A REVISION OF THE ORIBATID MITES OF JAPAN

I. THE FAMILIES PHTHIRACARIDAE AND ORIBOTRITIIDAE

Jun-ichi Aoki*

日本産ササラダニ類の分類学的研究

概述

As the first part of the revisional work on the Japanese oribatid mites, the present paper deals with the members of the two families, Phthiracaridae and Oribotritiidae. Twenty-eight species, including 15 new species, are described. Three new genera, Paraphthiracarus, Metaphthiracarus and Calyptophthiracarus, are erected. Keys to genera and species are also prepared.

引言

In the vast area of Asia, Japan appears to be the only country where the oribatid fauna has well been studied, though not so intensively as in Europe. Before 1957, however, our knowledge on the Japanese oribatid mites had been very poor and, so far known to me, only four species had been reported from our country (Karpeles, 1883; Jacot, 1935; Kishida, 1927, 1930 & 1931). The modern studies of this group of mites in Japan were started independently by Morikawa (1957), Fukui (1958) and Aoki (1958). In the succeeding twenty years, about 300 species of oribatids were reported from Japan and most of the common species were identified. But, it is supposed that at least twice the number of species will be found from there.

The aim of the present series of papers is to revise all the Japanese species described and reported scatteringly in various journals, adding a number of species new to the Japanese fauna and new to science.

All the holotype specimens and a part of the paratypes are deposited in the collection of the National Science Museum, Tokyo, and the remaining type materials were preserved in the collection of the Institute of Environmental Science and Technology, Yokohama National University, Yokohama.

致谢

The present study was based upon, in addition to my own material, a number of specimens which were offered to me or extracted from the soil samples sent to me.

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横浜国立大学 環境科学研究センター 土壌環境生物学研究室
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**List of Species Described**

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Explanation of the Code Numbers (JA-numbers) for Collecting Data

JA9: North side of Ustukushigahara, Nagano-ken, C. Japan, 16-X-1956, J. AOKI, from litter under a conifer forest.


JA29: The same as above.


JA51: Kosaka-machi and Ogiwara-cho in Masuda-gun, Gifu-ken, C. Japan, 12-XI-1957, R. KANO (J. AOKI), from litter.

JA63: Iwakiri, Miyazaki-ken, S. Japan, 6-II-1958, J. KUGOH (J. AOKI), from moss and litter layer.

JA106: Yumoto in Nikko, Tochigi-ken, C. Japan, 6-VI-1958, K. KANEKO (J. AOKI), from litter.


JA143: Yudaki Fall in Nikko, Tochigi-ken, C. Japan, 17-X-1958, R. KANO, from litter.
JA152: Mihama-cho, Minami-muro-gun, Mie-ken, C. Japan, 8-I-1959, J. KUGOH (J. AOKI), from litter.
JA606: Otashirogahara in Nikko, Tochigi-ken, C. Japan, 6-VIII-1961, J. AOKI, from surface layer (0-5 cm) of grassland soil.
JA610: Kotoku in Nikko, Tochigi-ken, C. Japan, 7-VIII-1961, J. AOKI, from surface layer (0-5 cm) of soil under *Quercus mongolica* var. *groseserrata* forest.
JA970: Ebijima Island, N of Tsushima, Nagasaki-ken, W. Japan, 25-VIII-1968, I. FUJIYAMA (J. AOKI), from surface layer of soil under a beach forest.
JA1191: Near Fuji-fuketsu Cave, west side of Mt. Fuji, Yamanashi-ken, C. Japan, 6-IX-1969, S. Ueno (J. Aoki), from moss and litter under a forest of Abies veitchii and Tsuga diversifolia.
JA1292: Aokigahara, Mt. Fuji, Yamanashi-ken, C. Japan, 22-VI-1970, J. Aoki, from surface layer (0-5 cm) of forest soil.


JA2121: The same as above.


JA2226: Mt. Tengu-dake near Mt. Ishizuchi, Ehime-ken, SW. Japan, 8-VIII-1969, K. Morikawa, from litter and moss under a forest of Abies veitchii.


JA2236: The same as above, but from fallen cones.

JA2237: The same as above, but from fallen twigs.

JA2238: The same as above, but from moss growing on the ground.

JA2239: The same as above, but from moss growing on rotten woods.

JA2240: The same as above, but from soil under a rotten wood.

JA2241: The same as above, but from fresh fallen leaves.

JA2243: The same as above, but from a fungus.

JA2244: The same as above, but from surface layer (0-5 cm) of soil.


Family **Phthiracaridae** Perty, 1841

[Iphekodani Ka]

**Diagnosis.** (1) Body armadillo-like. (2) Genital and anal apertures wide, being contiguous without ventral plate around them.

**Elementary chaetotaxy.** ntg: \((10+10) - (22+22)\); g: \((4+4) - (10+10)\); an: \((1+1) - (4+4)\); ad: \((1+1), (3+3) - (5+5)\). Monodactyle.

**Distribution.** Cosmopolitan.

**Remarks.** Ramsay (1966) created the genus *Notophthiracarus*, which is closely related to the genus *Hoplophthiracarus*, but is distinguishable from the latter by the reduction of two posterior pairs of adanal setae \((ad_1, ad_2)\). However, this condition has well been known also in the genus *Phthiracarus*. For examples, *Phthiracarus laevigatus* (C. L. Koch, 1841), *Ph. piger* (Scopoli, 1763), *Ph. italicus* (Oudemans, 1906), *Ph. lentulus* (C. L. Koch, 1841) and many other species have vestigial adanal setae, \(ad_1\) and \(ad_2\). Of course, we know many species with complete 3 pairs of adanal setae, too, such as *Ph. montanus* Pérez-Íñigo, 1969, *Ph. lanatus* Feider et Suciu, 1957, *Ph. anoymum* Grandjean, 1933, etc. On the assumption that Ramsay's (1966) separation of his genus *Notophthiracarus* from *Hoplophthiracarus* is reasonable and "the reduction of adanal setae" is considered an important character of generic rank, the large genus *Phthiracarus* may be divided into two groups almost of equal size. Because the type species, *Ph. laevigatus* (C. L. Koch, 1841), shows the reduction of adanal setae, a new genus *Paraphthiracarus* is established here for the members with complete 3 pairs of adanal setae.

**Table 1.** A new classification of the family Phthiracaridae. Comparison between the former and the new arrangements of the genera included.

<table>
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<th>Neophthiracarus shiptoni</th>
<th>Neophthiracarus neotrichus</th>
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<td>Steganacarus</td>
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Balogh & Csizár (1963) found an interesting species which had neotrichies on notogaster as well as on ano-adanal plates and created for it the genus *Neophthiracarus* (the type species: *N. insignis*). Later, the second and the third members were added to the genus, *N. shiptoni* Sheals et Macfarlane, 1966 and *N. neotrichus* Wallwork, 1966, both of which have 6 pairs of ano-adanal setae, while the type species has 9 pairs. In 1967, Balogh & Mahunka created another genus *Notophthiracarus*. But, this generic name has been preoccupied by *Notophthiracarus* Ramsay, 1966 and Balogh (1972) proposed a new name *Protophthiracarus* for their *Notophthiracarus*. According to Balogh & Mahunka (1967), main difference separating *Protophthiracarus* (= *Notophthiracarus* Balogh et Mahunka, nec Ramsay) from *Neophthiracarus* is less number of adanal setae (6–7 pairs compared with 9 pairs of *Neophthiracarus*). However, the other species with 6 pairs of adanal setae, such as *shiptoni* and *neotrichus*, were placed in the genus *Neophthiracarus* by their authors. This treatment seems to be reasonable, because difference in “the number” of neotrichial setae is generally not so important. The difference to justify the establishment of the genus *Protophthiracarus* is rather in that it has erect interlamellar setae. Thus, one among the three species of *Neophthiracarus*, *N. neotrichus* Wallwork, 1966, should be placed in the genus *Protophthiracarus*, because *N. neotrichus* has erect and thick interlamellar setae.

These two genera show neotrichy both in ano-adanal region and on notogaster. But, a species found from Japan shows neotrichy only on notogaster. Though the treatment of such a species is a difficult problem, a new genus *Metaphthiracarus* is proposed here provisionally. The classification and arrangement of the genera in the family Phthiracaridae are newly summarized in Table 1.

**Key to the genera of the family Phthiracaridae**

(*genus unknown from Japan*)

| 1. Neotrichy present | .............................................................. 2 |
| — Neotrichy absent   | .............................................................. 5 |
| 2. Neotrichy both on notogaster and ano-adanal region | ......................................................... 3 |
| — Neotrichy only on notogaster | ......................................................... 4 |
| 3. Interlamellar setae erect and distinctly longer or thicker than lamellar setae | ......................................................... *Protophthiracarus* Balogh et Mahunka, 1967 |
| — Interlamellar setae decumbent and not so different in shape from lamellar setae | ......................................................... *Neophthiracarus* Balogh et Csizár, 1963 |
| 4. Interlamellar setae erect; notogaster with anterior hood...*Calyptophthiracarus* ged. n. |
| — Interlamellar setae decumbent; notogaster without anterior hood... |
| ......................................................... *Metaphthiracarus* gen. n. |
| 5. Interlamellar setae erect and distinctly longer or thicker than lamellar setae... 6 |
| — Interlamellar setae decumbent and not so different in shape from lamellar setae... 7 |
| 6. Two posterior pairs of adanal setae reduced, very minute or only their insertion pores visible... ......................................................... *Notophthiracarus* Ramsay, 1966 |
| — Two posterior pairs of adanal setae not reduced, 3 pairs of adanal setae well... |
developed............................................................ **Hoplophthiracarus** Jacot, 1933

7. Two pairs of anal setae .......................................................... 8
   — Three pairs of anal setae; 2 pairs of adanal setae ... **Hoplophorella** Berlese, 1923
   — Four pairs of anal setae; 1 pair of adanal setae ........................................ 9
8. Two posterior pairs of adanal setae reduced, very minute or only their setal pores visible .......................................................... **Phthiracarus** Perty, 1841
   — Two posterior pairs of adanal setae not reduced, 3 pairs of adanal setae being well developed.......................................................... **Paraphthiracarus** gen. n.

9. More than 15 pairs of notogastral setae .............. **Atropacarus** Ewing, 1917
   — Less than 16 pairs of notogastral setae .................................................. 10

10. Dorsal ridge present on notogaster ............................................ **Tropacarus** Ewing, 1917
   — Dorsal ridge absent on notogaster .......................................................... **Steganacarus** Ewing, 1917

   **Genus Phthiracarus** Perty, 1839

   [Irekodani Zoku]

   *Phthiracarus* Perty, 1839, column 847; 1841, p. 874; van der Hamm, 1959, p. 47; Bulanova-Zachvatkina et al., 1975, p. 369; Aoki, 1977, p. 185.

   **Diagnosis.** (1) Ano-adanal plates with 5 pairs of setae, 2 anal and 3 adanal, including vestigials. (2) Two posterior pairs of adanal setae (*ad*1 and *ad*2) reduced, very minute or vestigial. (3) Body surface nearly smooth, only finely punctured. (4) Interlamellar setae decumbent and not so different in shape from lamellar setae. (5) Notogastral chaetotaxy unideficient.

   **Elementary chaetotaxy.**

   ntg: (15+15); g: (7+7)∼(9+9); ag: (0+0) or (1+1); an: (2+2); ad: (1+1). Monodactyle.

   **Type-species.** *Hoplophora laevigata* C. L. Koch, 1841.

   **Distribution.** Cosmopolitan.

   **Remarks.** By the establishment of a new genus *Paraphthiracarus* a number of members of the genus *Phthiracarus* should be removed from this genus. At least, the following species are retained in the genus *Phthiracarus* s. str., showing vestigial *ad*1 and *ad*2: *Phthiracarus pigar* (Scopoli, 1763); *Ph. crenophilus* Willmann, 1951; *Ph. italicus* (Oudemans, 1900); *Ph. lentulus* (C. K. Koch, 1841); *Ph. dubinini* Feider et Suciu, 1958; *Ph. nitens* (Nicolet, 1855); *Ph. pallidus* Feider et Suciu, 1958; *Ph. jacoti* Feider et Suciu, 1958; *Ph. globosus* (C. L. Koch, 1841) and *Ph. sellnicki* Feider et Suciu, 1957. Only 2 species, *Ph. japonicus* and *Ph. clemens*, have hitherto been recorded from Japan. These species are widely distributed in the mainlands of Japan except Hokkaido.

   **Key to the Japanese species of the genus Phthiracarus**

   1. Sensillus broadly lanceolate, resembling in shape "a flame of candle" ..............
      .......................................................... **Ph. japonicus** Aoki, 1958
   — Sensillus narrowly lanceolate, resembling "a slender knife"...**Ph. clemens** Aoki, 1963
Phthiracarus japonicus AOKI, 1958

[Yamato-irekodani]

(Fig. 1)

Phthiracarus japonicus AOKI, 1958, p. 171, fig. 1; 1965, p. 229, figs. 13 12D-E; 1977, p. 185, fig. 6; BULANOVA-ZACHVATKINA et al., 1975, p. 368.

Diagnosis. (1) Sensillus short, the widest part of sensillar head occurs a little distally of the mid-distance along its length and tip of sensillus not sharply pointed. (2) Anterior notogastral setae (c1 and c2) well separated from the posterior margin of collor. (3) Notogastral setae often winding near base.

Measurement. Notogaster (L) 370 (551) 690 µ, notogaster (H) 258 (403) 500 µ, aspis (L) 210 (295) 345 µ, notogastral setae 50-105 µ.

Elementary chaetota~. ntg: (15+15); g: (9+9); ag: (1+1); an: (2+2); ad: (3+3). Monodactyle.

Description. ASPIS: Lateral carina weak and fine, never reaching lateral margin of aspis. Lateral rim complete, progressively attenuating toward the anterior direction. Median ridge absent. Four pairs of prodorsal setae all thin and fine, their relative length: \( il > le > ro \approx ex \); il and le lying close to the surface of aspis; these setae are weakly winding. Sensillus short, resembling in shape "a flame of candle", but the tip is not sharply pointed; its widest part occurs a little distally of the mid-distance along the length. Opening of bothridium in lateral view covered in its posterodorsal half.— NOTOGASTER: Dorsal side rather strongly arched, the ratio length/height of notogaster being 1.28~1.43 (average 1.36). Surface nearly smooth, very finely and densely punctured. Fifteen pairs of notogastral setae thin and fine, their RLN being 10~17.5, mostly weakly winding on the portion near their insertions; setae c1 and c2 inserted behind the collor of notogaster, being well separated from its posterior margin; seta c3 inserted usually on this margin. Positions of vestigial setae (f1 and f2) and lyrifissures (ia, im and ip) as shown in Fig. 1.—GENITO-ANAL REGION: Genital setae arranged in 2 longitudinal rows: 4 relatively long setae in the outer row and 5 short setae in the inner row (The number of genital setae in the original description was incorrect). Aggenital seta inserted near the corner of anterior appendage of genital plate. Among 5 setae on ano-adanal plate 2 setae (ad1 and ad2) are vestigial (In the original description, these setae were erroneously described and figured, as if they existed); setae an1 and an2 longer than ad1; distance ad2-ad4 longer than ad1-ad2; an1-an2 nearly equal to, or slightly shorter than, ad1-ad2; ad3 located at a level between an1 and an2, usually closer to an1 than to an2; ad1~ad4 arranged in an almost straight line; ad3 inserted nearly on the middle point along the width of anal plate.

Type-locality. Utsukushigahara, Nagano-ken, Central Japan.

Collecting data. JA40 (10 exs.), JA107 (5 exs.), JA142 (1 ex.), JA582 (11 exs.), JA592 (1 ex.), JA594 (24 exs.), JA595 (4 exs.), JA610 (1 ex.), JA591 (5 exs.), JA792 (6 exs.),
JA1090 (1 ex.), JA1131 (4 exs.), JA1208 (2 exs.), JA1245 (1 ex.), JA1370 (20 exs.), JA2022 (11 exs.), JA2180 (3 exs.), JA2216 (1 ex.), JA2217 (4 exs.), JA2221 (1 ex.).

**Distribution.** Japan (Tochigi-ken, Gumma-ken, Saitama-ken, Chiba-ken, Niigata-ken, Nagano-ken, Yamanashi-ken, Shizuoka-ken, Tottori-ken, Ehime-ken).

