shi (4 ♂ 4 ♀, ?–VIII–37, S. Komamura; Mt. Sankaku, Yûbari-shi (6 ♂ 9 ♀,

20-VIII-78, NT). Tôbetsu-chô: Aoyama-chûô (8♂6♀, 23-VIII-78; 19♂4♀, 31-VIII-78; 1♂4♀2j, 11-VIII-79, NT); Kyôyûchi (2♂2♀, 31-VIII-78, NT). Nopporo, Ebetsu-shi (2♂1♀, 3-X-48, SS; 26♂27♀ 1j, 16-VIII~27-IX-78; 206♂199♀ 92j, 5-VII~31-X-79, NT). Sapporo: Botanical Garden (23♂13♀, 26-VIII-64, T. Aya; 1♂1♀, 13-IX-77; 7♂1♀, 2-IX-78, NT); Maruyama (13♂17♀, 27/31-VIII-57, SS; 24♂21♀ 1j, 30-VI~25-IX-78; 118♂138♀ 166j, 6-VII~1-XI-79, NT); Tsukisamu (26♂33♀, 27-VIII~11-IX-78, T. Kimura); Mt. Hakken (1j, 24-VII-78; 1♂8♀, 25-VIII-78; 1j, 16-VIII-79, NT); Jôzankei (2♀, 25-VIII-78, NT); Mt. Muine, 800 m (8j, 11-VIII-64, T. Aya); Ashiribetsu Fall (2j, 10-VIII-79, NT); Yunosawa (1♀ 4j, 27-VII-78, NT); Mt. Soranuma (1♂3♀, 1-X-78, NT). Hiroshima-chô: Todoyama (23♂20♀, 29-VIII-78, NT); Ômagari (4♂3♀, 29-VIII-78, NT). L. Shikotsu: Poropinai (7♂14♀, 24-VIII-79, NT); Maruyama (1♀, 24-VIII-79, NT). Ishikari-ôhama (3♂3♀, 29-VII-78, NT); Shiribetsu, Kimobetsu-chô (1♂1♀, 26-VIII-78, NT); Mt. Yôtei, 320~580 m (19♂5♀, 25-IX-81, NT, S. Nakano & S. Sasaki); Yôtei, Niseko-chô (1♂1♀, 26-VIII-78, NT); Ônuma Park (1♂, 6-IX-78, NT); Mt. Hakodate, Hakodate (3♂4♀, 16-IX-78, NT). — AOMORI PREF. Tsugaru-ôdai 4♂6♀, 15-IX-78, NT); Mt. Iwaki, 430~750 m (1♂3♀, 11/12-IX-78, NT); Sukayu Spa, 740~900 m (4♂6♀, 22/23-IX-75, SS; 1♂8♀, 9-IX-78, NT); Oirase, Ishigedo~Nenokuchi (50♂47♀, 10-IX-78, NT). L. Towada: (2♂1♀, 1-IX-57, SS); Yasumiya (1♂2♂, 24-IX-75, SS & I. Goto.) — AKITA PREF. Oide-en, L. Towada (4♀, 7-IX-75, I. Goto.) — IWATE PREF. Mt. Hayachine: Dake, 520~560 m (1♀, 23-VIII-80, NT; 1j, 24-VIII-81, H. Okada); Kawarabô, 1030~1050 m (1♂1♀, 24-VIII-80, NT).

This species is the commonest East Asian opilionid of the Leiobuninae, being distributed from a larger portion of Sakhalin and the Japanese Islands to the Korean Peninsula. On account of remarkable geographical variations of size or the diverse morphological characters it is one of the taxonomically "difficult" species and hitherto it has been known under a great variety of names.

To solve such taxonomic confusion, the senior author (S.S.) engaged for many years in extensive study of individual and geographical variations based upon numerous specimens covering various localities throughout Japan and adjacent areas. As a result, it has become evident that Japanese specimens hitherto recorded mainly under the name of *Nelima genufusca* represent two distinct species, both widely distributed almost all over Japan. Moreover, thorough examination on various type specimens of resembled species, most of which are deposited in the European museums, revealed that one of the two is assigned to *Nelima genufusca* as before, while the other is assigned to *Nelima gigantea* (Loman), which first described from Minoo-san, Osaka pref., in southern Honshu as a member of the genus *Leiobunum*.

As far as Hokkaido and the northernmost part of Honshu are concerned, both species are widely sympatric. Based on the examinations of the numerous material newly collected from Nopporo, Hokkaido, diagnostic characters between the two species are summarized in Table 3 (cf. Figs. 20-23). Formerly, S.S. (1949) reported that specimens of *N. genufusca* taken from this locality and Asahikawa, Hokkaido consist of two forms being separable by size. According to these, however, it is evident that two forms which referred to as dwarf and normal types in that paper correspond to *N. genufusca* and *N. gigantea*, respectively. Though these

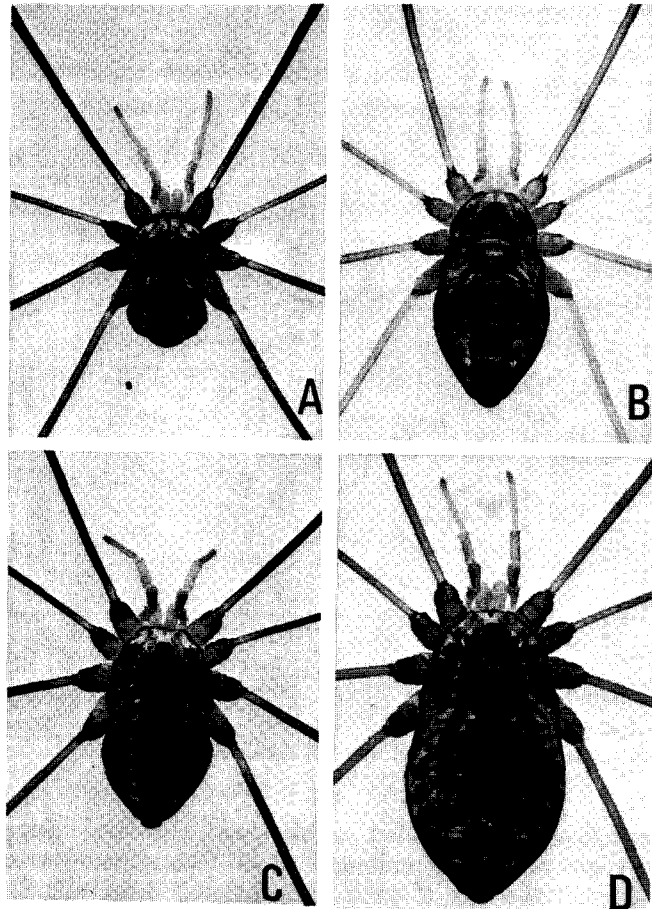


Fig. 20. A-B) *Nelima genufusca* (Karsch), A) male, B) female. C-D) *Nelima gigantea* (Loman), C) male, D) female. (Maruyama, Sapporo) All $\times 5.2$.

diagnostic characters show geographic variations to some extent, they seem to be valid at least for the specimens taken from Hokkaido and the northernmost part of Honshu except for the size which considerably varies geographically.

Redescription of *N. genufusca* based on the Hokkaido material (Nopporo ex.) is given below.

Measurements (in mm, $\bar{x} \pm SD$ are given in parentheses, $n=50$). ♂: Body L, 3.1–4.2 (3.78 ± 0.28); Cephalothorax L, 1.0–1.5 (1.17 ± 0.11); Femur of leg I L, 6.1–7.7 (6.78 ± 0.35). ♀: Body L, 4.7–6.3 (5.61 ± 0.35); Cephalothorax L, 1.3–1.9 (1.60 ± 0.16); Femur of leg I L, 5.6–6.8 (6.06 ± 0.41).