**Remarks.** Among the phthiracarid mites *Ph. japonicus* belongs to the group of species, the classification of which is most difficult. In the shape of sensilli, *Ph. japonicus* is closely resembling *Ph. piger* (SCOPOLI, 1763), *Ph. nitens* (NICOLET, 1855), *Ph. laevigatus* (C. L. KOCH, 1841), *Ph. crenophilus* WILLMANN, 1951, and *Ph. pallidus* FEIDER et SUCIU, 1958. Among them, *Ph. piger* seems to be most closely related to *Ph. japonicus*. The figures of its sensilli drawn by FEIDER et SUCIU (1957), WILLMANN (1931) and BULANOVA-ZACHVATKINA et al. (1975) much resembles those of *Ph. japonicus*, but the distal hyaline part appers to be smaller compared with that of *Ph. japonicus*; according to FEIDER et SUCIU (1957), anterior notogastral seta *c*₁ is more remote from notogastral collor than in *Ph. japonicus* and notogaster has a weak angle near seta *c*₁ as in *Ph. laevigatus*; median ridge of aspis is present, which is absent in *Ph. japonicus*. *Ph. laevigatus* is especially similar to *Ph. japonicus* in its small and thin notogastral setae and their position; but the characteristic angle near seta *c*₁ of notogaster can not be seen in *Ph. japonicus* and the sensilli are more pointed at apex. Both *Ph. nitens* and *Ph. laevigatus* are considerably larger in body size than *Ph. japonicus*. Another species, *Ph. crenophilus* and *Ph. pallidus*, are distinguishable from *Ph. japonicus* by their setae *c*₁ which are situated on, or very close to, the posterior margin of notogastral collor. In 1957, FEIDER et SUCIU redescribed *Ph. anonymum* GRANDJEAN, 1933 on their material collected in Rumania. The Rumanian specimens, however, are apparently not real *Ph. anonymum*, because they show vestigial condition of adanal setae and seta *c*₁ situated well behind the notogastral collor. The real *anonymum* has distinct 5 pairs of setae on anoadanal plates (*ad₁* and *ad₂* not vestigial) and setae *c*₁ inserted on the notogastral collor (GRANDJEAN, 1933; 1934). The “anonymum” of FEIDER et SUCIU (1957) must rather be considered as conspecific with the Japanese species, *Ph. japonicus*.

**Phthiracarus clemens** AOKI, 1963

[Tsurugi-irekodani]

*Phthiracarus clemens* AOKI, 1963, p. 218, figs. 1-4; BULANOVA-ZACHVATKINA et al., 1975, p. 369, pl. 138, fig. 925.

**Diagnosis.** (1) Sensillus elongate lanceolate. (2) Anterior notogastral seta *c*₁ widely separated from the anterior margin of notogaster, the distance between them distinctly longer than the length of *c*₁. (3) Median notogastral setae bending toward anterior direction. (4) Lateral carina long and distinct.

Key to the subspecies of *Ph. clemens*

1. Aspis with inconspicuous median ridge, which is almost of the same height
throughout its length; il and le distinctly shorter than 1/2 the length of aspis

Ph. Clemens Clemens Aoki, 1963

— Aspis with a distinct, arched median ridge; il and le nearly 1/2 as long as aspis

Ph. Clemens Kyushuensis subsp. n.

Phthiracarus Clemens Clemens Aoki, 1963

[Tsurugi-Irekodani]

(Fig. 2)

Phthiracarus ClemensAoki, 1963, p. 218, figs. 1-4, Bulanova-Zachvatkina et al., 1975, p. 369, pl. 138, fig. 925.

Diagnosis. (1) Median ridge of aspis low and almost of the same height throughout its length. (2) Prodorsal setae il, le and ex not greatly different in length. (3) il and le distinctly shorter than 1/2 length of aspis. (4) Sensillus shows its greatest width rather proximally.


Elementary chaetotaxy. ntg: (15+15); g: (9+9); ag: (1+1); an: (2+2); ad: (1+1). Monodactyle.

Description. Aspis: Lateral carina long and distinct. Median ridge of aspis inconspicuous, long and very low, never forming a distinct protrusion in lateral view. Dorsal part of aspis shows in lateral view an weak uneveness on the posterior part. Prodorsal setae il, le and ex long and thin, among which il is the longest; il and le winding on the basal portion. Sensillus lanceolate, but not sharply pointed at tip, the greatest width occurring posteriorly along its exposed portion. Posterodorsal half of bothridial opening covered by eyelid.—Notogaster: Highly arched and the anterior part fairly steeply sloping, but without angulation; the anterior border in lateral view slightly turned up. Fifteen pairs of notogastral setae short and fine; setae of the median series (c1, d1, e1, h1 and ps1) mostly strongly curved toward anterior direction; among the anteriormost setae, c1 more distant from the anterior margin than c0, the distance being far longer than the length of seta c1; seta e1 nearly on the posterior margin of notogastral collar.—Genito-anal Region: Nine pairs of genital setae arranged in 2 longitudinal rows, 4 longer setae in the outer row and 5 shorter ones in the inner row; among these shorter setae the anteriormost 2 pairs inserted on the anterior appendage of genital plates, though it is very difficult to detect them. The anterior margin of the appendage turned ventrally to form a sharp edge. Anoadanal plate has 3 setae and 2 insertion pores, i.e. ad1 and ad2 are vestigial; distance ad2-ad1 nearly equal to one another; ad1, ad2 and ad3 arranged in an almost straight line.

Type-locality. Tokyo, Central Japan.

Collecting data. JA28 (3 exs.), JA29 (2 exs.), JA51 (1 ex.), JA106 (4 exs.), JA152 (1 ex.), JA464-468 (6 ex.), JA592 (1 ex.), JA2120-2121 (9 exs.).

Distribution. Japan (Tochigi-ken, Gumma-ken, Tokyo, Gifu-ken, Mie-ken, Yaku Is.

Remarks. The figures of *Phthiracarus clemens* in the original description (Aoki, 1963) were not correct in the number and position of setae in genito-anal region: the setal formula of genital setae should be corrected as 4–5 (4 in the outer and 5 in the inner row) (Fig. 2C); more important mistake was made in the observation of adanal setae: in the Abb. 1 (p. 219, Aoki, 1963) $ad_1$ and $ad_2$ were drawn as they exist, but re-examination of the type material and many topotypes revealed that they are vestigial as in Fig. 2C. After this correction, *Ph. clemens* is easily distinguishable from *Ph. parabothricus* Feider et Suciu, 1957, which I (1963) considered most similar to *Ph.*

clemens. The present species is rather closely resembling Ph. globosus (C. K. Koch, 1841), Ph. ligneus Willmann, 1931, Ph. lentulus (C. L. Koch, 1841) and Ph. sellnicki Feider et Suciu, 1957. The shape of sensillus of Ph. globosus is most similar to that of Ph. clemens, but the notogaster is more strongly arched and notogastral setae are longer in Ph. globosus than in Ph. clemens. The sensilli of the latter 3 European
species have more long, attenuating tip, which is never seen in Ph. clemens. The notogastral setae of Ph. clemens are considered to be characteristic; they are very fine, short and mostly strongly curled toward anterior direction; the seta $c_1$ is inserted in the position more remote from notogastral collor than $c_5$ is. These characters are usful to separate Ph. clemens from all the 4 Europen species in comparison.

**Phthiracarus clemens kyushuensis** subsp. n.

[Hyuga-tsurugi-irekopodani]

(Fig. 3)

_Diagnosis._ (1) Median ridge of aspis distinct, becoming higher anteriorly. (2) Prodorsal setae $il$ and $le$ far longer than $ex$. (3) Setae $il$ and $le$ nearly 1/2 the length of aspis. (4) Sensillus shows its greatest width rather in the mid-portion.

_Measurement._ Notogaster (L) 450-610 $\mu$, notogaster (H) 322-445 $\mu$, aspis (L) 260-323$\mu$.

_Elementary chaetotaxy._ $ntg$: (15+15); $g$: (9+9); $ag$: (1+1); $an$: (2+2); $ad$: (1+1).

_Monodactyle._

_Type-series._ **HOLOTYPE** (NSMT-Ac 9085, in spirit): Kitagawa-mura, Miyazaki-ken, South Japan, 21-VI-1958, J. KUGOH (J. AOKI), from litter (JA109).—**PARATYPES** (1 ex. in spirit and 11 exs. on slides): the same data as holotype.

_Distribution._ S. Japan (Miyazaki-ken).

_Remarks._ The subspecies, Ph. clemens kyushuensis, which is distributed in the southern part of Japan, is easily distinguishable from the nominate subspecies of Central Japan by its higher median ridge of aspis. The other features are very similar between them, except difference in the relative length of prodorsal as well as noto-gastral setae and in the body size.

**Genus Paraphthiracarus** gen. n.

[Chika-irekopodani Zoku]

_Diagnosis._ (1) Ano-adanal plates with 5 pairs of setae, 2 anal and 3 adanal. (2) Three adanal setae complete, all distinctly developed. (3) Body surface nearly smooth, only finely punctured. (4) Interlamellar setae decumbent and not so different in shape from lamellar setae. (5) Notogastral chaetotaxy unideficient.

_Elementary chaetotaxy._ $ntg$: (15+15); $g$: (7+7) or (9+9); $ag$: (0+0) or (1+1); $an$: (2+2); $ad$: (3+3). **Monodactyle.**

_Type-species._ Phthiracarus lanatus Feider et Suciu, 1957.

_Distribution._ Cosmopolitan.

_Remarks._ As mentioned previously, the phthiracarid mites with complete 3 pairs of adanal setae are removed from the genus Phthiracarus and placed in the genus Paraphthiracarus. At least, the following species no doubt become members of Paraphthiracarus: Phthiracarus parabothrichus Feider et Suciu, 1957; Ph. baloghi Feider et
SUCIU, 1957; Ph. montanus PÉREZ-ÍÑIGO, 1969; Ph. pellucidus RAMSAy, 1966; Ph. anonymum GRANDJEAN, 1933. In addition, Ph. borealis (TRÅGÅRDH, 1910), Ph. ligneus WILLMANN, 1931, Ph. torosus WILLMANN, 1939 and Ph. peristomaticus WILLMANN, 1951, may also be included in the genus Paraphthiracarus.

Key to the Japanese species of the genus Paraphthiracarus

1. Notogastral setae very long; sensillus clavate ...P. lanatus FEIDER et SUCIU, 1957
   — Notogastral setae short and fine; sensillus lanceolate ........................................... 2
2. Aspis longitudinally striated ....................................................... P. australis sp. n.
   — Aspis without striation ................................................................. P. gibber sp. n.

Paraphthiracarus lanatus (FEIDER et SUCIU, 1957), comb. n.

[Shamoji-irekodani]

(Fig. 4)

Phthiracarus lanatus FEIDER et SUCIU, 1957, p. 26, pl. 3, figs. 17-25; BULANOVA-ZACHVATKINA et al., 1975, p. 369, pl. 138, fig. 926.

Diagnosis. (1) Adanal setae longer than anal ones. (2) Sensillus short and clavate.
(3) Notogastral setae long, the longest setae attaining half the length of notogaster.
(4) Seta c₁ distinctly shorter than the remaining notogastral setae. (5) Lateral carina on aspis very weak and short.

Measurement. Notogaster (L) 415-565 μ, notogaster (H) 300-390 μ, aspis (L) 240-283 μ.

Elementary chaetotaxy. 
ntg: (15+15); g: (9+9); ag: (1+1); an: (2+2); ad: (3+3).

Monodactyle.

Description. Aspis: Lateral carina very weakly developed, short and curved, extending above bothridium like an eyebrow. No distinct median ridge is developed. Interlamellar setae long, lying close to the surface of aspis; seta le reaching, or extending beyond, setal insertion of rostral seta. Exobothridial seta short, 1/3-1/4 as le. Sensillus has a short pedicel and thick, clavate head. Bothridium halfly covered by a right-angled scale.—Notogaster: Strongly arched posteriorly and rather flat anteriorly. Notogastral setae long and rather strong, bending on their proximal part toward anterior direction; setae c₁, c₂, e₁, h₁ and p₁ especially long, attaining 2/5-1/2 length of notogaster (RLN=42-52); R LN of most of the remaining setae 24-34; seta c₁ distinctly shorter and thinner than the others, less than 1/3 the length of seta c₂ its R LN being 13-15; seta c₁, c₂ and c₃ located close to the anterior margin of notogaster and almost equally distant from the margin; c₂ situated behind the posterior margin of collor.—Genito-anal region: Genital plate bears 9 setae: 4 setae in the outer row and 5 in the inner row. Aggenital seta exists near the outer corner of accessory plate. Ano-adanal plate provided with 5 long setae; anal setae about half the length.
Fig. 4. *Paraphthiracarus lanatus* (Feider et Suciu, 1957).—A: Lateral. B: Sensilli in various specs. C: Aspis. D: Genito-anal aperture.

of anal plate; adanal setae distinctly longer than anals, about as long as genital plate.

Type-locality. Rumania.

Collecting data. JA610 (1 ex.), JA2235 (17 ex.), JA2236 (29 ex.), JA2237 (10 ex.),
JA2238 (10 ex.), JA2239 (5 ex.), JA2240 (3 ex.), JA2241 (6 ex.), JA2243 (1 ex.), JA2244 (1 ex.).

Distribution. Rumania and Japan (Tochigi-ken).

Remarks. The specimens from Japan are mostly well in accord with the original description of Ph. lanatus by Feider & Suciu (1957). According to their figure (pl. 3, fig. 21), the species bears only 14 pairs of notogastral setae, lacking in setae c₁. But, these setae are supposed to be overlooked by them, because c₁ are far shorter and thinner than the remaining setae. Very inconspicuous lateral carina on aspis must also be overlooked by them. The notogastral setae of the Rumanian form appear to be not so strongly bending as those of the Japanese form.

Paraphthiracarus australis sp. n.

[Sakishima-irekodani]

(Fig. 5)

Diagnosis. (1) Anal setae distinctly longer than adanal setae. (2) Sensillus spindle-shaped, being swollen at the middle part and pointed at tip. (3) Notogaster strongly arched and the anterior part steeply sloping down. (4) Aspis has a swelling posteriorly and fine longitudinal wrinkles on the median part. (5) Bothridial scale situated posteriorly and hardly covering opening of bothridium.

Measurement. Notogaster (L) 440–602 μ, notogaster (H) 350–458 μ, aspis (L) 250–320 μ, aspis (W) 185–210 μ, genito-anal region (L) 320 μ, exposed part of sensillus (L) 40–50 μ.

Elementary chaetotaxy. ntg: (15+15); g: (9+9); ag: (1+1); an: (2+2); ad: (3+3). Monodactyle.

Description. Aspis: Lateral carina nearly straight. Median ridge inconspicuous. A swelling exists on the posterior part of aspis. Longitudinal wrinkles running on the median part of aspis. Interlamellar setae a little longer and thicker than lamellar setae; exobothridial seta shorter than le. Sensillus spindle-shaped, the greatest width occurs in the mid-distance along the exposed part of sensillus; the tip of the organ sharply pointed. Bothridial scale rectangular and situated behind bothridial opening, hardly covering the latter.—Notogaster: Strongly arched, especially in the anterior part, so that the part is steeply sloping down toward the anterior direction; the anterior margin only slightly turning up. Length/height of notogaster 1.31. Notogastral setae fine, weakly winding and not curving anteriorly; seta c₁ separated from the anterior margin of notogaster as distant as its setal length; c₁ located on the posterior margin of collor.—Genito-anal region: Genital plate bears 9 setae arranged in 2 rows, 4 in the outer row and 5 in the inner row; 2 of the inner row situated on the anterior appendage of genital plate; a small aggenital seta located near the outer corner of the appendage. Ano-adanal plate bears 5 setae; 2 anal setae longer than adanal setae; ad₁ and ad₂ the shortest; 3 adanal setae arranged in a straight line; distance ad₁-ad₂ longer than ad₂-ad₃ or an₁-an₂.
Fig. 5. *Paraphthiracarus australis* sp. n.—A: Lateral. B: Genital and ano-adanal plates. C: Sensilli. D: Aspis.

**Type-series.** **Holotype** (MSMT-Ac 9090, on slide): At the top of Mt. Omoto-dake, Ishigaki Island, South Japan, 6-XII-1972, from litter, J. Aoki (JA1550).—**Paratypes:** 5 exs. Sonai, Iriomote Island, S. Japan, 26-XI-1972, S. Nakamari & J. Aoki, from litter,
Remarks. *Paraphthiracarus australis* resembles *Paraphthiracarus parabothrichus* (Feider et Suciu, 1957) comb. n., but the latter species has more slender sensilli and notogastral setae $c_5$ situated far backward. *Paraphthiracarus anonymum* (Grandjean, 1933) comb. n. shows longitudinal striation on the anterior part of aspis, but not on the whole part as in *P. australis*, and the notogaster not so strongly convex as that of *P. australis*.

*Paraphthiracarus gibber* sp. n.  
[Semushi-irekodani]  
(Fig. 6)

*Diagnosis.* (1) Anterior part of notogaster, behind collor, strongly swelling. (2) Sensillus lanceolate and pointed at tip, the greater middle portion showing the same thickness. (3) Palpal femur as long as the combined length of 2 terminal segments. (4) Lateral carina of aspis distinct. (5) Anal setae slightly longer than adanal setae.

*Measurement.* Notogaster (L) 595–710 $\mu$, aspis (L) 325–360 $\mu$.

*Elementary chaetotaxy.* ntg: (15+15); g: (9+9); ag: (0+0); an: (2+2); ad: (3+3).

Monodactyle.

*Description.* *Aspis:* Lateral carina thin, but distinct. A weak median ridge developed on the anterior part of aspis. Four pairs of prodorsal setae all thin; seta $il$ a little longer than $le$ and more than twice as long as $ro$ or $ex$. Sensillus has a lanceolate head, which is of nearly the same thickness along the middle portion; tip of sensillus rather sharply pointed; eccentric core of sensillus has a dark-colored inner part.—*Notogaster:* Anterior part of notogaster strongly swollen to give us an impression of “humpback” (hence the name “gibber”); this swelling does not continue to collor, which is discernible as a flat zone, especially in lateral view; behind this swelling, the dorsum of notogaster becomes rather flat. Fifteen pairs of notogastral setae thin and weak; setae $c_1$ and $c_6$ almost equally distant from the anterior margin of collor; $c_5$ situated on the posterior margin of collor; insertion pores of vestigial setae $f_1$ and $f_2$ located anterior to $h_1$.—*Genito-anal region:* Anterior margin (not appendage) of genital plate thickened and its median end is observed as a rounded swelling in lateral view. Among 9 genital setae, 7 situated on the plate and 2 on the anterior appendage of the plate. Ano-adanal plate bears 5 setae; they are not greatly different in length from one another, though $an_1$ and $an_2$ a little longer than the remainder; distance $an_1-an_2$ nearly equal to $ad_1-ad_2$; $ad_2-ad_3$ a little longer than $ad_1-ad_2$.

*Type-series.* Holotype (NSMT-Ac 9091, in spirit): Mt. Yuwan-dake, Amami-Oshima, S. Japan, 8-1-1973, H. Suzuki, from litter and soil (JA2198).—Paratopotypes: 4 exs. the same data as holotype.—Paratypes: 1 ex. Tanbara-cho, Shuso-gun, Ehimeken, 13-IV-1968, K. Okuda (JA2192); 2 exs. the upper basin of Nakama-gawa River,
Iriomote Island, 5-XII-1972, S. Nakatamari & J. Aoki, from litter (JA1544).


Distribution. S. Japan (Ehime-ken, Amami-Ohshima, Iriomote Is.)

Remarks. The lanceolate sensilli of *P. gibber* resemble those of *Ph. pallidus* Feider et Suciu, 1958, *Ph. nitens* Nicolet, 1855 and *P. australis* sp. n., but the greater part of the head is of equal thickness. This tendency appears more distinctly in the sensilli of *P. borealis* (Trägårdh, 1910); this species was described from Sarekgebirge of Sweden and it is almost impossible that *P. borealis* is conspecific with *P. gibber* which was collected from one of the southern islands locating near the subtropical region of Japan. However, it is difficult to mention distinct difference between these two species, because almost no information can be obtained from Trägårdh's original description on notogaster and on genito-anal region. The only features distinguishing *P. borealis* from *P. gibber* are as follows: 1) the palpal femur longer than the combined length of terminal two segments and 2) the absence of any carina on aspis. The characteristic shape of the notogaster of *Ph. gibber* resembles that of *P. parabothrichus* Feider et Suciu, 1957, or *P. ligneus* Willmann, 1931, but the sensilli of these species are far more slender than in *P. gibber*.

Genus *Metaphthiracarus* gen. n.

[Oh-irekodani Zoku]

Diagnosis. (1) Notogastral neotrichy present. (2) Adanal neotrichy absent. (3) Ano-adanal plates with 5 setae, 2 anal and 3 adanal in position. (4) Sensillus long, without swollen part. (5) Interlamellar setae decumbent, similar in shape and size to lamellar setae. (6) Body surface smooth.

Elementary chaetotaxy. 

ntg: (18+18); g: (9+9); ag: (0+0); an: (2+2); ad: (3+3).

Type-species. *Metaphthiracarus bacillatus* sp. n.


Remarks. The genus *Metaphthiracarus* is very similar to the genus *Paraphthiracarus* except in notogastral neotrichy. The neotrichy, however, does not exist in ano-adanal region and the genus *Metaphthiracarus* is separable from *Neophthiracarus* as well as from *Protophthiracarus* which show neotrichy both on notogaster and on ano-adanal plates. A single species is known for the present time.

*Metaphthiracarus bacillatus* sp. n.

[Oh-irekodani]

(Fig. 7)

Measurement. Notogaster (L) 980–1210 µ, notogaster (H) 683–880 µ, aspis (L) 465–550 µ. RLN (from 4 exs.)—Prodorsal setae: ro 7 (8) 9; le 10 (12) 14, il 14 (15) 16;
Fig. 7. *Metaphthiracarus bacillatus* sp. n.—A: Genito-anal region. B: Aspis. C: Sensillus. D: Genital plate in lateral view. E: Lateral.

notogastral setae: $c_1$ 24 (28) 30, $c_2$ 41 (46) 49, $c_3$ 12 (15) 16, $c_p$ 37 (41) 44, $d_1$ 30 (31) 31, $d_2$ 30 (34) 39, $e_1$ 36 (39) 44, $e_2$ 36 (39) 46, $h_1$ 40 (41) 43, $h_2$ 33 (36) 39, $h_3$ 26 (30) 34, $p_{s_1}$ 34 (35) 36, $p_{s_2}$ 28 (30) 32, $p_{s_3}$ 27 (29) 33, $p_{s_4}$ 25 (27) 30; neotrichial setae: $n_1$ 38 (42) 48,
Elementary chaetotaxy. ntg: (17+17) or (18+18); g: (9+9); ag: (1+1); an: (2+2); ad: (3+3). Monodactyle.

Description. Aspis: Lateral carina very fine, but rather long. A low median ridge exists on the anterior half of aspis. Prodorsal setae fine and decumbent; interlamellar setae about 1/3 as long as aspis; le a little shorter than il; ro curved inward and downward; exobothridial seta straight and somewhat shorter than ro. Sensillus slender, nearly of equal thickness throughout its length, being only slightly thickened on the middle part; its exposed portion about as long as le; the tip pointed and bears a hyaline capsule. A trapezoidal scale located posterior to bothridial opening.—Notogastrer: A weak swelling found just behind the anterior margin. Notogastral setae long, being very slightly sigmoid, but having no special tendency to bend toward a definite direction. The number of the setae mostly 18 pairs (17 pairs in one specimen) with addition of 3 pairs of neotrichial setae to the ordinal number, 15 pairs; the three pairs of neotrichial setae appear around setal pore $f_1$ as shown in Fig. 7E with the provisional notation $n_1-n_3$; setae $n_5$ do not appear in the case that only 2 pairs of neotrichial setae exist. Setae $c_2$ the longest among notogastral setae, about as long as aspis; $c_3, h_1$ and 3 pairs of neotrichial setae are the next longest ones; $c_1$ distinctly shorter than any other notogastral seta; the other relations in length of setae: $c_2 > c_3 > c_1 > c_4; e_1 = e_2 > d_1 = d_3; h_1 > h_2 > h_3; p_5 > p_4 > p_3 > p_2$.—Genito-anal region: Nine pairs of genital setae are present, 4 pairs in the outer row and 5 pairs in the inner row; 3 pairs among the latter inserted on the anterior appendages. Adanal setae distinctly longer than anal setae; at least, $a_d_2$ and $a_d_3$ about twice as long as $a_n$. Distance $a_d_1-a_d_2$ slightly shorter than $a_d_2-a_d_3$; $a_d_3$ inserted at a level between $a_n$ and $a_n$.—Type-series. Holotype (NSMT-Ac 9094, in spirit): Tanbara-cho, Shuso-gun, Ehime-ken, S. Japan, 13–IV–1968, K. ORUDA (JA2192).—Paratopotypes: 3 exs. the same data as holotype.—Paratypes: 7 exs. Omogo-kei, Ehime-ken, S. Japan, 11–IV–1967, J. AOKI, from litter (JA727); 2 exs. Mt. Daisen, Tottori-ken, Japan, 28–IX–1969, K. Kurosa, from litter under a rotten wood (JA1387); 5 exs. Mt. Kiyosumi, Chiba-ken, C. Japan, X–1962, Y. Kitazawa, from A0-layer of soil (JA446); 3 exs. Mt. Nasu-dake, Tochigi-ken, C. Japan, 12–VIII–1965, J. Aoki, from litter (JA567).


Genus Calyptophthiracarus gen. n.

[Zukin-irekodani Zoku]

Diagnosis. (1) Anterodorsal part of notogaster strongly projecting forward, forming a hood over aspis. (2) Notogastral neotrichy present. Neotrichy absent. (4) Interlamellar setae erect, distinctly longer and thicker than lamellar setae. (5) Setae $i_1$ and $l_e$ inserted close together. (6) Notogastral setae $c_2$ and $c_4$ inserted close together.
Elementary chaetotaxy. ntg: (16+16); g: (9+9); ag: (1+1); an: (2+2); ad: (3+3).

Monodactyle.

Type-species. *Calyptophthiracarus mitratus* sp. n.


Remarks. In having a neotrichy restricted on notogaster, *Calyptophthiracarus* resembles *Metaphthiracarus*, but differs from the latter in the strong and erect interlamellar setae. From the genera with erect interlamellar setae, *Hoplophthiracarus* and *Notophthiracarus*, the present new genus differs in having a neotrichy on notogaster. But, the most peculiar features of *Calyptophthiracarus* are the hood-like anterior projection of notogaster and the characteristic position of *il* and *le* as well as *c₂* and *c₃*, which are situated close together, respectively. Similar hood-like projection is also found in the genus *Tropacarus*.

**Calyptophthiracarus mitratus** sp. n.

[Zukin-irekodani]

(Fig. 8)

Measurement. Notogaster (L) 780-910 μ, notogaster (H) 430-560 μ, aspis (L) 350-380μ.


Elementary chaetotaxy. ntg: (16+16); g: (9+9); ag: (1+1); an: (2+2); ad: (3+3).

Monodactyle.

Description. Aspis: Lateral carina short and weak. No distinct median ridge. Rostral seta weakly roughened and strongly curved inward. Lamellar seta as thin as *ro*, but without barbation and about 1.5× as long as *ro*. Interlamellar seta thick, long (3× as long as *le*), erect, distinctly barbed, sigmoid near base and curled at tip; *il* and *le* inserted close together anteromedially of bothridium. Exobothridial seta fine and short, shorter than *ro*. Sensillus setiform, weakly sigmoid near base, being thickest at the middle portion; at least, apical half of the organ bearing a hyaline capsule of rather irregular margin. Scale of bothridium not conspicuous, with a small dent posteriorly in dorsal view.—Notogaster: Anterodorsal part strongly protruding to form a hood-like projection covering the posterior half of aspis. Notogastral setae long and sparsely barbed; setae *c₁* inserted almost on the anterior margin of hood-like projection; setae *c₂* and *c₃* inserted very close together; setae of *c*-series not so different in length from one another, though *c₂* a little longer than the others; relative length of other notogastral setae: *d₂* > *d₁*; *h₁* > *h₂* > *h₃*; *pₛ₁* > *pₛ₂* > *pₛ₅* > *pₛ₇*. Neotrichial setae belong to the group of the longest setae.—Genito-anal region: Nine pairs of genital setae arranged in 2 rows, 4 pairs in the outer row and 5 pairs in the inner row; among the latter 5 pairs, 3 pairs are inserted on the anterior appendage. Ano-adanal plates bearing 2 anal and 3 adanal setae; the order in length of adanal setae: *ad₅* >
ad₁ > ad₂; anal setae shorter than half the length of ad₂. In lateral view, the upper part of ano-adanal plates with fine striation.—MOUTH PARTS: Chelicera bears minute prickles on each side: 18–20 prickles below seta cha and behind chb on the paraxial side (Fig. 8E) and 15–18 prickles behind the proximal part of movable digit on the antiaxial side. Palp 3-segmented; palpal chaetotaxy: 2-2-7.


Distribution. Japan (Ehime-ken, Tshushima Is., Yaku Is., Amami-Ohshima Is.)

Genus Neophthiracarus Balogh et Csiszár, 1963

[Kebuka-irekodani Zoku]


Diagnosis. (1) Notogastral neotrichy present. (2) Adanal neotrichy present. (3) Interlamellar setae decumbent, not so different in length and shape from lamellar setae. (4) Body surface smooth.

Elementary chaetotaxy. Body setae: ntg: (17+17), (20–20) or (50~+50~); g: (9+9), (9+8) or (9+10); ag: (1+1) or (2+1); an: (2+2) or (5+5); ad: (4+4).


Distribution. S. Argentine, Tierra del Fuego and Japan.

Remarks. After the establishment of the genus Neophthiracarus by Balogh et Csiszár (1963) with the type species N. insignis, Sheals & Macfarlane (1966) added to the genus the second species, N. shiptoni, which has more notogastral setae and less anal setae compared with the type species. In the same year, Wallwork (1966) described Neophthiracarus neotrichus from Campbell Island. This species, however, has thick and erect interlamellar setae and should be considered a member of the genus Protophthiracarus Balogh, 1972.

Neophthiracarus comosus sp. n.

[Kebuka-irekodani]

(Fig. 9)

Diagnosis. (1) Notogaster shows a strong neotrichy, bearing at least 100 long notogastral setae. (2) Sensillus slender baciliform, without a swollen head. (3) Ano-adanal plates with 2 anal and adanal setae.

Measurement. Notogaster (L) 1060–1180 µ, aspis (L) 510–545 µ, notogastral setae (L)
Fig. 9. *Neophthiracarus comosus* sp. n.—A: Genital plate in lateral view. B: Genital plate in lateral view. C: Genitoanal region. D: Lateral.

350–470 μ.

*Elementary chaetotaxy.* Body setae: ntg: (110), (140) or (150); g: (9+8) or (9+9); ag: (1+1) or (1+2); an: (2+2); ad: (4+4). Leg setae: I (1–4–4–5–18); II (1–2–3–3–12).
Description. ASIPS: All the prodorsal setae thin and smooth; il somewhat longer than le, ro ex; il and le inserted neary on the level of bothridia, le being a little anteriorly of il. Sensillus elongate baciliform, almost of the same thickness throughout its length, becoming slightly thinner toward the base; the tip pointed and bears a hyaline capsule. A trapezoidal scale exists behind opening of bothridium.—NOTOGASTER: An extreme neotrichy is developed on notogaster, especially on the anterior as well as on the posterior part; the total number of notogastral setae examined in 3 specimens are about 110, 140 and 150, respectively; neotrichial setae appear in the greatest number in the region of c-series setae and next in that of ps- and h-series setae, while they seem to be absent in the region of d- and e-series setae; the setae on notogaster long (RLN=33–42) and very weakly and sparsely barbed; most of the setae strongly curved near their insertions.—GENITO-ANAL REGION: Genital plates bear the normal number of setae, i.e. 9 pairs, though reduction of one seta on one side was observed in a specimen. Ano-adanal plates provided with 2 pairs of anal and 3 pairs of adanal setae; ad1–ad4, almost of equal in length, a little longer than twice the length of anal setae.


Distribution. Japan (Ehime-ken).

Remarks. Two known species of the genus, N. insignis Balogh et Csizsár, 1963, and N. shiptoni Sheals et Macfarlane, 1966, are easily distinguishable from N. comosus by their clavate sensilli and not so strongly developed neotrichy on notogaster (total numbers of notogastral setae are only 17 pairs and 20 pairs, respectively).

Genus Hoplophthiracarus Jacot, 1933

[Tachige-irekodani Zoku]


Diagnosis. (1) Interlamellar setae erect, conspicuous, far longer and thicker than lamellar setae. (2) Ano-adanal plate with 5 setae: 2 anal and 3 adanal. (3) Noto-gaster roughly punctate, though not so conspicuously. (4) Anal setae inserted on the median edge of ano-adanal plates.

Elementary chaetotaxy. ntg: (15+15); g: (7+7)~(9+9); an: (2+2); ad: (3+3). Monodactyle.

Type-species. Hoplodermia histricinum Berlese, 1908.

Distribution. Europe, USSR, America, Nepal Himalaya, Tongatapu Island and Japan.

Key to the Japanese species of the genus Hoplophthiracarus
1. Notogastral setae strongly curved toward anterior direction; seta c5 distinctly
shorter and thinner than \( c_2 \); sensillus clavate and strongly sigmoid; length of notogaster 271-380 \( \mu \) ....................................................H. pavidus (Berlese, 1913)

- Notogastral setae weakly curved or nearly straight; seta \( c_1 \) equal to, or somewhat longer than, \( c_2 \)................................................................. 2

2. Sensillus without a swollen head; aspis with median ridge; seta \( h_1 \) longer than \( ad_2 \); rostral seta almost equal to, or somewhat shorter than, lamellar seta; length of notogaster 800-950 \( \mu \) ....................................................H. ishikawai sp. n.