Male. Body from above as in Fig. 20A; dorsal integument smooth, moderately

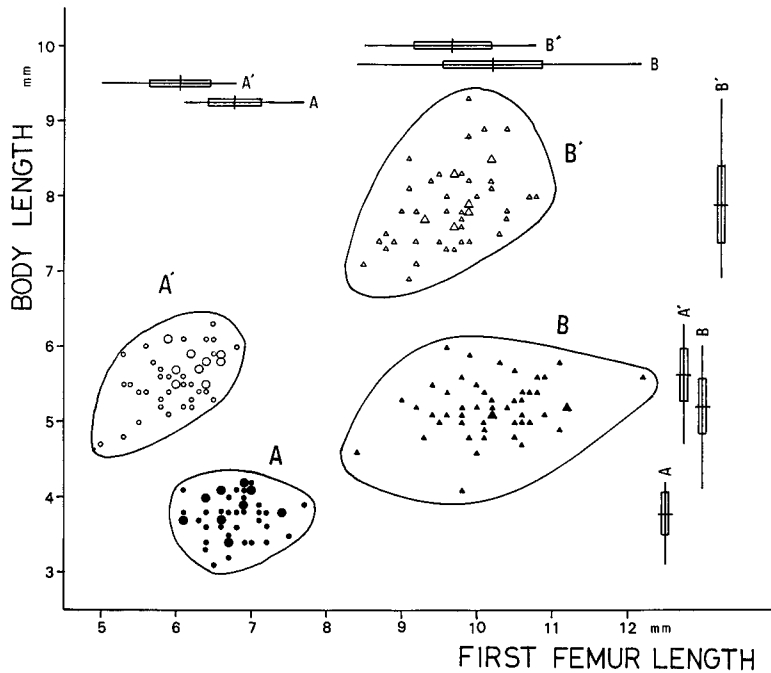


Fig. 21. Relation of body length to femur I length in *Nelima genufusca* (A-male, A'-female) and *Nelima gigantea* (B-male, B'-female). Bar diagrams include the range (horizontal line), mean (vertical line) and SD (box). (Nopporo)

hardened; cephalothorax somewhat wider than abdomen; lateral margins of cephalothorax slightly curved opposite insertions of coxae; transverse ridge posterior to eye tubercle and the last thoracic segment well delimited; first five tergites of abdomen fused to form a dorsal scutum. Eye tubercle separated by its diameter from the front margin of carapace, rounded, canaliculate above, the carinae with 6 to 8 minute dentations and a few fine hairs; from laterally wider than high, from above wider than length. Supra-cheliceral lamellae with a few fine denticles at tip. Labrum, as in Fig. 22C-D, scalpel-like in profile.

Venter. Surface of coxae I-IV and genital operculum with numerous scattered minute granules; free sternites likewise with a few granules.

Chelicera. As in Fig. 22I, normal in structure, with sparse short hairs only.

Palp. As shown in Fig. 22J; femur nearly straight, disto-dorsally with two or three minute black denticles; patella moderately curved below, thickened distally without a disto-medial apophysis, dorso-laterally with a few black denticles; tibia with no apophysis, unarmed, only hairy; tarsus slightly curved ventrally, with a definite row of small black tubercles and with dense fine hairs, distal end below with a comb-like bundle of hairs; tarsal claw with 7 to 9 teeth below.

Legs. Slender, extremely long, trochanters laterally with some small sharp-pointed denticles; femora, patellae, and tibiae throughout with scattered small sharp-pointed denticles and hairs; remainder of leg-segments only hairy.

Coloration. Ground color above dark brown, carapace with a wide median area of silvery-white in front of eye tubercle and on this area present whitish brown spots; marking pattern as in Fig. 20A. Eye tubercle dark brown with black eye rings. Transverse ridge back of eye tubercle and the last thoracic segment dark brown with irregular silvery-white spots. Dorsal scutum and free tergites uniformly dark brown; suture between tergite I and II marked with silvery-white, in some one pair of small silvery-white spots on each segment. Venter, in contrast with dorsum, uniformly bright; coxa I-IV yellowish brown; genital operculum and all free sternites yellowish brown to silvery-white. Chelicera pale whitish yellow; palp whitish yellow to yellowish brown, femur darkened distally, patella and tibia somewhat darkened dorsally. Legs: trochanters of all legs yellowish brown with dark brown patches on posterior and anterior sides; femora dark brown, proximal ends, except for capita paler; remaining leg segments uniformly dark brown.

Penis. Penis shaft 0.35-0.45 (\bar{x} =0.40, n=4) mm W at base, 0.13-0.16 (\bar{x} =

Table 3. Diagnostic characters between *Nelima genusfusca* and *N. gigantea*.

Characters	<i>genusfusca</i>	<i>gigantea</i>
I. Size (cf. Fig. 21)		
1. Body length	♂ 3.1~4.2 mm, ♀ 4.7~6.3 mm	♂ 4.1~6.0 mm, ♀ 6.9~9.3 mm
2. Length of femur I	♂ 6.1~7.7 mm, ♀ 6.1~7.7 mm	♂ 8.4~12.2 mm, ♀ 8.5~10.8 mm
II. Structure (cf. Figs. 22 and 23)		
1. Palp	Patella armed with only a few denticles Teeth on ventromesal surface of male tarsus form a definite row	Patella armed dorsally with more than ten denticles Numerous teeth on ventromesal surface of male tarsus proximally not form a definite row
2. Labrum	♂ : distally somewhat swollen (ventral view) ♀ : Apex more sharply angulated (lateral view)	♂ : distally much swollen (ventral view) ♀ : Apex blunt (lateral view)
3. Genital operculum	Somewhat short and smooth	Relatively long and rough
4. Penis	Short, alate part rather elongated, extending on distal two-thirds of the shaft	Long, alate part relatively short, extending approximately within distal half of the shaft
5. Seminal receptacle	Short	Elongated
III. Coloration	Abdomen dark brown with irregular white spots on both sides of anterior half	Abdomen uniformly dark brown

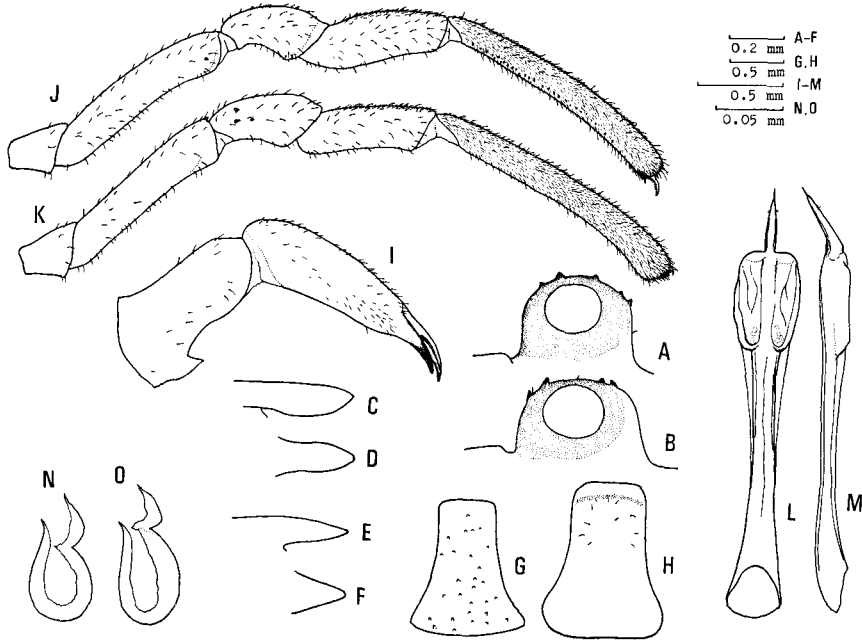


Fig. 22. *Nelima genufusca* (Karsch). A-B) Lateral view of eye tubercle, A) male, B) female. C-D) Labrum, male, C) lateral, D) ventral. E-F) The same, female, G-H) Genital operculum, G) male, H) female. I) Left chelicera, male. J-K) Left palp, J) male, K) female. L-M) Penis, L) ventral, M) lateral. N-O) Seminal receptacle. (A-N, Nopporo; O, Oirase)