- Sensillus with a more or less swollen head; aspis without distinct median ridge; seta \( h_1 \) shorter than \( ad_2 \); rostral seta longer than lamellar seta ........................................... 3

3. Sensillus weakly swollen at tip; foveolation on body surface not so conspicuous; aspis rather flat; notogastral setae moderately long (RLN 13-21); length of notogaster 440-592 ....................................................H. kugohi Aoki, 1959

- Sensillus distinctly swollen at tip; foveolation on body surface very clear; aspis strongly convex; notogastral setae short (RLN 8-14); length of notogaster 370-490 \( \mu \)..........................................................H. foveolatus sp. n.

Hoplophthiracarus pavidus (Berlese, 1913)

[Kogata-irekodani]

(Fig. 10)

Hoplophthiracarus pavidus: van der Hammen, 1963, p. 307, figs. 1-8; Bulanova-Zachvatkina et al., 1975, p. 372, pl. 139, fig. 938a; Feider et Calugar, 1969, p. 77, fig. 6.

Diagnosis. (1) Notogastral setae strongly curving toward anterior direction. (2) Seta \( c_1 \) distinctly shorter and thinner than \( c_2 \). (3) Sensillus with a distinct oval head and a long sigmoid peduncle. (4) Lateral carina rather long, but never reaching rostrum. (5) Notogastral lappet inconspicuous. (6) No median ridge on aspis.

Measurement. Notogaster (L) 271-380 \( \mu \), notogaster (H) 162-240 \( \mu \), aspis (L) 148-210.

Elementary chaetotaxy. ntg: (15+15); g: (9+9); ag: (1+1); an: (2+2); ad: (3+3).

Monodactyle.

Description. Aspis: Lateral carina curving above bothridium, almost straight in the remaining portion, comparatively long, but never reaching rostrum. Lateral rim rather broad, becoming suddenly narrow anteriorly below the anterior end of lateral carina. No median ridge is present. A short, but distinct, curved line arising from the margin of aspis and running toward the median direction. Interlamellar seta thick and erect, weakly bending posteriad at tip; it is roughened on the anterior 3/4. Lamellar seta minute. Rostral seta directed forward, almost straight or slightly bending downward, more than twice as long as \( le \). Exobothridial seta thinner, but nearly as long as \( ro \) and longer than \( le \). Sensillus clavate, having a rounded oval head and
thin, long peduncle, which is sigmoid in the proximal portion. Foveolae sometimes found on aspis.—Notogaster: Lateroventral margin of notogaster shows a distinct angulation on the middle part. Lappet is poorly developed, without distinct posterior angulation, so that the anterolateral margin of notogaster almost smoothly continuous backward. There are 15 pairs of notogastral setae and 2 pairs of vestiges; the setae rather strong, mostly curving to the front direction, weakly roughened on their distal half and not sharply pointed at tip; their RLN (relative length to notogaster): 10–18 (average: 13.6); the longest setae \( h_1 \) nearly similar in length to interlamellar setae \( ad_2 \). Vestige \( f_1 \) situated close to \( h_1 \), but difficult to detect in lateral view of animal; \( f_2 \) located in the area of a triangle \( e_2h_2h_3 \), being closer to \( h_2 \) or \( h_3 \) than to \( e_2 \). Lyri-fissure \( ia \) situated in the vicinity of \( cp \), posteromedially of the seta; \( im \) located between \( cp \) and \( h_3 \). The surface of notogaster shows very indistinct foveolation, which is only visible in strongly inclined parts.—Genito-anal region: Genital plate bears 9 setae; the posterior 4 comparatively long and arranged with wider interspaces; the anterior 5 minute, especially the anteriormost 2 are difficult to detect, because they are inserted on the anterior face of genital aperture. One small aggenital seta situated on the lateroanterior corner of the aperture. Anal plate with a strong anterior lock. Two anal setae situated close together on the median margin of the plate. Adanal seta \( ad_1 \) inserted near the median margin, while \( ad_2 \) and \( ad_3 \) distant from it; \( ad_3 \) shorter than \( ad_1 \) or \( ad_2 \), and subequal in length to \( an_1 \). Foveolation on genital and anal plates more distinct than that on notogaster.

Type-locality. Tiarno, Trentino, N. Italy.
Collecting data. JA1171 (3 exs.), JA1325 (2 exs).
Distribution. Italy, Netherlands, Rumania and Japan (Tobishima Island and Nagano-ken).

Remarks. The Japanese material is mostly well in accord with the redescription and figures of \( H. pavidus \) by van der Hamm (1963). Some differences are, however, found in the following points: (1) Lyri-fissures \( ia \) and \( im \) equally distant from \( cp \) in the European form, while \( ia \) is far closer to \( cp \) than \( im \) is in the Japanese one. (2) van der Hamm (1963) stated “\( h_1 \) is situated slightly in front of \( f_1 \), whilst it is behind it in \( P. anonymum \)”, but in the Japanese form \( h_1 \) situated slightly in front or behind \( f_1 \) (in the two Japanese specimens examined the situation is as shown in Fig. 10F). Among the Japanese specimens, those collected from Tobishima Island are far smaller in body size (length of notogaster 271–272 \( \mu \)) compared with the mainland form of Japan and the European form.

**Hoplophthiracarus kugohi** Aoki, 1959

[Kugoh-irekodani]

(Fig. 11)

*Hoplophthiracarus kugohi* Aoki, 1959, p. 17, fig. 12; 1977, p. 185, fig. 5.

**Diagnosis.** (1) Sensillus with an weakly swollen, elongate head. (2) Lateral
carina on aspis very long, reaching the tip of rostrum. (3) Adanal seta \( ad_2 \) longer than the longest notogastral seta \( h_1 \). (4) Notogastral setae moderately long, slightly curved and weakly barbed.

**Measurement.** Notogaster (L) 550–630 \( \mu \), notogaster (H) 340–450 \( \mu \), aspis (L) 270–320 \( \mu \). Notogastral setae moderately long, slightly curved and weakly barbed.

**Description.** Aspis: Lateral carina extraordinarily long, arising from above bothridium, running almost parallel with lateral margin of aspis on the distal half, reaching the tip of aspis. Interlamellar seta long and thick, barbed on its distal half. Lamellar seta short and smooth, about 1/5 as long as \( il \). Rostral seta somewhat longer than \( le \), bending downward. Sensillus slender, weakly winding near base, with an elongate, irregularly shaped, hyaline head. Longitudinal striation found behind \( il \) and \( le \), on the posterior part of aspis. Exobothridial seta minute—Notogaster: Notogastral setae similar to \( il \), thick and barbed on their distal half, slightly bending toward anterior direction; setae \( c_1 \) and \( c_2 \) nearly equally distant from the anterior margin of notogaster; \( c_3 \) a little longer than \( c_2 \). Notogastral surface foveolate except on collar.—Genito-anal region: Nine pairs of genital setae present; 4 pairs among them situated somewhat distant from the inner margin of genital plate, 2 pairs close to the margin and 3 pairs on the anterior appendages of genital plates. Ano-adanal plates with 5 pairs of setae; \( an_1 \) and \( an_2 \) inserted on the inner edge of the plate, being subequal in length and in thickness to \( ad_3 \); adanal setae \( ad_1 \) and \( ad_3 \) distinctly thicker and longer than the setae mentioned above; \( ad_2 \) longer than the longest notogastral seta \( h_1 \). All the setae weakly roughened.

**Type-locality.** Miyazaki, S. Japan.

**Collecting data.** JA63 (2 exs.), JA1307 (1 ex.), JA1715 (3 exs.), JA2115 (5 exs.), JA2192 (1 ex.).

**Distribution.** Japan (Tokyo, Ehime-ken, Miyazaki-ken, Ogasawara Islands, Yaku Island.

**Remarks.** Some corrections should be made in my original description and figures (Aoki, 1959) of *H. kugohi*: (1) I mentioned in the description “Die Seitenkante der Aspis ist breit, nach vorn aber plötzlich verengert.”, but in fact the lateral rim of aspis (=die Seitenkante) is narrow as usual; this mistake was caused by my misconception of lateral carina as inner margin of the lateral rim. (2) I described also that the genital plates have 6 pairs of setae, but the species has 3 more pairs of setae on the anterior appendages of genital plates. (3) From the description and figure (Abb. 12-D) it seemed that \( an_1 \), \( an_2 \) and \( ad_1 \) were equally close to the inner margin of ano-adanal plate, but close examination revealed that \( an_1 \) and \( an_2 \) were inserted on the very edge of the plate, while the insertion pore of \( ad_1 \) is slightly removed from the margin as shown in Fig. 11E. (4) The correct position of notogastral setae could not be seen in the original figure (Abb. 12-A) which was drawn after the specimen in somewhat inclined condition; the lateral view of body have been redrawn here after another specimen in the right position (Fig. 11A).
Hoplophthiracarus siamensis Aoki, 1965, which was described from Thailand is considered here a subspecies of H. kugohi and will be treated hereafter Hoplophthiracarus kugohi siamensis Aoki, 1959, comb. n. The subspecies is different from the nominate subspecies H. kugohi kugohi Aoki, 1959, in the shorter notogastral setae (RLN 13-19), the shorter interlamellar setae (RLN 16-20), the adanal setae $ad_5$ only slightly longer than $h_1$, and the smaller body size (length of notogaster 341-490 μ). “Hoploph-
thiracarus siamensis" reported by HAMMER (1972) from Tahiti may be the same sub-
species.

Hoplophthiracarus ishikawai sp. n.

[Ishikawa-irekodani]

(Fig. 12)

Diagnosis. (1) Sensillus without swollen part on apex. (2) Median ridge exists
on aspis. (3) Aspis rather flat. (4) Adanal setae \( ad_2 \) shorter than the longest
notogastral setae \( h_1 \). (5) Seta \( c_4 \) a little longer than \( c_9 \). (6) Rostral seta somewhat
shorter than lamellar seta. (7) Aspis narrow, about 1.5× as long as wide.

Measurement. Notogaster (L) 800–950 \( \mu \), notogaster (H) 540–570 \( \mu \), aspis (L) 370–
445 \( \mu \).

Elementary chaetotaxy. ntg: (15+15); g: (9+9); ag: (0+0); an: (2+2), ad: (3+3).
Monodactyle.

Description. Aspis: Aspis rather flat and narrow (1.45× as long as wide), with
a low, but distinct median ridge. Lateral carina never reaching the rim of aspis.
Rostral seta nearly straight and short, a little shorter than lamellar seta. Lamellar
seta comparatively long and thick, almost as the distance between le and il. Inter-
lamellar seta long and thick, 4.0–4.8× as long as le, barbed at least on its apical 2/3,
directed dorsoanteriad and inserted on aspis at an angle of about 45°. Sensillus almost
of equal thickness throughout its length, without swollen head apically; a distinct
barbation found on its apical 1/3. Exobothridial seta very minute and almost invisible.

—Notogaster: Convexity of notogaster weak, especially on the posterior part. Fifteen
pairs of notogastral setae moderately long, nearly straight, sparsely barbed along their
apical 2/3 and pointed at tip, but not sharply; RLN of the setae 15–27 (average 20.3);
seta \( c_4 \) a little longer than \( c_9 \); \( h_1 \) and \( p_{51} \) the longest and \( p_{51} \) the shortest; distance \( h_3 \)-
\( p_{51} \) subequal to \( p_{52}–p_{51} \). Foveolation on the notogastral surface rather fine and well
visible only in inclined aspects.—Genito-anal region: Nine pairs of genital setae have
normal position. Anal and adanal setae weakly barbed. Adanal seta \( ad_2 \) longer than
the longest notogastral setae \( h_1 \) and \( p_{51} \); \( ad_1 \) 1/3 as long as \( ad_2 \).

Type-series. Holotype (NSMT-Ac 4351, on slide): Yuyaguchi, Shuso-gun, Ehime-
the same data as holotype.

Distribution. Japan (Ehime-ken).

Etymology. The species ishikawai was named after Dr. Kazuo ISHIKAWA (Assoc.
Prof. in Matsuyama Shinonome Junior College) who kindly offered the author a good
series of oribatid specimens including the present new species.

Remarks. H. ishikawai is superficially resembles H. kugohi AOKI, 1959, but distin-
guishable from the latter by the larger body size, the presence of median ridge on
aspis, the setiform sensilli and the adanal setae \( ad_2 \) shorter than the longest noto-

*H. nepalensis* Sheals, 1965, has also setiform sensilli, but the organ is attenuating toward the tip, the adanal setae $ad_e$ longer than the longest notogastral setae and the body size is smaller (the length of notogaster 330 µ-500 µ).
Hoplophthiracarus foveolatus sp. n.

[Yoroi-irekodani]

(Fig. 13)

Diagnosis. (1) Foveolation on body surface very clear, well visible on the whole surface. (2) Notogastral setae short (RLN 8-14) and blunt at tip. (3) Aspis broad and strongly convex. (4) Median ridge absent on aspis. (5) Sensillus with a distal oval head.

Measurement. Notogaster (L) 370 (451) 490 μ, notogaster (H) 240 (289) 320 μ, aspis (L) 200 (244) 270 μ, aspis (H) 100-110 μ.

Elementary chaetotaxy. ntg: (15+15); g: (9+9); ag: (1+1); an: (2+2); ad: (3+3). Monodactyle.

Description. ASPIS: Aspis strongly convex, without median ridge; the whole surface, except the lateral region, distinctly foveolate. Lateral carina very short, existing above the bothridial opening just like an eyebrow. Rostral seta short and thin, but somewhat longer and thicker than lamellar seta. Exobothridial seta as long as ro and as thin as le. Interlamellar seta thick, nearly straight and upright, barbed along its apical half and blunt at tip. Sensillus sigmoid bearing a hyaline, rounded head at tip. A small rectangular scale exists behind bothridium.—NOTOGASTER: The whole surface distinctly foveolate even in the region of lappet. The posterior corner of lappet not conspicuously projecting. Fifteen pairs of notogastral setae short, barbed along their apical half and blunt at tip; RLN of the setae: 8-14 (average 11.7); seta c₁-c₃ nearly of equal length; the remaining setae also not so largely different in length from one another. Lyrifissure im located about mid-distance between cp and h₃, sometimes a little closer to cp or h₃.—GENITO-ANAL REGION: Genital as well as ano-adanal plates distinctly foveolate. Genital plate bears 9 setae, among which 3 are inserted on the anterior appendage; the anterioriormost seta of the outer row situated posterior to the posterioriormost seta of the inner row, i.e. the inner and the outer rows of genital setae never overlapping. Anal and adanal setae not so short as notogastral ones, ad₃ a little longer and ad₄ quite longer than the longest notogastral setae; ad₅ half as long as ad₃ and subequal in length to anal setae.


Other collecting data. 5 exs. Mt. Maya, Kobe, Hyogo-ken, 29-V-1969, J. Aoki, from litter (JA1134).

Distribution. Japan (Kanagawa-ken, Wakayama-ken, Hyogo-ken, Sado Island).

Remarks. Hoplophthiracarus robustior Jacot, 1933, appears to be most alike to H.
foveolatus in the deep body color, the strongly foveolate body surface, the vaulted aspis and the short, straight and roughened notogastral setae. The body size is also quite similar in both the species. Hower, *H. robustior* differs from the present new species in having the sensilli without swollen head and the interlamellar setae and notogastral setae c₁ ("II: 1" by JACOT) swollen distally. The notogastral and interlamellar setae seem to be longer than those of *H. foveolatus.*
Genus *Hoplophorella* Berlese, 1923

[Hanabira-irekodani]


**Diagnosis.** (1) Ano-adanal plates with 3 pairs of anal setae and 2 pairs of adanal setae. (2) Notogaster with 15 pairs of setae. (3) Body integument foveolate.

Elementary chaetotaxy. ntg: (15+15); g: (4+4) or (7+7); ad: (1+1); an: (3+3); ad: (2+2). Monodactyle.

**Type-species.** *Holophora cucullatum* Ewing, 1909.

**Distribution.** North America, Italian Somaliland, Japan, Thailand, Flint Is. (S. E. Polynesia), Tchad, Madagascar.

**Remarks.** Segregation of the genus *Hoplophorella* from the related genus *Hoplothiracarus* is not always clear. In a certain species, in which the posteriormost seta on ano-adanal plate is located more or less close to the median margin, generic position of the species depends on the interpretation, whether we consider the seta anal or adanal one. For example, the systematic position of *Hoplophorella zebra* Balogh, 1962, from Madagascar is somewhat doubtful. On the other hand, *Steganacarus brevipilis* Balogh, 1958, from E. Africa is no doubt a member of the genus *Hoplophorella*, because the second posterior seta is apparently inserted outside the line of median trio of setae.