0.14) mm W at narrowest portion, 2.07–2.25 (\bar{x} = 2.13) mm L; glans 0.10–0.13 (\bar{x} = 0.11) mm W at widest portion, 0.35–0.42 (\bar{x} = 0.38) mm L; stylus 0.07–0.08 (\bar{x} = 0.07) mm L. Penis shaft flattened dorso-ventrally, widest at base, gradually narrower toward tip; alate; a pair of enlarged wings, extending along the distal two-thirds of the penis shaft; as in Fig. 22L-M.

Female. Much larger than the male but with somewhat shorter legs (cf. Fig. 21); when distended with eggs, abdomen widely rounded on the sides and pointed posteriorly. Palp with fewer denticles than in male, and the tarsus without the definite row of teeth.

Ovipositor. Consisting of three forceps segments and about 22 normal segments, of which first 12–14 armed with a whirl of eight spines; seminal receptacles located within the second segment as in Fig. 22N-O.

Distribution. Sakhalin, Japan (Hokkaido, Honshu, Shikoku, Kyushu), Korea.

Notes. For the details of geographic variations of this species and the following *N. gigantea*, their distribution, and taxonomic treatment of the other resembled species refer to a separate paper to be published by the senior author in the future.

* ** *Nelima gigantea* (Loman, 1902)

(Figs. 20C-D, 21, 23)

Liobunum giganteum Loman, 1902, p. 177. [Two female syntypes from Minoosan, Ôsaka pref.,¹⁾ Japan, Lenz leg., in ZMH, examined]; Roewer, 1910, p. 210, fig. 28 in T. 5; 1923, p. 894.

Nelima genufusca: Suzuki, 1949, p. 18 (in part).

Leiobunum giganteum: Roewer, 1957, p. 343.

Nelima tenuis Roewer, 1957, p. 351. [Male holotype from Hokkaido, Japan, collector unknown, in SMF (R II 5892/71), examined] NEW SYNONYMY.

Nelima gigantea: Suzuki, 1976c, p. 247.

Specimens examined. HOKKAIDO. Abashiri (2♀, 18-VIII-46, E. Monma); Wakotohantô, L. Kussharo (19♂ 8♀, 3-IX-57, SS); L. Akan (2♂, 3-IX-57, SS); Akkeshi, Marine Biol. Station, Hokkaido Univ. (1♂ 3♀, 1-IX-57, SS); Honbetsu (12♂ 11♀, 4-VIII-78, H. Katakura). Asahigawa-shi: Kamuikotan (7♂, 18-IX-46, T. Imamura); Kaguraoka (6♀, 21-IX-48, T. Imamura); Asahiyama-kôen (3♂ 1♀, 27-IX-48, SS). Maui-kyûryô, Yuni-chô (8♂ 8♀ 1j, 20-VIII-78, NT); Hattari, Atsuta-mura (2♂ 2♀, 31-VIII-78, NT). Tôbetsu-chô: Aoyama-chûtô (1♂, 23-VIII-78; 2♂ 1♀, 31-VIII-78, NT); Kyôyûchi (2♂, 31-VIII-78, NT); Benkabetsu (1j, 11-VIII-79, NT). Nopporo, Ebetsu-shi (11♂ 4♀, 3-X-48, SS; 115♂ 72♀ 2j, 20-VII~27-IX-78; 236♂ 173♀ 70j, 5-VII~31-X-79, NT). Sapporo: Shimo-nopporo (1♂, 29-VIII-78, NT); Botanical Garden (58♂, 26-VIII-64, T. Aya; 2♂ 1♀, 13-IX-77; 6♂, 2-IX-78, NT); Maruyama (26♂ 11♀ 1j, 22-VIII-48, T. Imamura; 26♂ 29♀, 27/31-VIII-57, SS; 61♂ 64♀ 95j, 30-VI~9-X-78; 287♂ 313♀ 142j, 6-VII~1-XI-79, NT); Tsukisamu (87♂ 64♀ 1j, 3-VII~2-X-78, T. Kimura); Mt. Moiwa (2♂ 5♀ 1j, 1-VIII-46, T. Imamura; 3♂ 2♀, 26-VII-78, NT); Misumai (1♂ 1♀, 27-VII-78, H. Watabe); Mt. Hakken (3♂, 25-VIII-78; 2♂ 1♀, 16-VIII-79, NT); Jôzankei (1♀, 25-VIII-46, T. Imamura); Ashiribetsu Fall (1♂, 10-IX-70, M. Kawakatsu; 5♂ 2♀, 10-VIII-79, NT); Yunosawa (3♂ 5♀ 5j, 27-VII-78, NT); Mt. Soranuma (3♂ 2♀, 1-X-78, NT). Hiroshima-chô: Todoyama (8♂ 8♀, 29-VIII-78, NT); Ômagari (1♂, 29-VIII-78, NT). Eniwakyô, Eniwa (1♂ 1♀, 8-X-78, H. Katakura). L. Shikotsu: Poropinaï (7♂ 6♀, 24-VIII-79, NT); Maruyama (1♀, 24-VIII-79, NT). Tomakomai Experimental Forest, Hokkaido Univ. (65♂ 103♀ 66j, 1~4-VIII-78; 3♂ 4♀, 19-VIII-80, NT); Katsuraoka, Otaru (5♂ 2♀, 18-VIII-78, NT); Shiribetsu, Kimobetsu-chô (9♂ 3♀, 26-VIII-78, NT); Mt. Yôtei, 580 m (1♀, 25-IX-81, NT, S. Nakano & S. Sasaki); Kondô, Niseko-chô (1♂, 26-VIII-78, NT); Utasai, Kuromatsunai-chô (5♂ 2♀, 7-IX-79, NT); Ônuma Park (6♂ 1♀, 26-VIII-57, SS; 1♂, 6-IX-78, NT); Mt. Hakodate, Hakodate (11♂ 13♀, 16-X-78, NT). — AOMORI PREF. Osorezan (1♂, 14-IX-78, NT); Tanabu (6♂ 10♀, 15-VIII-57, Y. Kitazawa); Tsugaru-ôdai (10♂ 8♀, 15-IX-78, NT). Asamushi: Marine Biol. Station, Tôhoku Univ. (7♂ 6♀, 8-IX-78, NT; 2♀, 13/14-IX-78, M. Sato); Hachimangû (15♂ 15♀, 8-IX-78; 1♀ 2j, 8-VIII-80, NT). Hakkôda: Sukayu Spa, 740~900 m (10♂ 7♀, 22/23-IX-75, SS; 4♂ 2♀, 9-IX-78, NT); Yachi Spa, 900 m (2♂, 4-IX-75, I. Goto). Oirase, Ishigedo~Nenokuchi (25♂ 17♀, 10-IX-78, NT). L. Towada: (2♂ 1♀, 12-X-49, T. Imamura); Nenokuchi, 400 m (2♀, 4-VIII-75; 7j, 11-VII-82, NT); Yasumiya, 400~470 m (12♂ 5♀ 31j, 3/4-VIII-75, NT; 24-IX-75, SS & I. Goto). — AKITA PREF. Oide-en, L. Towada (1♂ 3♀, 7-IX-75, I.

1) In the original paper the type-locality was spelt "Minoosan, Setsu, central Japan" and the materials used were five individuals which consisted of two males and three females according to Roewer (1910), but presently only two female syntypes are deposited in ZMH, and one male and one female paratypes are in SMF (R I/5/54).

Goto); Yatate Spa (1♂, 2-X-41, collector unknown); Mt. Hachimantai (1j, 27-VII-81, H. Okada); Tazawako-kôgen Spa, 640 m (8♂3♀, 26-VIII-80, NT); L. Tazawa, 250~270 m (3♂1♀, 25-VIII-80, NT). — IWATE PREF. Mt. Hayachine: Dake, 520~560 m (2♂1♀, 23-VIII-80, NT; 3j, 24-VII-81, H. Okada); Dake~Kawarabô, 600~1300 m (18♂12♀, 24-VIII-80, NT). Ryûsendô, Iwaizumi (1j, 8-VIII-59, K. Morikawa); Hiraizumi (1♂1♀, 5-X-52, SS).

In 1957 Roewer described *Nelima tenuis* based on a single male from Hokkaido. The holotype housed in the SMF (R II 5892/71) was employed for this study. It is an old individual in which the dorsum is much darkened, being nearly black excepting a whitish median front area of the carapace. However, in the measurements of body and legs and almost all characters including penis structure it closely resembles *N. gigantea*. From this it is apparent that *N. tenuis* is a synonym of *N. gigantea*.

Roewer (1911) recorded further occurrence of this species from Japan based on the three specimens preserved in the ZMB. The vial containing these harvestmen (ZMB12648) is labeled "*Leiobunum giganteum* Loman, Japan (Hilgendorf) 2♀1♂ pull. Roewer det. 1911." However, examination of the material revealed that it consists of two different species, namely, one female of *Leiobunum japonicum japonicum* Müller and two females of *Gagrellopsis nodulifera* Sato et Suzuki.

Description (Nopporo ex.).

Measurements (in mm, $\bar{x} \pm SD$ are given in parentheses, n=50). ♂: Body L, 4.1-6.0 (5.20±0.36); Cephalothorax L, 1.3-1.9 (1.55±0.13); Femur of leg I L, 8.4-12.2 (10.21±0.66). ♀: Body L, 6.9-9.3 (7.88±0.51); Cephalothorax L, 1.8-2.7 (2.32±0.20); Femur of leg I L, 8.5-10.8 (9.68±0.52).

Male. In structure much similar to *N. genufusca*. Eye tubercle rounded above, canalculated, the carinae with 6-8 denticles and a few hairs. Supracheliceral lamellae with a few small denticles at tip. Labrum, as shown in Fig. 23C-D, club-shaped, from below gently rounded distally. Surface of all coxae and genital operculum roughly granular. Transverse ridges of free sternites with scattered pointed granules. Genital operculum as in Fig. 23G, more elongated than that of the former species.

Chelicera. As in Fig. 23I, normal, with short sparse hairs only.

Palp. As shown in Fig. 23J, nearly same as that of *N. genufusca* in basic structure; femur with a few black denticles on distal surface; patella dorso-laterally with more black denticles than in *genufusca*; tibia unarmed, only hairy; tarsus with a ventromesal row of black sharp-pointed tubercles and with an indefinite second row of 5-7 small tubercles extending on the proximal half of the length, distal end below with a bundle of stiff hairs; tarsal claw with 6-8 teeth below.

Legs. Slender and extremely long; trochanters anteriorly and posteriorly, femora, patellae, and tibiae entirely with scattered black sharp-pointed denticles and hairs; remainder of leg segments unarmed, only hairy.

Coloration. Similar to the foregoing species but differs in the following respects: posterior ridges of carapace lack white irregular markings; all femora of

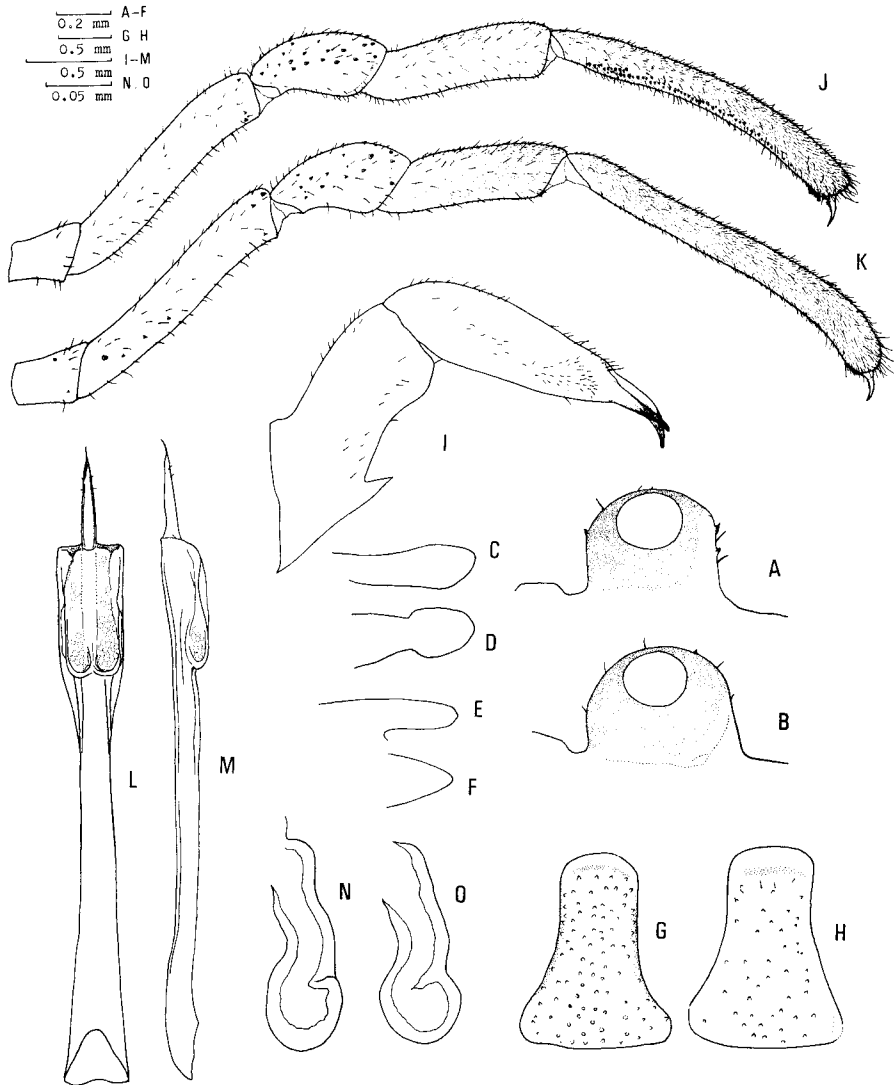


Fig. 23. *Nelima gigantea* (Loman). A-B) Lateral view of eye tubercle, A) male, B) female. C-D) Labrum, male, C) lateral, D) ventral. E-F) The same, female. G-H) Genital operculum, G) male, H) female. I) Left chelicera, male. J-K) Left palp, J) male, K) female. L-M) Penis, L) ventral, M) lateral. N-O) Seminal receptacle. (A-N, Nopporo; O, Oirase)

legs considerably darkened, blackish, except for proximal ends including capita.