**Key to the Japanese species of the genus *Hoplophorella***

1. Notogastral setae broad and spatulate................................................................. 2
   — Notogastral setae short and thorn-like......................................................... 3

2. Notogaster with anterior hood; notogastral setae broadly leaf-shaped; length of notogaster 360–395 μ .............................................................. *H. cucullata* (Ewing, 1909)
   — Notogaster without anterior hood; notogastral setae narrowly leaf-shaped; length of notogaster 300–339 μ ...................................................... *H. hamata* (Ewing, 1909)

3. Median ridge on aspis moderably developed and arch-shaped; all genital setae fine; all anal setae inserted close together; length of notogaster 520–620 μ ............
   ................................................................. *H. spiniger* sp. n.
   — Median ridge on aspis strongly developed and almost trapezoid in lateral view; some of genital setae broadened and leaf-shaped; an1 remote from an2 and an3; length of notogaster about 450 μ ............................................. *H. cristata* sp. n.

**Hoplophorella cucullata** (Ewing, 1909)

[Hanabira-irekodani]

(Fig. 14)

*Hoploderma cucullatum* Ewing, 1909, p. 133, pl. 6, fig. 35.
**Hoploderma licinophorum** Berlese, 1913, p. 102, pl. 8, fig. 99.

**Hoplophorella cucullata:** Jacot, 1933, p. 249; Aoki, 1959, p. 18, fig. 13; 1977, p. 184, fig. 4.

**Diagnosis.** (1) Notogastral setae broadly spoon-shaped, almost oval. (2) Notogaster with an anterior, distinctly elevated hood. (3) Adanal setae $ad_4$ broadened.

**Measurement.** Notogaster (L) 360–395 $\mu$; notogaster (H) 233–239 $\mu$; aspis (L) 204–210 $\mu$; aspis (H) 90–91 $\mu$.

**Elementary chaetotaxy.** ntg: (15+15); g: (4+4); ag: (0+0)?; an: (3+3); ad: (2+2). Monodactyle.

**Description.** ASPIS: Median ridge distinct, arch-shaped, protruding beyond the dorsal outline of aspis in lateral view. Lateral carina long, but not reaching lateral margin of aspis. Lamellar, interlamellar and rostral setae subequal in length. Ex-

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*Fig. 14. Hoplophorella cucullata* (Ewing, 1909).—A: Lateral. B: Dorsal.
obotheidial seta very minute and hardly visible. Sensillus strongly curved in ?-form.

Integument foveolate except on the lateral parts.—Notogaster: Anterior hood well
developed and distinctly elevated, its posterior part turning over and overhanging the
the dorsal side. Lappet also well developed, but its upper end not forming a distinct
angulation. Fifteen pairs of notogastral setae broadly spoon-shaped, each bearing a
short peduncle and an almost oval, strictly describing, a bowl-shaped distal portion;
the widest part attaining to 2/3 the length of the setae; setae c₁, c₂ and c₃ inserted on
the notogastral hood; cₚ located far backward than usual, so that the distance c₂-cₚ
about 2.7 x as long as c₁-c₃; seta h₃ inserted on the line joining cₚ to pₛₙ. Notogastral
integument distinctly foveolate; the foveolae being separated by interspaces nearly as
wide as the foveolae; but, on the elevated hood, they become smaller or disappear.

Lyrifissure ia located just above seta cₚ and im above h₃.—Genito-anal region: Genital
plates bear 4 pairs of setae nearly equally spaced; no seta could be detected on
the anterior appendages. Three pairs of anal setae subequal in length and weakly
curved forward, an₂ being inserted somewhat closer to an₁ than to an₃. Adanal seta
ad₁ broad and leaf-shaped, but not bowl-shaped as notogastral setae; ad₂ short, straight
and pointed at tip.

Type-locality. Columbia in North America.

Collecting data in Japan. JA63 (2 exs.), JA970 (4 exs.), JA973 (1 ex.), JA975 (1 ex.),
JA992 (1 ex.), JA993 (1 ex.), JA1071 (1 ex.), JA1689 (3 exs.), JA1710 (1 ex.).

Distribution. North America and South Japan.

Remarks. Aoki (1959) reported the species from S. Japan with the figures, but
without description. These figures, however, had some errors in the number of setae:
(1) In the figure in lateral view (Abb. 13-A) exobothridial seta, notogastral seta eₛ,
lyrifissures (ia and im) and genital seta gₛ were not drawn. (2) In the figure in dorsal
view (Abb. 13-B) the notogastral setae h₁ were not drawn. These setae and the
fissures exist in fact as in the corrected figures here presented. The author and the
year "(Wing, 6909)" should also be corrected as "(Ewing, 1909)". The Japanese speci-
mens are fairly smaller than the American (480 μ in notogastral length).

Hoplophorella floridae Jacot, 1933, stat. n.

[Hoso-hanabira-irekodani]

(Fig. 15)

Hoplophorella cucullata floridae Jacot, 1933, p. 250, pl. 21, figs. 18-21.

Diagnosis. (1) Notogastral setae spoon-shaped. (2) Notogaster without anterior
hood. (3) Adanal setae ad₁ broadened.

Measurement. Notogaster (L) 300 (329) 339 μ, notogaster (H) 176 (187) 198 μ, aspis
(L) 158 (170) 184 μ, aspis (H) 67 (72) 78 μ.

Elementary chaetotaxy. ntg: (15+15); g: (4+4); ag: (0+0)?; an: (3+3); ad: (2+2).
Monodactyle.
Description. **Aspis:** Median ridge weakly arched; the dorsal margin of aspis, in lateral view, has a flattish, weak constriction behind the ridge, but no constriction in front of the ridge, so that the dorsal margin of the ridge smoothly connected with the dorsal margin of rostrum. Interlamellar seta decumbent, longer and thicker than the remaining prodorsal setae, being inserted on the anterior end of the low, flattish elevation in the posterior part of aspis. Lamellar seta shorter and thinner than il. Rostral seta thicker than le, bending downward. Exobothridial seta very minute, almost vestigial. Sensillus strongly curled in the form of ?-mark; the distal portion of the organ weakly thickened and roughened. Integument of aspis almost smooth except on the posterior elevation, which shows longitudinal striation; no foveolation found on aspis.—**Notogaster:** The anterior part without hood. Lappet not prominent. Fifteen pairs of notogastral setae broadened distally, spoon-shaped; the widest part at most 1/3 the length of the setae. Distance of the setae _c2-cp_ almost 1.5~1.7× as long as _c2-c_s; seta _h_3 inserted on a level above the line joining _cp_ to _ps_. Lyrifissure

![Image](image-url)

**Fig. 21.** *Hoplophorella floridiae* Jacot, 1933.—A: Lateral. B: Adanal seta _ad_.
C: Notogaster in dorsal view.
ia located just above cp; im located between cp and h, being closer to cp than to h,.

Integument of notogaster foveolate, but the foveolae are indistinct and variable in size.—Genito-anal region: Genital plate with 4 minute setae subequally spaced; no setae could be detected on the anterior appendage. Three anal setae equal in length and shape, weakly bending forward at tip; distance an1-an2 very slightly shorter than an2-an3. Adanal seta ad1 about 9× as long as ad2, being broadened distally like notogastral setae, but minutely pointed at tip. Foveolae almost evanescent.

Type-locality: Florida, N. America.
Collecting data. JA1524 (18 exs.).
Distribution. N. America and Japan.

Remarks. The Japanese specimens are well in accord with Jacot's description and figures of Hoplophorella cucullata floridae, though they are somewhat smaller in body size than the North American specimens. The occurrence of the subspecies in Japan is, however, unreasonable, because we must admit the fact that both Hoplophorella cucullata and its subspecies H. cucullata floridai are distributed together in N. America as well as in Japan. By this reason, H. cucullata floridai should better be treated as a separate species, "Hoplophorella floridai". The clear differences in the presence or absence of notogastral hood, in the shape and position of notogastral setae, in the location of lyrifissures, and in the development of integumental foveolation give support to the separation of the two species. Hoplophorella hamata (Ewing, 1909) and H. obsoletior Berlese, 1923, are also lacking in the notogastral hood and may be close relatives of H. floridai. But their taxonomical statuses are unknown because of the insufficient descriptions. H. scapellata Aoki, 1965 (=H. africana Wallwork, 1967, syn. n.) from Thailand and Tchad also resembles H. floridai in the shape of notogaster and its setae. But it is distinguishable from H. floridai by the longer, more expanded interlamellar setae, the shorter lamellar setae and especially the rostral setae which are longer, more expanded and strongly curved inward; the rostral setae of H. floridai are slender and their mutual distance is nearly as long as the setae. H. glauca Hammer, 1972, from Tahiti differs from H. floridai in the reticulate integument of notogaster and in the latticework-like surface structure of the posterior part of aspis.

Hoplophorella spiniger sp. n.

[Toge-irekodani]

(Fig. 16)

Diagnosis. (1) Notogastral setae short and thorn-like. (2) Notogaster without anterior hood. (3) Median ridge on aspis large and arched. (4) Adanal setae ad, normal and not broadened. (5) Genital setae normal.

Measurement. Notogaster (L) 520–620 μ, notogaster (H) 305–380 μ, aspis (L) 265–320 μ, aspis (H) 130–155 μ.
**Fig. 16.** *Hoplophorella spiniger* sp. n.—A: Lateral. B: Aspis. C: Sensillus. D: Lamellar seta. E: Interlamellar seta. F: Genital and ano-adanal plates.

*Elementary chaetotaxy.* ntg: (15+15); g: (7+7); ag: (1+1); an: (3+3); ad: (2+2). Monodactyle.

*Description.* *Aspis:* Median ridge well developed and arch-shaped, fully occupying in length the area between interlamellar and rostral setae; in the dorsal view, the anterior part suddenly broadened. Behind the median ridge found a shallow transverse groove, on which interlamellar and lamellar setae are inserted and behind which the surface of aspis is provided with several longitudinal wrinkles. Lateral carina long, but never reaching the lateral margin of aspis. Four pairs of setae on aspis (*ro, le, il* and *ex*) nearly equal in length, though *le* somewhat shorter than the remainder; *il* the thickest and *ex* the finest among them. Sensillus curved near the basal as well as the apical part; the apex broadened and strongly roughened or serrated. The integument of aspis with large foveolae, which become however smaller on the posterior part and disappear near the lateral margins.—*Notogaster:* Elongate and rather flat; the posterior part strongly protruding, while the curvature of dorsal side is very weak. Notogastral setae short, thorn-like, not sharply pointed at tip; the setae on the
anterior half of notogaster curving toward posterior direction. Lyrifissure ia located a short distance anteromedian to \( cp \), and im between \( cp \) and \( h \). Notogastral surface densely covered by large foveolae, which become smaller only on lappet.—Genito-anal region: Genital plate provided with 4 setae and on the anterior appendage 3 more setae. Among 3 anal setae the posterior one \( (an_1) \) distinctly shorter than the remaining seta \( (an_2 \text{ and } an_3) \); the distance \( an_1-an_2 \) a little longer than \( an_2-an_3 \). Adanal seta \( ad_1 \) longer than \( ad_2 \), being inserted on the level of \( an_2 \).

**Type-series.** Holotype (NSMT-Ac 9111, in spirit): Omogo Valley, Ehime-ken, 11–IV–1967, J. Aoki, from litter (JA726).—Paratypotype: 1 ex. the same data as holotype.


**Distribution.** Japan (Ehime-ken).

**Remarks.** All the known species arranged in the genus *Hoplophorella* have the notogastral setae which are long enough to be easily recognized under a low magnification. But *Staganacarus brevipilis* Balogh, 1958, from E. Africa bearing short notogastral setae should be included in the genus *Hoplophorella*, because the second posterior pair of setae on ano-adanal plates are enough separated from the median margin of the plate and can not be considered “anal”, but “adanal” setae \( (ad_1) \). *Hoplophorella brevipilis* (Balogh, 1958), comb. n., is different from the present new species in having the more fine and weak notogastral and prodorsal setae and the more short and thick sensilli; the notogaster of *H. brevipilis* is almost globose and far strongly swollen dorsally than in *H. spiniger*.

**Hoplophorella cristata** sp. n.

[Tosaka-irekodani]

(Fig. 17)

**Diagnosis.** (1) Median ridge of aspis very conspicuous and trapezoidal in lateral view. (2) Four setae among genital setae leaf-shaped. (3) Notogaster without anterior hood. (4) Notogastral setae short and thorn-like. (5) Adanal setae \( ad_1 \) normal, not broadened.

**Measurement.** Notogaster (L) 452 μ, notogaster (H) 280 μ, aspis (L) 270 μ, aspis (H) 155 μ.

**Elementary chaetotaxy.** ntg: \( (15+15) \); g: \( (7+7) \); ag: \( (?) \); an: \( (3+3) \), ad: \( (2+2) \). Monodactyle.

**Description.** Aspis: Median ridge conspicuously developed, protruding in lateral view in a trapezoidal shape, reminding us of a beak of the birds “hornbills”, the
posterior part of the ridge makes almost a right angle; in dorsal view, the ridge is found to be very broad and nearly rectangular with rounded posterior part. Lateral carina very fine and weak, especially in the anterior half; in addition to it, a short carina exists behind bothridium and 2 long, weak carinae in the lateral part of aspis. Interlamellar setae shorter and thinner than il. Rostral setae slightly longer than il, curving downward. The surface of aspis densely covered by large foveolae except in the lateral part.—NOTOGASTER: The dorsal side only weakly swollen. In lateral view, the dorsal margin and the anterior margin of notogaster make a comparatively sharp angle. Fifteen pairs of notogastral setae short, stiff and almost straight. Lyrifissure ia located median or anteromedian to seta cp; im between setae cp and h4, being equally distant from the setae or closer to h4. Integument densely covered by large foveolae except on lappet, where the foveolae become smaller.—GENITO-ANAL REGION: Genital plate provided with 4 setae along the median margin and 3 setae on the anterior appendage; the former 4 setae broadened and leaf-shaped,
while the latter 3 are normal. Ano-adanal plate strongly protruding; anal setae \( an_1 \) far distant from the couple of the setae \( an_2 \) and \( an_3 \); the setae a little shorter than \( ad_1 \) and distinctly longer than \( ad_2 \).

**Type-specimen.** **Holotype** (NSMT-Ac 9113, in spirit): Mt. Yuwan-dake, Amami-Ohshima Island, 8–1–1973, H. SUZUKI, from litter and soil in a tree hole and under a rock (JA2198).

**Distribution.** Japan (Amami-Ohshima Is.)

**Remarks.** The present new species similar to the foregoing species, *H. spiniger*, in the form of notogaster and its setae, but is easily distinguishable from the latter by the large, trapezoid median ridge on *aspis* and the presence of leaf-shaped genital setae.

**Genus Atropacarus** Ewing, 1917

[Arame-irekodani Zoku]

*Atropacarus* Ewing, 1917, p. 131; Balogh, 1972, p. 43.

**Diagnosis.** (1) Ano-adanal plates with 4 pairs of anal setae closely inserted and 1 pair of adanal setae. (2) Notogaster with more than 15 pairs of setae. (3) Dorsal carina absent on notogaster. (4) Sensillus cord-shaped and strongly curled at tip. (5) Integument foveolate. (6) Ano-adanal plate strongly convex.

**Elementary chaetotaxy.** ntg: \((16+16)\) or \((17+17)\); g: \((7+7)\); ag: \((1+1)\); an: \((4+4)\); ad: \((1+1)\). Monodactyle.

**Type-species.** *Hoplophora stricula* C. L. Koch, 1836.

**Distribution.** Europe and Japan.

**Remarks.** Van der Hammen (1959) treated the genus *Atropacarus* as a synonym of the genus *Steganacrus* Ewing, 1917, and most of the modern authors followed his conception, having placed the common species, *striculus* (the type species of *Atropacarus*), under the genus *Steganacarus*. Balogh (1972) revived, however, the genus *Atropacarus*. He distinguished this genus from the genus *Steganacarus* by the presence of more than 15 pairs of notogastral setae. Although evaluation of the number of the notogastral setae in the level of generic separation is still questionable, the trial may be admitted as a step in the classification of the family Phthiracaridae. Ewing (1917) considered the absence of median ridge (median carina) on *aspis* as one of the characters of the genus *Atropacarus*. But, the ridge in *striculus* seemed to be unnoticed, because of its gently sloping edge and the rough integument similar to that of the most part of *aspis*. At least, *Steganacarus serratus* Feider et Suciu, 1957 and *S. phyllophorus* (Berlese, 1904) should be included in the genus *Atropacarus*.

**Atropacarus striculus** (C. L. Koch, 1836)

[Arame-irekodani]

(Fig. 18: A–D)
Hoplophora stricula C. L. Koch, 1836, fasc. 2, no. 10; Nicolet, 1855, p. 472, pl. 10, fig. 5.