Penis (Fig. 24L-M). Penis shaft 0.37–0.47 (\bar{x} =0.42, n=4) mm W at base, 0.17–0.22 (\bar{x} =0.18) mm W at narrowest portion, 3.16–3.23 (\bar{x} =3.20) mm L; glans 0.13–0.19 (\bar{x} =0.15) mm W at widest portion, 0.54–0.56 (\bar{x} =0.55) mm L; stylus 0.13–0.14 (\bar{x} =0.14) mm L. Penis shaft flattened dorso-ventrally, widest at base and decreasing width distally; alate, a pair of wings extending along distal one-thirds to a half of penis shaft.

Female. Larger than male and with the abdomen considerably broader and more swollen behind, but with shorter legs (cf. Fig. 21). Palpal tarsus without the definite row of teeth. Labrum somewhat small and not swollen distally.

Ovipositor. Consisting of three forceps segments and about 25 normal segments, of which first 14–16 armed with a whirl of eight spines; seminal receptacles located within the second segment, elongated as in Fig. 23N-O.

Distribution. Hokkaido, Honshu, Kyushu.

Superfamily Ischyropsalidoidea
Family Sabaconidae

***Sabacon makinoi makinoi* Suzuki, 1949**

(Fig. 27)

Sabacon makinoi Suzuki, 1949, p. 15, figs. 1–7. [Two male syntypes from Nopporo, Hokkaido, Suzuki leg., in ZLHU, examined]; 1960, p. 22, fig. 3 in pl. 11; 1965a, p. 40 (in part, fig. 2); 1972e, p. 37; 1974, p. 90 (in part, figs. 4F, 5A-B, F-G).

Sabacon habeii Suzuki, 1965a, p. 41 (in part, figs. 3A, 4A, B, C, holotype ♂ only, the ♀♀ belong to *Sabacon imamurai* Suzuki, 1964); 1966b, p. 98, fig. 3; 1972d, p. 453.

Specimens examined. HOKKAIDO. Shiretoko, Mt. Rausu, ca. 350 m (1 ♂ 2j, 28-VII-75, SS & NT). Daisetsu: Yukomanbetsu (11 ♂ 15 ♀ 1j, 24-VII-75, SS & NT); Yukomanbetsu ~ Sugataminoike 2j, 23-VII-75, SS & NT); Tenninkyô, 650 m (2 ♀, 25-VII-75, SS & NT); Nopporo, Ebetsu-shi (38 ♂ 52 ♀ 120j, 20-IV~21-XI-79, NT); Maruyama, Sapporo (1 ♂ 1 ♀, 16-VI-78; 1 ♂ 2 ♀ 2j, 20-VI-78; 2j, 5-VII-78; 8 ♂ 12 ♀ 53j, 24-IV~26-X-79, NT); Mt. Yôtei, 320~1500 m (1 ♂ 1 ♀ 49j, 25-IX-81, NT, S. Nakano & S. Sasaki).

Distribution. Hokkaido. (Fig. 27)

**** *Sabacon makinoi sugimotoi* n. subsp.**

(Figs. 24–27)

Sabacon makinoi: Suzuki, 1958a, p. 67; 1965a, p. 40 (in part); 1974, p. 90 (in part, fig. 5C).

Specimens examined. AOMORI PREF. Shiriya (1 ♂, 18-VIII-57, Y. Kitazawa); Osorezan (2 ♂, 20-VIII-57, Y. Kitazawa); Tsugaru-ôdai (2j, 15-IX-78, NT). ASAMUSHI: Marine Biol. Station, Tôhoku Univ. (1 ♀ 1j, 8-VIII-78, NT); Hachiman-gû, 20~80 m (3 ♂, 8-VIII-80; 1 ♂ 1 ♀ 19j, 23-VII-81; 3 ♂ 1 ♀ 2j, 2/3-VII-82, NT; 8 ♂ 6 ♀ 31j, 21-VII-81, SS). Mt. Hakkôda, 910~1000 m (1j, 1-VIII-75, NT). Towada: Nenokuchi, 400 m (1 ♀ 2j, 4-VIII-75, NT); Yasumiya, 410 m (1 ♂ 3 ♀ 4j, 3-VIII-75, NT). — AKITA PREF. L. Towada: Hakka camping site, 405 m (1 ♂ holotype and 2 ♂, 1 ♀, 1j paratypes, 4-VIII-1975, I.

Goto and N. Tsurusaki leg.); Wainai, 405 m (2j, 4-VIII-75, I. Goto & NT). Mt. Hachimantai: Ônuma, 940 m (1j, 5-VIII-75, NT); Fukenoyu Spa~Mt. Hachimantai, 1300 m (1j, 7-VIII-75, NT). — IWATE PREF. Mikaeri-tôge, Mt. Hachimantai, 1580 m (1♂ 8j, 8-VIII-75, NT); Ryûsendô Cave, outside cave (2♂, 3-VIII-59, K. Morikawa). Ôfunato-shi: Shimokinoene, Higoroichi (1♀, 20-VIII-70, H. Akama); Sekiya, Higoroichi (1♂, 21-VIII-70, H. Akama); Sekiyadô Cave, Higoroichi (1j, 23-VIII-70, H. Akama). — FUKUSHIMA PREF. Abukuma-dô Cave, Takine-chô (2j, 19-VII-76, T. Kuramoto); Saitô, Miharu-chô (1j, 15-VIII-81, H. Kobari). — TOCHIGI PREF. Tôshôgû, Nikkô (1♀, 6-VIII-55, SS). — NIIGATA PREF. Tsubaki, Ryôtsu-shi, Is. Sado, 20 m (1♀ 1j, 20-VII-80, NT); Mt. Yahiko, Nishikanbara-gun, 450 m (1♀ 3j, 22-VII-80, NT); Okutadami Dam, near Denryokukan, ca. 700 m (6♂ 2♀, 23-VIII-81, SS). — NAGANO PREF. Togakushi, Chûsha, 1200 m (4j, 23-VII-80, NT); Minamikamishiro, Otari-mura, Kitaazumi-gun, 790 m (6♂ 8♀ 3j, 28-VII-80, NT); Kamikôchi, 1550~1570 m (1♂ 8j, 16-VII-77, NT & H. Komatsu). — TOYAMA PREF. Mt. Tateyama, Midagahara, 1940~2000 m (1♂, 31-VII-80, NT). — HIROSHIMA PREF. Hiba-gun, Kenmin-no-mori: Rokunohara, ca. 810 m (1♂ 2j, 7-VIII-81); Rokunohara~Oppara (5j, 9-VIII-81); Mt. Tateboshi, 1100~1200 m (2♂ 1♀, 11-VIII-81); Ikenodan, 1279 m (11♂ 6♀ 5j, 12-VIII-81); All specimens were collected by M. Kuya. — TOKUSHIMA PREF. Mt. Tsurugi: ca. 1700 m (3♀, 9-VIII-60, K. Tomishima); Ichinomori, ca. 1800 m (3♂ 2♀, 11-VII-76, K. Tomishima).

The type specimens are at present deposited in the Suzuki collection.

Measurements (in mm, specimens from Hakka, L. Towada). Body L: ♂ 2.2, ♀ 2.8. Leg II L (♂): Fe 2.8, Pa 0.8, Ti 2.7, Mt 3.3, Ta 3.8, Total 13.4.

Male. Body small (Figs. 24A, 25A), dorsal integument moderately soft; anterior margin of carapace with a few fine hairs. Eye tubercle relatively large, deeply furrowed above, but with few short dark hairs frontally. Last thoracic segment with two median brown bristles. Scutal areas smooth, but in some each with an only slightly chitinized long or broadly oval patch bearing a transverse row of short dark brown hairs, in some others posterior patches are divided into two halves; free tergites each with a transverse row of short hairs. Coxae and

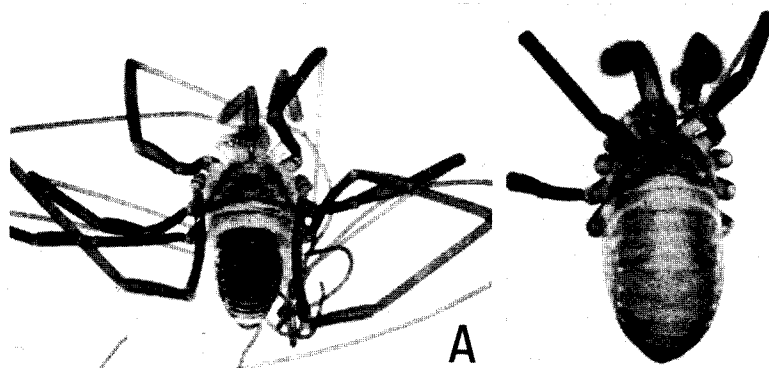


Fig. 24. *Sabacon makinoi sugimotoi* n. subsp. A) Male, B) female. (Hakka, L. Towada) All $\times 10$.

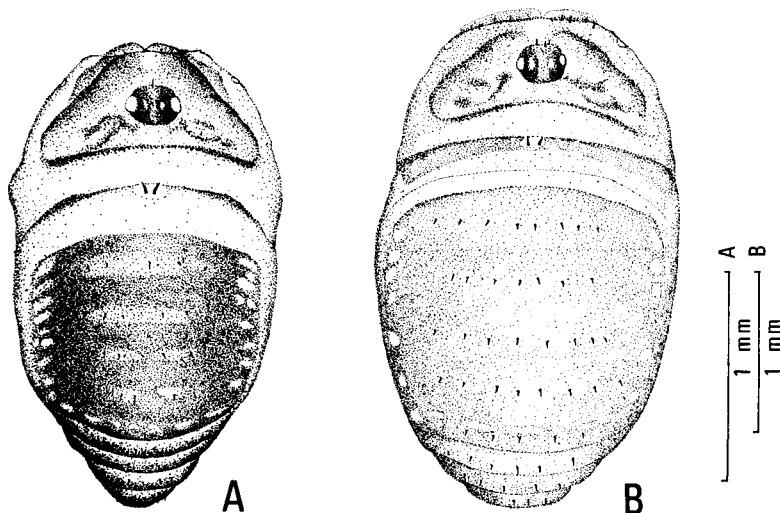


Fig. 25. *Sabacon makinoi sugimotoi* n. subsp. A) Male, B) female. (Hakka, L. Towada)

genital operculum with numerous scattered, moderately long, blackish bristles; free sternites each with a row of short blackish hairs.

Chelicera. Proximal segment with a strong dorsal elevation (Fig. 26C), distal segment unarmed, only with stiff dark hairs; fingers as shown in Fig. 26E.

Palp (Fig. 26A). All segments slender, without marked swelling, patella lacks a dorso-medial spur.

Legs. Relatively long; femora, patellae and tibiae with scattered short black hairs.

Coloration. Ground color pale rusty brown, carapace with dark brown patches as shown in Fig. 25A; eye tubercle blackish, canal lighter. Abdominal segments above purplish to dark brown with small pale spots laterally on each side and on the fifth segment, free tergites banded with dark brown. In some specimens abdomen above almost blackish. Coxae of legs pale rusty brown, free sternites each with an anterior brown band. Chelicera and palp rusty brown, in some more or less darkened. Legs rusty to dark brown, tibiae of second legs lacking a wide distal band of white.

Penis. Relatively wide, flattened dorso-ventrally; stylus long and fine, of the form as shown in Fig. 26F-H.

Female (Figs. 24B, 25B). Similar to male but with larger body; first cheliceral segment lacking a dorsal elevations (Fig. 26D); palp, especially tibia larger and more strongly swollen on the basal half (Fig. 26B); coloration usually lighter than in male. Ovipositor as in Fig. 26I, stumpy type.

Remarks. The present specimens occurring in Tôhoku and north Kantô

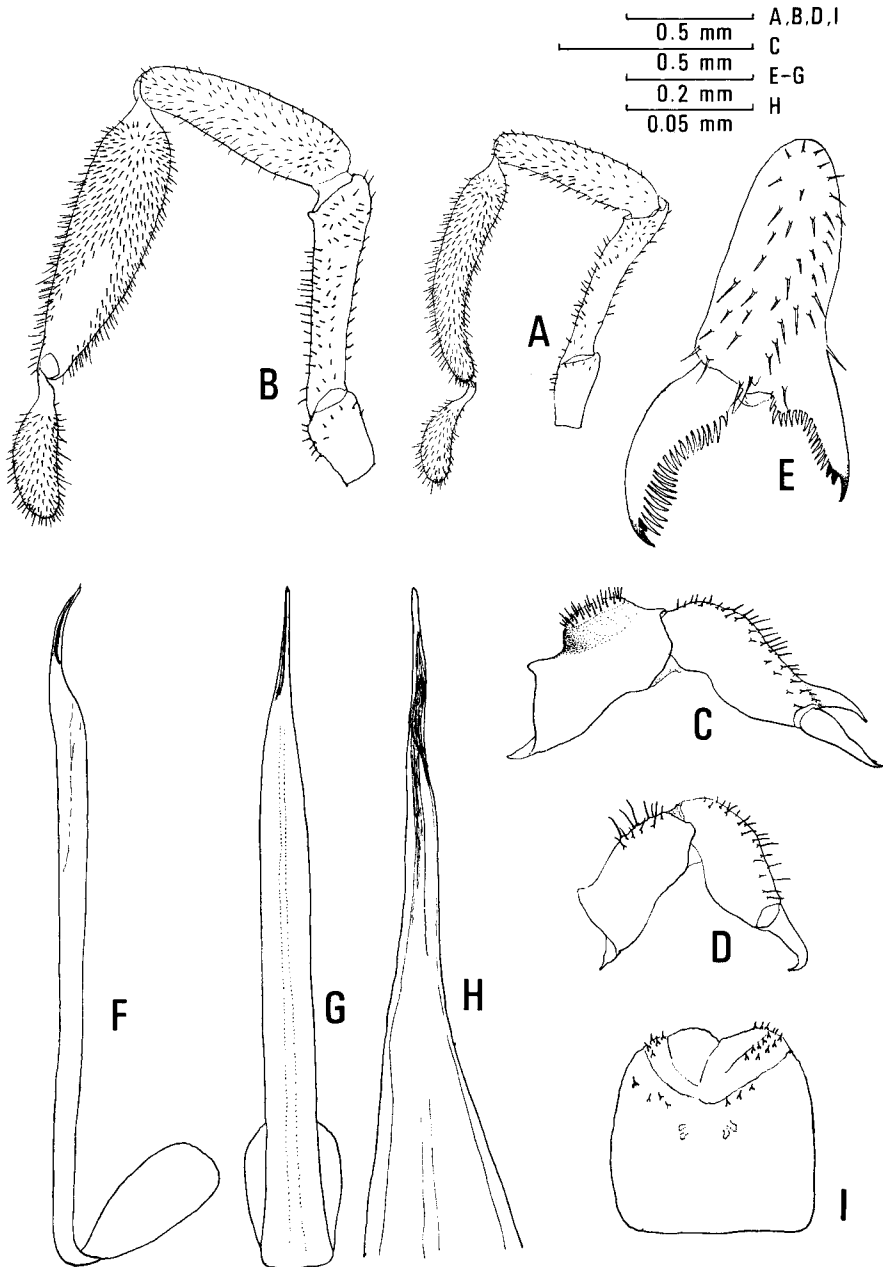


Fig. 26. *Sabacon makinoi sugimotoi* n. subsp. A-B) Palp, medial, A) male, B) female. C-D) Chelicera, lateral, C) male, D) female. E) Cheliceral fingers, frontal, male. F-G) Penis, F) lateral, G) ventral. H) Glans, dorsal. I) Seminal receptacle. (A-E, I, Hakka; F-H, Yasumiya, L. Towada)