Hoplodermma striculum: Michael, 1888, p. 563, pl. 51, fig. 7; Oudemans, 1915, p. 231; Willmann, 1931, p. 190, fig. 346.

Hoplodermma striculum: Sellnick, 1928, p. 40, fig. 91.

Steganacarus striculum: Feider et Suciu, 1957, p. 33, pl. 12, figs. 101–110; Fujikawa, 1972, p. 132, fig. 5; Aoki, 1965, p. 299, figs. 13-12-E~G; 1977, p. 185, fig. 7.

Stegenacarus striculum: Aoki, 1958, p. 174, fig. 4.

Stegenacarus senex Aoki, 1958, p. 172, fig. 3.

Diagnosis. (1) Notogaster with 16 pairs of setae. (2) Notogastral setae almost straight, rigid, blunt at tip and roughened apically. (3) Anal setae long and curved forward.


Elementary chaetotaxy. ntg: (16+16); g: (7+7); ag: (1+1); an: (4+4); ad: (1+1). Monodactyle.

Description. Aspis: Median ridge is present, but it is not distinctly projecting beyond the dorsal margin of aspis in lateral view; in anterior or posterior view of aspis, the surface of aspis concave on both sides of the median ridge. Lateral carina absent. Rostral seta weakly or sometimes strongly curved downward. Lemellar seta almost straight; le 2/3 as long as ro, blunt at tip and barbed along 3/4 of its length. Exobothridial seta fine and short. Sensillus sigmoid near base and strongly curved distally, being densely barbed on its distal half. Integument of aspis except lateral parts distinctly foveolate.—Notogaster: Sixteen pairs of notogastral setae present; a pair of neotrichial setae (n) inserted between h₁ and c₀; the setae do not represent setae f₁, because a pair of setal pores indicating vestigial setae f₁ exist between h₁ and n. All the setae rigid, almost straight and roughened along their apical 1/2~1/3; their RLN 10~15. Lyrifissure ia situated above c₀; im lateroposterior to c₀, mostly closer to c₀ than to h₀. Whole integument distinctly foveolate.—Genito-anal region: Genital plate with 7 setae along the median ridge, among which the posterior 3 setae are somewhat longer than the remainder and the anterior 2 setae inserted on the anterior appendage. Anal setae long, attenuating and gently curving forward distally; the posterior 2 setae (an₁ and an₂) distinctly longer than the anteriors (an₃ and an₄). Adanal seta blunt at tip and subequal or a little shorter than the anterior anal setae.

Type-locality. Regensburg, Germany.

Collecting data in Japan. JA9 (3 exs.), JA140 (1 ex.), JA143 (1 ex.), JA154 (17 exs.), JA191 (1 ex.), JA575 (2 exs.), JA592 (2 exs.), JA597 (24 exs.), JA606 (7 exs.), JA772 (1 ex.), JA984 (1 ex.), JA1107 (9 exs.), JA1191 (3 exs.), JA1292 (1 ex.), JA1370 (4 exs.), JA1387 (8 exs.), JA1693 (1 ex.), JA2219 (2 exs.), JA2221 (2 exs.), JA2226 (23 exs.), JA2227 (1 ex.), JA2230 (3 exs.), JA2290 (1 ex.), JA2291 (1 ex.).

Distribution. Europe and Japan (Hokkaido, Tochigi-ken, Gumma-ken, Niigata-ken, Nagano-ken, Yamanashi-ken, Tottori-ken, Ehime-ken, Tsushima Is., and Yaku Is.).

*Atropacarus striculus* (C. L. Koch, 1836) var. *clavatus* var. n.

[Kombo-aram-irekodani]

(Fig. 18: E)

**Diagnosis.** Notogastral setae clavate and strongly barbed apically.

**Measurement.** Notogaster (L) 340-405 μ, notogaster (H) 190-225 μ, aspis (L) 180-195 μ.

**Collecting data.** 2 exs.: Panorama station of Mt. Ishizuchi, Ehime-ken, Japan, 6-VIII-1969, K. Morikawa, from litter (JA2219); 1 ex.: Hatcho-zaka of Mt. Ishizuchi, Ehime-ken, 8-VIII-1969, K. Morikawa, from litter (JA2229); 2 exs.: Panorama station of Mt. Ishizuchi, 14-VIII-1969, K. Morikawa, from litter (JA2231); 1 ex.: Between the
1st and 2nd rest places, Mt. Ishizuchi, 9-VIII-1969, K. Morikawa, from litter (JA2232).

Distribution. Japan (Ehime-ken).

Remarks. Among the specimens collected at Mt. Ishizuchi were found several specimens which have notogastral setae different in shape from those of the typical *A. striculus*. The specimens were considered at first to represent a new subspecies of *A. striculus*, but they should be treated as a variety of *A. striculus*, because both the forms were obtained from the same litter sample (JA2219).

Family **ORIBOTRITIIDAE** Grandjean, 1954

[Tate-irekodani Ka]

**Diagnosis.** (1) Genito-anal region narrow. (2) Anal plate separated from ventral plate by anoventral suture. (3) Notogastral surface glabrous, without distinct foveolation.

**Elementary chaetotaxy.** ntg: (14+14) or (15+15); g: (5+5)~(11+11); ag: (2+2) (5+5); an: (0+0)~(3+3); ad: (2+2), (3+3) or (4+4). Monodactyle or tridactyle.


Key to the Japanese genera of the family Oribotritiidae

1. Genital and ventral plates separated, at least partly, by a longitudinal suture... 2  
   — Genital and ventral plates fused, without suture separating them .............................. **Austrotritia** Sellnick, 1959

2. Genital and ventral plates completely separated by a suture ................................. 3  
   — Genital and ventral plates incompletely separated, both the plates being fused partly in anterior part...................................................... **Indotritia** Jacot, 1925

3. Palp 5-segmented; anogenital cleft present; bothridial scale situated above bothridium.............................................................. **Oribotritia** Jacot, 1925  
   — Palp 3-segmented or 4-segmented; anogenital cleft absent; bothridial scale situated below bothridium .................................................. 4

4. Legs monodactyle .............................................................. **Protoribotritia** Jacot, 1938  
   — Legs tridactyle ...................................................................... 5

5. Four pairs of adanal setae; aspis with 1 lateral carina on each side; genital plate with 7-9 setae .......................................................... **Maerkelotritia** Hammer, 1967  
   — Two or three pairs of adanal setae; aspis without lateral carina; genital plate with 6 setae .............................................................. **Mesotritia** Forsslund, 1963

Genus **Oribotritia** Jacot, 1925

[Tate-irekodani Zoku]

Oribotritia Jacot, 1925, p. 83, 1930, p. 253; 1933, p. 258; Hammen, 1959, p. 34; Mäkel, 1964, p. 18;

Tritia Berlese, 1833, fasc. 6 (1).

**Diagnosis.** (1) Suture separating genital and ventral plates complete. (2) Ano-genital cleft present. (3) Bothridial scale situated above bothridium. (4) Aspis with a lateral carina on each side. (5) Legs tridactyle. (6) Palp 5-segmented.

**Elementary chaetotaxy.** ntg: (14+14); g: (7+7), (8+8) or (9+9); ag: (2+2) or (3+3); an: (0+0) (3+3); ad: (2+2) or (3+3). Tridactyle.

**Type-species.** Phthiracarus berlesei Michael, 1898.

**Distribution.** Europe, USSR, E. Africa, S. America, Hawaii and Japan.

**Remarks.** Aoki (1959) described Oribotritia mollis from South Japan, but my re-examination of the type material revealed that the species should be placed in the genus Indoritia and is identical with I. javensis (Sellnick, 1923).

**Table 2.** Comparison among the distinguishing characters of the five related species of the genus Oribotritia.

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**Table 3.** Chaetotaxies (solenidia excluded) of palp and legs in 3 Japanese species of Oribotritia.

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Oribotritia fennica Forsslund et Markel, 1963

[Kita-irekodani]

(Fig. 19)

Diagnosis. (1) Notogastral setae strong and erect. Sensillus almost glabrous. (3) Eight pairs of genital, 3 pairs of aggenital and 3 pairs of anal setae. (4) Three setae on palpal femur and 2 setae on palpal tibia.

Measurement. Notogaster (L) 980-1675 μ, notogaster (H) 640-1050 μ, aspis (L) 540-800 μ. On the other measurements see Table 4.

Elementary chaetotaxy. ntg: (14+14); g: (8+8); ag: (3+3); an: (3+3); ad: (3+3). Tridactyle.

Description. Aspis: Lateral carina distinct. All prodorsal setae glabrous; rostral setae as long as their mutual distance, being curved downward and inward, so that their tips often touching each other; lamellar setae decumbent, a little longer than ro; interlamellar setae the longest, erect, nearly straight, being 2.5-3.2x as long as their mutual distance and 1.7-2.2x as long as le; distance il-il shorter than il-le.

Table 4. Measurements (in μ) of body setae and their mutual distances in 4 specimens of *Oribotritia fennica* collected in Hokkaido, N. Japan.

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<td>100–115</td>
<td>91–120</td>
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Exobothridial seta straight and a little shorter than *le*. Sensillus slender, glabrous and almost of equal thickness throughout its length except the apex. The posterior part of aspis shows light spots of irregular shape and arrangement.—**NOTOGASTER**: Fourteen pairs of notogastral setae fairly strong, long and erect; their relative lengths to notogaster (RLN) 11–24, mostly 19–23; but even the longest setae shorter than interlamellar setae.—**GENITO-ANAL REGION**: Genital aperture is an elongate shield; each plate with 8 setae, of which 4 are inserted on the anterior appendage. Aggenital area with 3 long setae (exceptionally 2 or 4 on either side of the plates); usually *ag₂* is the longest and *ag₁* the shortest; *ag₃* often reaching insertion of *ag₂*. Anal plate with 3 minute setae; *an₂* inserted closer to *an₃* than to *an₁*; ratio in distance *an₁-an₃/an₂-an₃*: 1.9–3.17 (mostly 2.2–2.5). Adanal plate with 3 setae; *ad₁* distinctly shorter than *ad₂* or *ad₃*; *ad₂* inserted closer to *ad₃* than to *ad₁*; ratio *ad₁-ad₂/ad₂-ad₃*: 1.4–2.4; usually *an₁* located in front of *ad₁*, *an₂* in front of *ad₂*, and *an₃* in front of *ad₃*; but, one of paired setae of *an₃* rarely comes behind *ad₃*. Adanal fissures *iad* located in a level between *an₂* and *an₃*.—**INFRACAPITUM**: Setae *a*, *m* and *h* very minutely barbed; *h* as long as, or a little longer than, seta *m*; *h* reaching insertion pores of adoral setae or tips of adoral sclerite at most, never reaching tip of adoral setae; seta *a* somewhat shorter than *m*; seta *elm* shorter than half the length of *a*.

**Type-locality.** Nylandia in Finnland.


**Distribution.** Finnland, Sweden and Japan.
Oribotritia tokukoae Aoki, 1973

(Fig. 20)


Diagnosis. (1) Two pairs of aggenital setae. (2) Eight pairs of genital setae. (3) Three pairs of anal setae. (4) Very fine and short notogastral setae. (5) Slender, needle-shaped sensilli.

Measurement. Notgaster (L) 2160 (2220) 2320 \( \mu \), notogaster (H) 1460 (1476) 1500 \( \mu \), aspis (L) 1000 (1092) 1200 \( \mu \). Body setae: ro 110-165 \( \mu \), le 110-130 \( \mu \), il 170-280 \( \mu \), ntg 90-160 \( \mu \).

Elementary chaetotaxy. Body setae: ntg: (14+14); g: (8+8); ag: (2+2); an: (3+3); ad: (3+3). Palpal setae: (0-2-0-3-9). Leg setae: I (1-4-5-5-25?), II (1-4-4-4-19), III (3-3-3-3-16), IV (3-2-2-3-12). Solenidia: I (2-1-3), II (1-1-2), III (1-1-0), IV (1-1-0).

Description. Aspis: A little longer than wide. Each side with a lateral carina ending posteriorly in the level of insertion pore for lamellar seta. Lateral rim reaching the anterior margin of rostrum. Aspal setae thin and smooth; their relative length: \( il > ro > la \) (The original description was incorrect in this regard). Exobothridial seta nearly as long as lamellar seta. Sensillus setiform or needle-shaped, being almost equal in thickness throughout its length. Bothridial scale rounded triangular, being situated above and behind bothridial opening. Fine, longitudinal striations on the anterior part of aspis. Many irregular light spots on the posterior part and near insertion of lamellar setae.—Notogaster: Comparatively low for its length. Fourteen pairs of notogastral setae fine, short and weakly curved; even the longest setae attain to 1/10 the length of notogaster. Insertion pore of vestigial seta \( f_2 \) situated anterior to \( h_1 \). Lyrifissure ia located under \( cp \), and \( ip \) in front of \( h_1 \).—Genito-anal region. Genital plate provided with 8 short setae (3 in the anterior and 5 in the posterior group). Two pairs of aggenital setae very short. Anal and adanal plates each with 3 setae; \( an_1 \) located in a level between \( ad_1 \) and \( ad_2 \); \( an_2 \) usually between \( ad_2 \) and \( ad_3 \). Adanal fissure iad which was not drawn in the original figure is situated in a level between \( ad_2 \) and \( ad_3 \) near the lateral edge of adanal plate.—Infracapitulum: Setae a, m and h long and sparsely barbed. Setae or densely and minutely roughened; or1 curved and rather blunt at tip. Seta elm a little longer than 1/2 of seta a. Palpal femur only with 2 setae; palpal tibia with 3 setae.—Legs: Solenidia on genua and tibiae of legs I~IV all accompanied each by a short seta. On tarsus I, \( \omega_1 \) and \( \omega_2 \) situated almost side by side nearly mid-distance along the length of tarsus; \( \omega_3 \) inserted closer to the proximal end of tarsus; \( \omega_2 \) the longest, with a fine tip; relative length of them—\( \omega_1 : \omega_2 : \omega_3 = 1.8 : 3.3 : 1 \).

Type-locality. Mt. Poroshiri in Hokkaido, N. Japan.

Collecting data. JA1365 (6 exs.), JA1366 (3 exs.), JA2195 (21 exs.).

Distribution. Japan (Hokkaido).
Remarks. *Oribotritia tokukoae* resembles the following 4 species: *O. fennica* Forslund et Märkel, 1963; *O. berlesei* (Michael, 1898); *O. storkani* Feider et Suciu, 1957; *O. hermanni* Grandjean, 1967. As shown in Table 2 the anogenital chaetotaxy (8-2-3-3) is peculiar to *O. tokukoae*. The aggenital setae of *O. tokukoae* are very minute, while those of the other species are so long enough, that *ag*₁ reaches the pore of *ag*₂. The adanal fissures of *O. tokukoae* are situated in a level behind setae *ad*₃, while those of the remaining species are located in front of *ad*₃.

**Oribotritia chichijimensis** sp. n.

[Chichijima-irekodani]

(Fig. 21)

**Diagnosis.** (1) Eight pairs of genital, 2 pairs of aggenital and 2 pairs of anal setae. (2) Palpal femur with 4 setae. (3) Lamellar and interlamellar setae shorter than rostral setae. (4) Sensillus slightly thickened distally with a hyaline capsule.

**Measurement.** Notogaster (L) 1010-1340 μ, notogaster (H) 740-840 μ, aspis (L) 560-670 μ, the longest notogastral setae 130-160 μ.

**Elementary chaetotaxy.** ntg: (14+14); g: (8+8); ag: (2+2); an: (2+2); ad: (3+3).

**Leg solenidia:** I (2-1-3), I₁ (1-1-2), I₁₁ (1-1-0), IV (1-1-0). Heterotridactyle.

**Description.** Aspis: A single lateral carina on each side. Lateral rim reaching anterior end of aspis. Four pairs of prodorsal setae thin, with a fine tip; rostral, lamellar and interlamellar setae bending downward and inward; exobothridial seta nearly straight; their relative length: ex>ro>in>le; la<le-le; le shorter than half the length of ex. Sensillus has an axis attenuating sharply toward the tip, but it bears a hyaline capsule distally, so that the distal part of sensillus seems to be very slightly thickened. The posterior part of aspis shows an irregular integumental pattern of light and dark colors; several light spots found near and outside rostral setae.—Notogaster: Fourteen pairs of notogastral setae short, fine and weakly bending; the longest setae 130-140 μ (RLN=11.8-12.9). Lyrifissure is located below *cp* and *ip* in front of *hₜ*.—Genito-anal region: Genital plate bears 8 setae, 4 in the anterior and the remaining 4 in the posterior group (One paratopotype specimen has 9 setae on the left genital plate). Two aggenital setae on each side, the posterior one (*ag*₂) being longer than the anterior one (*ag*₁). Anal plate bears 2 short setae anteriorly; *an*₁ situated usually anterior to the level of *ad*₃. Three adanal setae on each side also short; *ad*₂ inserted closer sometimes to *ad*₁, sometimes to *ad*₃; *ad*₃ located nearly in the level of *iad*, usually somewhat posterior to the latter.—Infracapitulum: setae *a*, *m* and *h* long and very minutely barbed; seta *h* the longest, almost reaching the tip of setae *or*₂ and *or*₃; setae *a* and *m* subequal in length, about 1/1.5-1/1.7 as long as *h*; seta *elm* half as long as *a*, or a little more short; seta *or*₁ distinctly barbed, while *or*₂ and *or*₃ are weakly barbed. Palpal femur with 4 setae; solenidion on palpal tarsus very weakly bending distally or almost straight.—Legs: All solenidia on genua and
tibiae of legs I-IV, except solenidion on tibia I, each accompanied by a short seta; the accompanying seta of solenidion on tibia I is very long, being more than twice as long as the solenidion. On tarsus I, \( \omega_1 \) situated nearly mid-distance along the length of tarsus, slightly bending toward proximal direction; \( \omega_2 \) inserted distally of \( \omega_1 \), being long, whip-like and twice as long as \( \omega_1 \); \( \omega_3 \) inserted proximally of \( \omega_1 \), being shorter than half the length of \( \omega_1 \); distance \( \omega_1-\omega_2 \) and \( \omega_1-\omega_3 \) nearly equal; \( \omega_3 \) distant from the proximal end of tarsus only for its length.


**Distribution.** Japan (Bonin Islands).

**Remarks.** As in the case of the other species of the genus *Oribotritia*, it is also difficult to find, without dissection, distinguishing characters of the present new species. By separate mounting on slides of mouth parts and legs the peculiar chaetotaxies on palps and legs are exposed; 4 setae on palpal femur, 32 setae on tarsus I, 16 setae on tarsus IV, and 4 setae on tibia III. The combination of 2 aggenital and 2 anal setae setae on each side is also a feature peculiar to the species.

**Genus Indotritia** Jacot, 1929

[Nanyo-irekodani Zoku]


**Diagnosis.** (1) Fissure separating genital and ventral plates is incomplete, both the plates being fused anteriorly. (2) Aspis with 2 lateral carinae on each side. (3) Palp 5-segmented. (4) Palpal femur and genu immovably hinged. (5) Anal and adanal plates separated by a suture. (6) Anogenital cleft present. (7) Ventral plica with terminal sinus. (8) Tarsi tridactylous. (9) Three setae each on trochanter III and IV. (10) Bothridial scale prominent, dorsal in position to bothridium. (11) Dense striation on the anterior part of aspis.

**Elementary chaetotaxy.** ntg: (14+14); g: (9+9); ag: (2+2) or (3+3); an: (2+2) or (1+1); ad: (2+2) or (3+3). Tridactyle.

**Type-species.** *Tritia krakatauensis* Sellnick, 1923.

**Distribution.** Krakatau Is. of Indonesia, Thailand, Japan, New Zealand, Peru, N.
America, Yugoslavia and S. Africa.

Remarks. The following species have hitherto been known as the members of the genus *Indotritia*: *I. krakatauensis* (SELLNICK, 1924); *I. krakatauensis consimilis* MÄRKL, 1964; *I. javensis* (SELLNICK, 1923); *I. carolinae* (JACOT, 1930); *I. acanthophora* MÄRKL, 1964; *I. sellnicki* AOKI, 1965: *I. aotearoana* RAMSAY, 1966. The seven forms mentioned above can be distinguished from one another by the number of setae on the genito-anal region and some other features as shown in Table 5. Comparison in the table shows that *I. aotearoana* is peculiar in many characters: Anal setae and aggenital cleft (tr) are completely lacking; the sensilli are barbed and not pointed apically; the palps are 4-segmented, while those of the other species are 5-segmented as far as known, and the aspis bears only a single carina on each side. Thus, the systematic position of *I. aotearoana* must be reconsidered in future. The only reason, by which the species is included in the genus *Indotritia*, is the presence of incomplete suture partly separating genital and aggenital fields. The species of the genus *Indotritia* seem to have 14 pairs of notogastral setae as ascertained in *I. krakatauensis consimilis*, *I. acanthophora*. In the original description of *I. sellnicki*, AOKI (1965) gave the figure of the species only with 11 pairs of notogastral setae. But, re-examination of the type specimen revealed that it had 14 pairs of the setae. The setae $c_3$, $d_3$ and $h_3$ had been overlooked, because the type specimens were dark-colored. In the original figure of *I. krakatauensis* only 12 pairs of notogastral setae were drawn. SELLNICK (1924) must have overlooked setae $c_3$ and $h_2$.

Table 5. Distinguishing characters of seven species of *Indotritia*.

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<th></th>
<th>an</th>
<th>ad</th>
<th>ag</th>
<th>g</th>
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<th>il</th>
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<td>2</td>
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<td>3</td>
<td>2-3</td>
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<td>distinct</td>
<td>&gt;la</td>
<td>smooth</td>
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<tr>
<td><em>I. javensis</em> (from Java)</td>
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<td>2</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>smooth</td>
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<td>lacking</td>
<td>=la</td>
<td>barbed</td>
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</table>

*Indotritia javensis* (SELLNICK, 1923)

[Jawa-irekodani]

(Figs. 22-23)


*Oribotritia mollis* AOKI, 1959, p. 19, fig. 14; 1977, p. 186, fig. 9.

Diagnosis. (1) Interlamellar setae longer and thicker than lamellar setae. (2) Anal plate with 1 and adanal plate with 3 setae. (3) Notogastral seta $c_3$ inserted very close to the lateroanterior margin of notogaster.
**Measurement.** Notogaster (L) 585 (727) 845 μ, notogaster (H) 490 (610) 715 μ, aspis (L) 355 (403) 450 μ.

**Elementary chaetotaxy.** ntg: (14+14); g: (9+9); ag: (3+3); an: (1+1); ad: (3+3). Tridactyle.

**Description.** **Aspis:** Two lateral carinae on each side; the anterior one stronger than the posterior one. Anterolateral margin of aspis in dorsal view not smoothly rounded, but rostrum weakly protruding. An weak swelling exists on the anterior part around rostral setae; the part surrounding the swelling finely and densely striated.

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**Fig. 22.** *Indotritia javensis* (SELLNICK, 1923).—A: Lateral. B: Genito-anal region. C: The posteriormost part of ano-adanal region and terminal sinus of notogaster. D: The anteriormost part of genital aperture. E: Aspis. F: Leg I.
Interlamellar setae erect, longer than their mutual distance and distinctly thicker and longer than lamellar setae which are weak and decumbent; rostral setae somewhat shorter than lamellar ones, but thicker than these; they are situated close together, so that the mutual distance is distinctly shorter than the setae. Sensillus setiform, smooth, pointed apically; the exposed portion slightly longer than interlamellar seta. Bothridial scale prominent, dorsal in position to bothridium.—**Notogaster**: Strongly arched in lateral view; the value height/length of notogaster 0.80–0.88. Fourteen pairs of notogastral setae fairly strong, weakly bending forward; seta $c_4$ inserted close to the anterolateral margin of notogaster; the distance from the margin is about 1/4 the length of the setae.—**Genito-anal region**: The suture incompletely separating genital and aggenital fields, reaching from behind the level between $g_5$ and $g_7$. Among the 9 pairs of genital setae, 4 pairs are located on genital plates and 5 pairs on the anterior appendages. Aggenital field bears 2 or 3 setae, $ag_1$ being inserted near the anterolateral corner of the field. Aggenital cleft (tr) about half the length of the width of aggenito-adanal plate. Anal plate bears only a single seta near the anterior end of the plate. Among three pairs of adanal setae, $ad_1$ more or less closer to $ad_5$ (according to Grandjean's notation). A small $iad$ located in a level between $ad_2$ and $ad_1$ on each side.—**Palp**: Palp 5-segmented; femur and genu separated, but they are immovably hinged. Palpal chaetotaxy 0–2–0–2–10. Eupathidia $ul'$ and $sl'$ fused basally. Seta $d$ longer than cm. Tarsal solenidion curved on apex.—**Legs**: Chaetotaxy of total setae; I (1–4–7–6–22), II (1–4–5–4–18), III (3–2–4–4–12), IV (3–2–3–4–11). Solenidial chaetotaxy: I (0–0–2–1–3), II (0–0–1–1–2), III (0–0–1–1–0), IV (0–0–1–1–0). All solenidia on genua and tibiae accompanied each by a short seta.

**Type-locality.** Java.

**Collecting data.** JA1551 (1 ex.), JA1553 (1 ex.), JA1715 (8 exs.), JA2190 (2 exs.), JA2293 (2 exs.), JA2294 (2 exs.).

**Distribution.** Java and Japan (Niigata-ken, Miyake Island, Yaku Island, Ishigaki Island).

**Remarks (1).** The present species is distinguishable from any other congeners by (1) the genito-anal region bearing 1 anal and 3 adanal setae, (2) the interlamellar setae distinctly thicker and longer than lamellar setae, and (3) the strongly swollen notogaster. The number of aggenital setae of *I. javensis* seems to be variable within the species. The specimens from the type locality (Java) and those from Niigata-ken (Northern Japan) have 2 pairs of aggenital setae, while the specimens collected in Yaku Island (South Japan) have 3 pairs of the setae. No important difference could be found among these 3 forms to segregate them as separate species. At first, only the specimens from Yaku Island with 3 pairs of aggenital setae were at my hand and I considered to separate them as a new subspecies from the form of Java with only 2 pairs of aggenital setae, as Märkel (1964) did in the case of *Indotria krakatauensis* and *I. krakatauensis consimilis*. But, the later discovery of the specimens with 2 pairs of the setae in Niigata-ken located far in North of Yaku Island stopped me from creating a new subspecies.
Fig. 23. *Indotritia javensis* (Sellnick, 1923) (=the holotype specimen of *Oribotritia mollis* Aoki, 1959).—A: Notogastral seta. B: Tarsus IV. C: Genito-anal region. D: Sensillus and bothridial scale.

*Remarks (II).* Having re-examined the holotype specimen of *Oribotritia mollis* Aoki, 1959, I found that this species belonged to the genus *Indotritia* and, almost without doubt, to the species, *Indotritia javensis*. Because the original drawings of *O. mollis* was not correct in part, some structures have been redrawn; the sutures separating genital and aggenital fields is incomplete anteriorly; the aggenital field on each side bears 3 setae (only 2 setae were indicated in the original figure); the notogastral setae are thicker and more bending than those in the original figure. After these corrections, it becomes almost certain that *O. mollis* is identical with *I. javensis*. Only the number of genital setae remains questionable: I could detect only 6 pairs of setae in the genital region.

**Genus Austrotritia Sellnick, 1959**

*Minami-irekodani Zoku*


*Diagnosis.* (1) Genital and ventral plates completely fused. (2) A long, oblique ano-genital cleft (trv) found on ventral plate. (3) Famulus on tarsus I associated with $\omega_2$. (4) Aspis without posteromedian apodeme. (5) Bothridial scale lies above bothridium. (6) Posterior part of anal plate without seta.

*Elementary chaetotaxy.* Body setae: ntg: (14+14); g: (8+8), (9+9) or (11+11); ag: (2+2), (3+3) or (5+5); an: (1+1), (2+2) or (0+0); ad: (3+3). Leg setae: Setae on
Table 6. Comparison of important features among the species of Austrotritia.

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<th>A. lebroneci saraburiensis</th>
<th>A. briani</th>
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<tr>
<td>dentata</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3-3-4</td>
</tr>
</tbody>
</table>

1: Genital setae (nos. of setae on each side) 9
2: Aggenitel setae 10: Coxa III (nos. of setae)
3: Anal setae 11: Coxa IV ( )
4: Adanal setae ( ) 12: Seta " of tarsus IV (1=swollen, 0=not swollen)
5: Lateral carinae (nos. of carinae on each side) 13: Barbation on claws (1=present, 0=absent)
6: Position of \( p_s \) (2=high, 1=not so high) 14: Exobothridial seta (1=distinct, 0=vestigial)
7: Position of \( w_1 \) on tarsus I in relation to \( w_0 \) (2=far distal, 1=close together) 15: Rostral margin (2=serrate, 1=smooth)
8: Solenidion on tarsus II (2=coupled with setae \( ft \), 1=one solenidion coupled with \( ft \), 0=not coupled with \( ft \))

Table 7. Leg chaetotaxies of 5 species of the genus Austrotritia.

<table>
<thead>
<tr>
<th>Species</th>
<th>Total Setae</th>
<th>Solenidia</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. kinabaruensis</td>
<td>1-4-5-5-21</td>
<td>2-1-3</td>
</tr>
<tr>
<td>A. lebroneci saraburiensis</td>
<td>1-4-7-6-21</td>
<td>2-1-3</td>
</tr>
<tr>
<td>A. ishigakiensis</td>
<td>1-4-6-6-24</td>
<td>2-1-3</td>
</tr>
<tr>
<td>A. saraburiensis</td>
<td>1-4-6-6-23</td>
<td>2-1-3</td>
</tr>
<tr>
<td>A. lebroneci</td>
<td>1-4-6-6-21</td>
<td>2-1-3</td>
</tr>
<tr>
<td>A. ishigakiensis</td>
<td>1-4-5-5-18</td>
<td>2-1-3</td>
</tr>
<tr>
<td>A. saraburiensis</td>
<td>1-4-5-5-18</td>
<td>2-1-3</td>
</tr>
<tr>
<td>A. lebroneci</td>
<td>1-4-5-4-22</td>
<td>2-1-3</td>
</tr>
<tr>
<td>A. ishigakiensis</td>
<td>1-4-5-4-18</td>
<td>2-1-3</td>
</tr>
<tr>
<td>A. saraburiensis</td>
<td>1-4-5-4-18</td>
<td>2-1-3</td>
</tr>
<tr>
<td>A. lebroneci</td>
<td>1-4-5-4-18</td>
<td>2-1-3</td>
</tr>
<tr>
<td>A. ishigakiensis</td>
<td>1-4-5-4-18</td>
<td>2-1-3</td>
</tr>
<tr>
<td>A. saraburiensis</td>
<td>1-4-5-4-18</td>
<td>2-1-3</td>
</tr>
<tr>
<td>A. lebroneci</td>
<td>1-4-5-4-18</td>
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</tr>
<tr>
<td>A. ishigakiensis</td>
<td>1-4-5-4-18</td>
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<td>A. saraburiensis</td>
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<td>A. lebroneci</td>
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<td>A. ishigakiensis</td>
<td>1-4-5-4-18</td>
<td>2-1-3</td>
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<tr>
<td>A. saraburiensis</td>
<td>1-4-5-4-18</td>
<td>2-1-3</td>
</tr>
</tbody>
</table>

trochanter I-II-III-IV: (1-1.3-3). Setae on femora I-II-III-IV: (4-4.2-2). Solenidial formulae on legs: I (2-1-3), II (1-1-2), III (1-1-0), IV (1-1-0).

Type-species. Austrotritia quadricarinata Sellnick, 1959.

Distribution. S. E. Polynesia, Hawaii, N. Borneo, Thailand, Japan and Bonin Island.

Remarks. Nine species of the genus Austrotritia including 3 new species described later were studied to extract the generic characters of the genus mentioned above. The following features are found to be variable among species and not constant within the genus as partly shown in Table 6. (1) The number of setae in anogenital area is much variable except adanal setae which are always 3 pairs in the number. (2) Aspis has 1 or 2 lateral carinae on each side. (3) The number of setae on trochanter III and IV is mostly 3, but that on coxae III and IV is variable from 2 to 4. (4)
KAMSAY & SHEALS (1969, p. 110) included the following features in the diagnosis of the genus: a) the high position of \( \psi \) on notogaster, b) the distal position of \( \omega_2 \) in relation to \( \omega_1 \) on tarsus I, and c) solenidia on tarsus II coupled with setae \( ft \). However, the study of the 3 new species found in Japan showed that these features are not always observed in the genus as shown in Table 6. (5) The additional features which they (p. 112) considered possibly constant within the genus are also ascertained in the 3 new species, namely at least the seta \( u'' \) of tarsus IV is swollen and femur I has a "sub-apical cusp". (6) RAMSAY & SHEALS (1969) found dorsal barbs on the lateral claws of *Terratritia askewi*. Such a condition, though not so distinct, is also observed in 2 species of the genus *Austrotritia*. (7) Chaetotaxies on genua, tibiae and tarsi of legs I~IV are much variable within the genus as shown in Table 7, while those on trochantera~femora and those of solenidia seem to be constant.

**Key to the Japanese species of the genus *Austrotritia***

1. Rostral margin minutely serrate; anal plates with with 2 pairs of setae; solenidion \( \omega_2 \) on tarsus II not coupled with seta \( ft \); tibia IV with 5 setae...\( A. \, dentata \) sp. n.
   