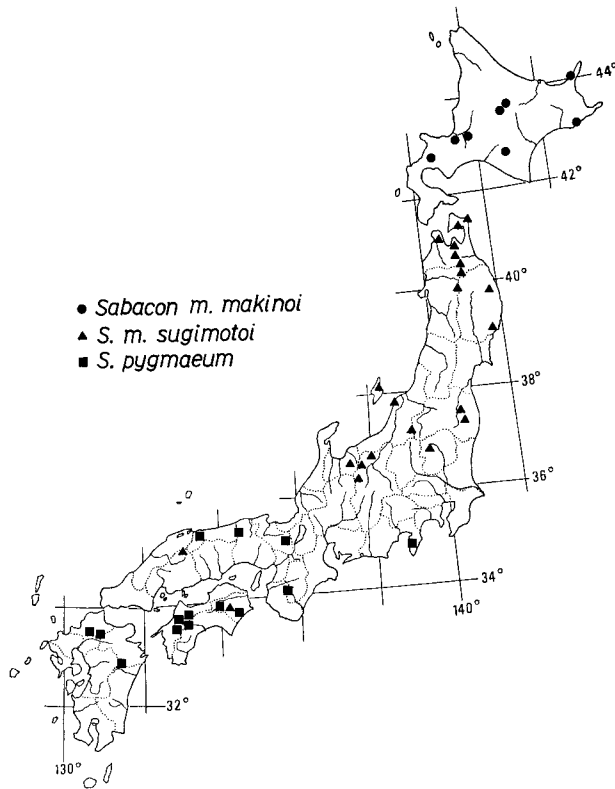


Fig. 27. Distribution of *Sabacon makinoi makinoi*, *S. makinoi sugimotoi*, and *S. pygmaeum*.

districts have so far been treated as *S. makinoi* (Suzuki 1958a, 1965a, 1974). However, examination of numerous newly collected materials revealed that the females from Honshu and Mt. Tsurugi, Shikoku have no marked scutum on the abdomen, while those from Hokkaido with always scutum laminatum or scutum intermediate between laminatum and dissectum. This difference is distinct enough to separate the both populations at subspecific level. The present new subspecies is also closely related to *S. pygmaeum* Miyosi occurring mainly in west Japan. The former, however, differs from the latter by having no distomedial spur on the palpal patella of the male and lacking a wide distal band of white on the tibia of the second leg. These two species seem to be allopatric except for Mt. Tsurugi, Shikoku (cf. Fig. 27).

This subspecies is named for Mr. Masayuki Sugimoto who helped us in various ways in collecting the material of Towada area.

Distribution. Honshu (Tôhoku, north Kantô, Chûbu districts, and the

northern mountainous area of Hiroshima pref.), Shikoku (so far known from Mt. Tsurugi alone).

***Sabacon imamurai* Suzuki, 1964**

Sabacon imamurai Suzuki, 1964, p. 58, figs. 1-2. [Type-locality: Nippara Stalactite Grotto, Tokyo pref., Honshu]; 1965b, p. 351, 1 figs.; 1972c, p. 442; 1974, p. 97, figs. 8-9.

Sabacon habei: Suzuki, 1965a, p. 41 (in part, figs. 3B, C, 4D, E, ♀♀ only, ♂ belongs to *S. makinoi* Suzuki, 1949)

Specimens examined. HOKKAIDO. Yukomanbetsu, Mt. Daisetsu (2♂ 4♀ 12j, 24-VII-75, SS & NT); Mt. Poroshiri, 850~860 m (3j, 14-VI-81, NT); Nopporo, Ebetsu-shi (27♂ 31♀ 37j, 20-IV~31-X-79, NT). Sapporo: Maruyama (25j, 24-IV~30-VII-79, NT); Nakayama-tôge (1j, 24-VII-78, NT). Tomakomai, Exptl. Forest, Hokkaido Univ. (1♀, 19-IX-80, NT). — AOMORI PREF. Asamushi, Hachimangû, 20~80 m (1j, 23-VII-81, NT). — IWATE PREF. Mt. Hachimantai, near Mikaeri-tôge, ca. 1580 m (1♀, 27-IX-75, SS).

Distribution. Hokkaido, Honshu, Kyushu.

Superfamily Troguloidea
Family Nipponopsalididae

** ***Nipponopsalis yezoensis* (Suzuki, 1958)**

Ischropsalis yezoensis Suzuki, 1958b, p. 167, figs. 1-6. [Type-locality: Shimizugasawa, Akan National Park, Hokkaido]; 1965a, p. 39; 1965b, p. 350, 1 fig.

Nipponopsalis yezoensis: Martens and Suzuki, 1966, p. 220, fig. 5.

Specimens examined. HOKKAIDO. Daisetsu: Sôunkyô, ca. 600 m (1♂, ?-VIII-70; 1j, 7-VI-71; 1♂ 1♀, 2-VII-71, H. Sako); Mt. Asahi-dake, Yukomanbetsu~Sugataminoike (2♂ 4j, 23-VII-75, SS & NT); Yukomanbetsu (4♂ 5♀ 3j, 24-VII-75, SS & NT). Mt. Poroshiri, 850~860 m (1j, 14-VI-81, NT); Nakayama-tôge, Sapporo-shi (1j, 24-VII-78, NT); Mt. Yôtei, 580~1500 m (6j, 25-IX-81, NT, S. Nakano, S. Sasaki). — IWATE PREF. Mt. Hachimantai, near Mikaeri-tôge, 1580 m (2♂ 1♀ 3j, 8-VIII-75, NT).

Distribution. Hokkaido, Honshu (Tôhoku and Chûbu districts).

Notes. Occurrence in Mt. Hachimantai is the first record from Tôhoku district. No remarkable difference exists between Mt. Hachimantai and Hokkaido populations.

General notes

1. Composition of the opilionid fauna of Hokkaido with reference to those of adjacent areas

Fifteen opilionid species so far recorded from Hokkaido may be roughly divided into two groups, namely the Oriental and the Pale- or Holarctic ones. The Oriental group is represented by the members of Gagrellinae (Gagrellidae) (2 species, 13.3%) while the Pale- or Holarctic group by all others (86.7%). The Pale- or Holarctic group thus dominates the Opiliones fauna of Hokkaido. Among these Holarctic

species, two relict species, *Caddo agilis* and *Kainonychus akamai*, are remarkable by showing Japano-North American distributional pattern. As mentioned before *Caddo agilis* occurs disjunctively in Japan and in the northeastern area of North America. On the other hand, *Kainonychus akamai*, ranging from Hokkaido to the eastern part of Honshu, shows a close affinity with *Paranonychus* known from Oregon to Atka Island, Alaska (Suzuki 1975). These Japano-North American disjunctive distributional patterns are also exhibited in several other species so far recorded from Honshu, Shikoku or Kyushu (Suzuki 1972, Suzuki et al. 1977). For the distribution of such species, Hokkaido occupies an important position, therefore, further occurrence of some of these species in Hokkaido may be expected. Particularly, it is much probable that *Caddo pepperella*, which has a similar distribution pattern to *C. agilis*, will be found in Hokkaido. On the other hand, occurrence of *Phalangium opilio* in Hokkaido is of much interest. This is a common

Table 4. Opiliones recorded from Hokkaido, together with the species known from the northernmost area of Honshu and Sakhalin. +=presence, Scientific name= vicariant, Subfamily names abbreviated with initial letters: P=Phalangiinae; O=Oligolophinae; G=Gagrellinae; L=Leiobuninae.

Family (Subfam.)	Species	N. Honshu	Hokkaido	Sakhalin
Triaenonychidae	<i>Kainonychus akamai</i>	<i>a. akamai</i>	<i>a. esoensis</i>	
	<i>Mutsunonychus fuscus</i>	+		
Caddidae	<i>Caddo agilis</i>	+	+	
	<i>Caddo pepperella</i>	+		
Phalangiidae	(P) <i>Phalangium opilio</i>		+	
	<i>Euphalangium albofasciatum</i>			+
	(O) <i>Oligolophus aspersus</i>	+	+	+
	<i>Mitopus morio</i>	(+: Japan Alps)	+	+
Gagrellidae	(G) <i>Gagrellula montana</i>	+		
	<i>Melanopa grandis</i>	+		
	<i>Metagagrella tenuipes</i>	+	+	
	<i>yezoensis</i>			
	<i>Systemocentrus japonicus</i>	+		
	<i>Paraumbogrella huzitai</i>	+	+	
	<i>Leiobunum j. japonicum</i>	+	+	
	<i>Leiobunum platypenis</i>	+	+	
	<i>Leiobunum globosum</i>	+	+	
	(L) <i>Leiobunum tohokuense</i>	+		
	<i>Nelima saghalina</i>			+
	<i>Nelima genufusca</i>	+	+	+
	<i>Nelima gigantea</i>	+	+	
Sabaconidae	<i>Sabacon makinoi</i>	<i>m. sugimotoi</i>	<i>m. makinoi</i>	
	<i>Sabacon imamurai</i>	+	+	
Nipponopsalididae	<i>Nipponopsalis yezoensis</i>	+	+	

species in Europe but still unrecorded from Asia region. The distribution of this species in North America and New Zealand is considered to be secondary (i.e.). Here also, it seems probable that Hokkaido specimens are not a native but a recent colonist from Europe or the other primary colonies by human agency. However, at present we hesitate to draw a conclusion on this problem because our knowledge on opilionid fauna of the adjacent areas in Continental Asia is insufficient.

In Table 4 the opilionid fauna of Hokkaido is compared with those of two adjacent areas, the northernmost area of Honshu and Sakhalin.

The fauna of the northernmost area of Honshu is relatively well explored. With the exception of *Phalangium opilio*, all species from Hokkaido are also distributed in Honshu. On the contrary, six out of 19 species recognized in the northernmost area of Honshu have not been found from Hokkaido, though as mentioned above, future finding of *Caddo pepperella* in Hokkaido is highly expected. According to Minato (1972), Tsugaru strait (Hokkaido/Honshu) had closed during Riss ice age (ca. 170,000 years ago); furthermore, it closed twice during early and middle main Würm (respectively ca. 27,000 and ca. 20,000~18,000 years ago)¹⁾. Therefore these six species (except for *C. pepperella*) are considered as the northward invaders from southern stocks in Honshu after the final formation of Tsugaru strait.

On the other hand, our knowledge concerning the Opiliones of Sakhalin is rather poor, and only five species have been recorded by Suzuki (1941, 1956) and Roewer (1956, 1957). Among these, two species, *Euphalangium albofasciatum* and *Nelima saghalina* are not known from Hokkaido. However, occurrence of the former in Hokkaido may be also expected, because this species inhabits the southern Kuril Islands (Is. Kunashir and Is. Iturup), too (Suzuki 1956). As the geographical barrier, Soya strait (=La Perouse, Sakhalin/Hokkaido) seems to be less important than Tsugaru strait, because the final formation of the former is relatively recent (ca. 12,000 years ago) (Minato 1972). Therefore, most of the species known from Hokkaido may be also distributed in Sakhalin. Further extensive surveys on the opilionid fauna of these areas, especially that of Sakhalin, Amur and N.E. Siberia must be undertaken in order to bring a thorough understanding of the faunal formation of the Japanese Islands.

2. Revisions

In this paper the following revisions were presented.

1) *Nelima melanodorsum* Roewer, 1911 and *Mitopus striatipes* Roewer, 1957: Synonymous with *Oligolophus aspersus* (Karsch, 1881).

2) *Metagagrella tenuipes yezoensis* (Suzuki, 1949): In accordance with the replacement of the nominate species *Gagrella japonica* Roewer, 1910 to *Metagagrella tenuipes* (L. Koch, 1878), the Hokkaido populations formerly referred to as *Gagrella japonica yezoensis* Suzuki, 1949 is amended as *Metagagrella tenuipes yezoensis*

1) Recently, an important opinion that Tsugaru strait had never closed during Würm ice age has appeared (Ohshima 1976~77).

(Suzuki, 1949). Also the populations of Aomori pref., formerly recorded as *G. j. japonica* were treated here as *M. t. yezoensis*.

3) Hokkaido population of *Leiobunum curvipalpe*-group: It was tentatively named as *Leiobunum esoense* Suzuki, 1976 on account of lacking male. However, as it has become evident that it contains two different species, *L. platypenis* Suzuki, 1953 and *L. globosum* Suzuki, 1976, the name *L. esoense* must be excluded.

4) *Nelima tenuis* Roewer, 1957: Synonymous with *Nelima gigantea* (Loman, 1902).

5) *Sabacon makinoi sugimotoi* n. subsp.: Honshu specimens formerly treated as *Sabacon makinoi* Suzuki, 1949 proved to be distinct enough to treat as a new taxon on the basis of morphological differences in female.

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Summary

1) Opiliones fauna of Hokkaido and its adjacent areas, the northernmost area of Honshu and Sakhalin, was comprehensively studied. Some species were reclassified by the extensive examination based on numerous specimens including types. As a result, 25 species and subspecies, belonging to 16 genera, 6 families and 2 suborders were recognized to occur in these areas. Within these one new subspecies, *Sabacon makinoi sugimotoi* was included.

2) *Phalangium opilio* was newly recorded from Hokkaido. This is the first record of this species in Asian region.

3) The specific characters of males and females of three species belonging to *Leiobunum curvipalpe*-group, *L. platypenis*, *L. globosum*, and *L. tohokuense*, which inhabiting Hokkaido and/or the northern Honshu were discussed. Females of these species, of which species distinction had so far been rather ignored, could be readily distinguished from each other by the shape of labrum, structure of palp and so on.

4) Basing mainly on Hokkaido specimens, diagnostic characters between the two closely related species, *Nelima genufusca* and *N. gigantea* were presented with the redescrptions of those.

- 5) Some comments were given on the faunal composition in these areas.

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