   — Rostral margin smooth; anal plates with 1 pair of setae; solenidion \( \omega_2 \) on tarsus II coupled with seta \( ft \); tibia IV with 4 setae

2. Aspis with 1 carina on each side; claws smooth; tibia III with 4 setae

   \( A. \, unicarinata \) sp. n.

   — Aspis with 2 carinae on each side; claws with barbation dorsally; tibia III with 5 setae...\( A. \, ishigakiensis \) sp. n.

**Austrotritia unicarinata** sp. n.

[Minami-irekodani]

(Fig. 24)

**Diagnosis.** (1) Aspis with a single carina on each side. (2) Anal plates with 1 pair of setae anteriorly. (3) Two pairs of aggenital setae. (4) Exobothridial seta vestigial. (5) Rostral margin smooth. (6) Coxae III and IV each with 2 setae. (7) Solenidion \( \omega_2 \) on tarsus I inserted a little distally of \( \omega_1 \). (8) Solenidion \( \omega_1 \) on tarsus II free of \( ft \), while \( \omega_2 \) coupled with \( ft \). (9) Setae \( u'' \) and \( it'' \) on tarsus IV swollen in their basal two-third. (10) Claws smooth.

**Measurement** (on holotype). Notogaster (L) 770 \( \mu \), notogaster (H) 570 \( \mu \), aspis (L) 380 \( \mu \).

**Elementary chaetotaxy.** Body setae: \( ntg: (14+14) \); \( g: (9+9) \) or \( (10+10) \); \( ag: (2+2) \); \( an: (1+1) \); \( ad: (3+3) \). Leg setae: total setae: I (1-4-6-6-23), II (1-4-5-4-18), III (3-2-3-4-14), IV (3-2-2-4-11); solenidia: I (2-1-3), II (1-1-2), III (1-1-0), IV (1-1-0). Tridactyle.

**Description.** Aspis: Comparatively elongate, parallel-sided in dorsal view (Fig. 24–D); the ratio of length: width is about 100 : 80. A single, distinct lateral carina on each side of aspis. Three prodorsal setae (\( il, la \) and \( ro \)) nearly equal in length; \( il \) and \( ro \) almost erect and thicker than \( la \); \( il\|il-il=1/2.6, ro/ro-ro=1/1.8 \). Sensillus long
Fig. 24. *Austrotritia uncinata* sp. — A: Lateral. B: Genito-anal region. C: A dorsal part of tarsus I bearing 3 solenidia, famulus and seta ft. D: Aspis. E: Subapical cusp on femur I. F: A part of mouth parts in ventral view, showing palp, rutella, anterior genital setae(a) and adoral setae(or). G: Tarsus IV.
and smooth, being slightly thickened in the middle portion. Bothridial scale shows a form of a distorted trapezoid. Exobothridial seta vestigial. Fine longitudinal striation found on the anterior half of aspis.—NotoGaster: Fourteen pairs of notogastral setae short and weakly curved; seta c₃ separated from the anterior margin of notogaster for the distance nearly equal to its length; seta pₛ₁ fairly high in position, but distance pₛ₁–pₛ₂ slightly shorter than pₛ₂–pₛ₃.—Genito-anal region: In the genital field 5 pairs of setae are present in one specimen (Fig. 24–A) and 4 pairs of setae in the other specimen (Fig. 24–B); anterior carinae have 5 pairs of setae; the total number of genital setae 8 or 9 pairs. Two pairs of aggenital setae. Anal plates bears 1 pair of setae anteriorly. Distance of anal setae ad₁–ad₂ a little longer than ad₃–ad₄. Adanal fissure iad located in a level between ad₂ and ad₃, closer to ad₄.—Infracapitulum: Adoral setae or₁, or₂ and or₃ all densely barbed; or₁ not bifid at tip. Setae a, m and h weakly barbed; a a little shorter than m or h; a thicker than m and the latter thicker than h; supracoxal seta (e) shorter than 1/2 the length of seta a.—Palps: Four-segmented; palpal femur and genu partly fused and immovably connected with each other. The setal formula (0–2–0–2–10). Apical setae ul' and su fused basally.—Legs: Heterotridactyle, but median claw not so different in shape from lateral claws, the former being slightly thicker than the latter. The leg chaetotaxy as shown in Table 7. All the solenidia on genua I–IV and tibiae I–IV each coupled with a short seta; ω₂ on tarsus I as well as ω₁ and ω₀ on tarsus II coupled with seta ft. Solenidion ω₂ on tarsus I inserted a little distally in relation to ω₁; famulus associated with ω₂; ω₃ inserted far from the group of these setae (ω₁, ω₂, δ and ft) (Fig. 24–C). Sub-apical cusp on femur I with a short pointed tooth on the distal end (Fig. 24–E). Solenidia on genu I very long, extending beyond the tips of calws. Setae u'', it'' and s swollen in their basal 2/3–3/4, the tip suddenly tapering to form a fine tips (Fig. 24–G).

Type-series. Holotype (NSMT-Ac 9124, in spirit): Nakanodaira, Hahajima Island of Bonin Islands, Japan, 4-VII-1970, T. HABE (J. AOKI), from litter.—Paratopotype: 1 ex. (on 2 slides): the same data as holotype.

Distribution. Japan (Bonin Island).

Austrotritia ishigakiensis sp. n.

[Ishigaki-irekodani]

(Fig. 25)

Diagnosis. (1) Aspis with 2 carinae on each side. (2) Two pairs of aggenital setae. (3) Exobothridial setae vestigial. (4) Rostral margin smooth. (5) Coxa IV with 2 setae. (6) Solenidion ω₂ on tarsus I inserted a little distally of ω₁. (7) Solenidia ω₁ and ω₂ on tarsus II each coupled with seta ft. (8) Seta u'' on tarsus IV swollen. (9) Median as well as lateral claws show a fine barbation dorsally. (10) Genital setae 7 pairs.
Fig. 25. *Austrotritia ishigakiensis* sp. n.—A: Lateral. B: Genito-anal region. C: A dorsal part of tarus I bearing 3 solenidia and famulus. D: Aspis. E: Subapical cusp on femur I.

**Measurement** (on holotype). Notogaster (L) 870 μ, notogaster (H) 680 μ, aspis (L) 438 μ.

**Elementary chaetotaxy.** Body setae: ntg: (14+14); g: (7+7); ag: (2+2); an: (1+0); ad: (3+3). Leg setae: I (1-4-6-6-24), II (1-4-5-4-22), III (3-2-4-5-14), IV (3-2-3-4-11). Solenidia: I (2-1-3), II (1-1-2), III (1-1-0), IV (1-1-0). Tridactyle.

**Description.** Aspis: The ratio of length: width of aspis is about 100:80. Two parallel lateral carinae exist on each side; the upper carina stronger than the lower one. Interlamellar seta a little longer and thicker than lamellar as well as rostral seta; il/il-il=1/1.5, ro/ro-ro=1. Sensillus long and smooth, attenuating toward the tip. Bothridial scale trapezoidal. Exobothridial seta vestigial. Fine longitudinal striation on the anterior half of aspis.—**Notogaster:** Fourteen pairs of notogastral setae long and strong compared with those of the other two Japanese sepecies of *Austrotritia.*
Seta \( c_\text{c} \), inserted close to the anterolateral margin of notogaster; the tip well extends beyond the margin, if the seta is directed toward anterior direction. Seta \( ps_1 \), high in position, so that distance in lateral view of \( ps_1 - ps_2 \) longer than \( ps_2 - ps_3 \). Seta \( c_\text{c} \) located closer to \( c_2 \) than to \( c_\text{c} \). Lateroabdominal gland opening (\( gla \)), lyrifissure \( im \) and insertion pore of vestigial seta \( f_2 \) situated close together.—**Genito-anal Region:** Seven pairs of genital setae are present, 4 pairs on genital field and 3 pairs on anterior carinae. Two pairs of aggenital setae, of which the posterior ones (\( ag_2 \)) distinctly longer than the anterior ones (\( ag_1 \)). On the single specimen collected, the left anal plate bears one seta anteriorly, while the right plate lacks in seta. Adanal seta \( ad_2 \) situated closer to \( ad_4 \) than to \( ad_1 \). Adanal fissure (\( iad \)) located in a level between \( ad_2 \) and \( ad_3 \), being closer to \( ad_2 \) than to \( ad_3 \).—**Infracapitulum:** Adoral setae barbed; \( or_1 \) strongly curved at tip. Setae \( a, m \) and \( h \) almost smooth; \( a \) thicker than \( m \) or \( h \). Supracoxal seta (\( e \)) half as long as seta \( a \).—**Palps:** Four-segmented; palpal femur and genu only dorsally separated by a groove and fused ventrally. The setal formula (0-2-0-2-10). Apical setae \( ulf \) and \( su \) fused basally.—**Legs:** Median claw a little stronger than the laterals; all the claws minutely barbed dorsally. Leg chaetotaxy as shown in Table 7. All the solenidia on genua I–IV and those on tibiae I–IV each coupled with a short seta; \( o_1 \) and \( o_2 \) on tarsus II coupled with setae \( ft \), but solenidia on tarsus I not accompanied by \( ft \); both \( ft' \) and \( ft'' \) long and separated from solenidia; \( o_2 \) on tarsus I inserted a little distally in relation to \( o_1 \); famulus associated with \( o_2 \) (Fig. 25-C). Subapical cusp on femur I triangular (Fig. 25-E). Solenidia on genu I long, extending beyond the tips of claws for a short distance. Seta \( u'' \) distinctly swollen.

**Type-specimen.** **Holotype (NSMT-Ac 9126, on 2 slides):** Yoon, Ishigaki-jima Island, S. Japan, 6–XII–1972, J. Aoki, from litter (JA1551).

**Distribution.** Japan (Ishigaki-jima Island).

**Austrotritia dentata** sp. n.

[Fuchiba-irekodani]

(Fig. 26)

**Diagnosis.** (1) Rostral margin with minute teeth. (2) Aspis broad, almost as broad as long. (3) Anal plate with 2 setae anteriorly. (4) Aspis with 2 lateral carinae on each side. (5) Coxae III with 3 setae. (6) Exobothridial seta distinct. (7) Solenidia \( o_1 \) and \( o_2 \) on tarsus II not coupled with setae \( ft \). (8) Claws smooth. (9) Genital setae 8 pairs.

**Measurement.** Notogaster 700–765 \( \mu \), (L) notogaster (H) 500–590 \( \mu \), aspis (L) 385–420 \( \mu \).

**Elementary chaetotaxy.** Body setae: \( ntg: (14+14); g: (8+8); ag: (2+2); an: (2+2); ad: (3+3). \) Leg setae: I (1-4-6-6-21), II (1-4-5-5-18), III (3-2-4-4-14), IV (3-2-3-5-12). Solenidia: I (2-1-3), II (1-1-2), III (1-1-0), IV (1-1-0). Tridactyle.

*Description. Aspis*: The ratio width/length of aspis is 1/1~4/5. Rostral margin with some ten, minute teeth arranged at irregular intervals. Each side of aspis bears 2 lateral carinae of equal strength. Rostral, lamellar and interlamellar setae short and weak; *ro* curved toward anterior direction and *il* toward posterior direction.
Exobothridial seta well developed, being far longer than the other prodorsal setae mentioned above. Sensillus smooth and long, tapering distally. Bothridial scale with rounded margin, being semicircular or rounded trapezoid.—Notogaster: Fourteen pairs of notogastral setae short and fine, being weakly curled distally or proximally. Because of its shortness and posterior position, seta \( c_3 \) never reaches the anterolateral margin of notogaster. Seta \( ps_1 \) not so high in position; the distance \( ps_1 - ps_2 \) shorter than \( ps_2 - ps_3 \).—Genito-anal region: Eight pairs of genital setae are present, 5 pairs in genital field and 3 pairs on anterior carinae. Two pairs of short aggenital setae. Each anal plate bears 2 setae anteriorly without exception in all the 3 specimens examined. Adanal seta \( ad_i \) inserted always at a level a little posterior to \( an_i \); \( ad_i \) situated closer to \( ad_i \) than to \( ad_i \). Adanal fissure \( (iad) \) located outside \( ad_i \).—Infra-capitulum: Adoral setae very weakly roughened; \( or_1 \) not bifid at tip. Setae \( a, m \) and \( h \) almost smooth; \( h > m > a \) in length; \( a \) somewhat thicker than \( m \) or \( h \). Supracoxal seta \( e \) shorter than half the length of \( a \).—Palps (Fig. 26-G): Five-segmented; palpal femur and genu clearly separated and movably hinged. Setal formula \( (0-3-0-2-10) \); femur with 3 (!) setae. It could not be ascertained whether the setae \( ul' \) and \( su \) fused or not.—Legs: Median claw a little stronger than the laterals; they are smooth on dorsal sides. The leg chaetotaxy as shown in Table 7. But one paratopotype bears 4 setae each on coxa IV and trochanter IV (Fig. 26-C). All solenidia on genu I–IV and tibiae I–IV each coupled with a short seta. Solenidion \( \omega_1 \) on tarsus I coupled with \( ft \); \( \omega_1 \) and \( \omega_2 \) on tarsus I inserted almost side by side (Fig. 26-E); famulus coupled with \( \omega_2 \). Subapical cusp on femur I inconspicuous, being represented by a low ridge without anterior tooth (Fig. 26-F). Seta \( u'' \) on tarsus IV swollen.


Distribution. Japan (Kanagawa-ken).

Genus Mesotritia FORSSLUND in FORSSLUND et MÄRKL, 1963, s. lat.

[Kirekomi-irekodani Zoku]


Diagnosis. (1) Notogaster with a terminal fissure. (2) Bothridial scale situated under bothridium. (3) Genital as well as anal field separated from ventral plate. (4) Anterior carinae of genital field without setae. (5) Lamellar and interlamellar setae arranged laterally, before and behind. (6) Genu IV without solenidion. (7) Aspis with posterior median apodeme. (8) Palps 4–segmented.

Elementary chaetotaxy. \( \text{ntg: } (14+14); \text{ g: } (5+5), (6+6) \text{ or } (7+7); \text{ ag: } (2+2); \text{ an: } (1+1) \text{ or } (2+2); \text{ ad: } (2+2), (3+3) \text{ or } (5+5). \) Tridactyle.

Type-species. Mesotritia testacea FORSSLUND, 1963.
Distribution. Europe and Japan (new record).

Remarks. The generic name ‘‘Mesotritia’’ was published without statement such as gen. nov., generic designation of the type species, because the description Mesotritia testacea by FORSSLUND (1963) has been published by accident before the description of the genus. In the strict application of the international code of zoological nomenclature, availability of the name ‘‘Mesotritia’’ becomes questionable. However, as Märkel (1964) and the succeeding authors (Sheals, 1965; Märkel, 1968; Ramsay & Sheals, 1969; Balogh, 1972) did, I approve of the availability of ‘‘Mesotritia’’ by monotypy.

Key to the species of the genus Mesotritia s. lat.*

1. Adanal plate with 5 setae; genital plate with 9–11 setae ........................................... M. fraeoeensis (Sellnick, 1923)
   — Adanal plate with 2–3 setae; genital plate with 5–7 setae ........................................ 2

2. Genital plate with 5 setae; anal plate without seta...M. brachythrix (Walker, 1964)
   — Genital plate with 6–7 setae .................................................................................. 7

3. Interlamellar seta situated almost mid-distance between bothridium and rostral seta ........................................... M. nuda (Berlese, 1887)
   — Interlamellar seta situated close to bothridium than to rostral seta ................. 4

4. Anal plate with 1 seta ............................................................................................... 5
   — Anal plate with 2 setae ........................................................................................ 8

5. Rostral seta longer than lamellar seta ........................................................................ 6
   — Rostral seta shorter than lamellar ........................................................................ 7

6. Rostral seta reaching rostral margin; mutual distance il-il shorter than la-la
   — Rostral seta never reaching rostral margin; mutual distance il-il a little longer than la-la ........................................... M. okuyamai sp. n.

7. Adanal fissures iad almost level with anal setae; aspis with a number of minute teeth scattered on the surface between bothridia ........................................... M. spinosus sp. n.
   — Adanal fissures iad located posterior to the level of anal setae; aspis without teeth on the surface ........................................... M. testacea Forsslund, 1963

8. Genital plate with 6 setae; interlamellar seta reaching the insertion of lamellar seta ........................................... M. grandjeani (Feider et Suciu, 1957)
   — Genital plate with 7 setae; interlamellar seta not reaching the insertion of lamellar seta ........................................... M. pifli Märkel, 1964

Mesotritia spinosa sp. n.

[Kirekom-ierekodani]

(Fig. 27)

Diagnosis. (1) Anal plate with a single seta. (2) Rostral seta shorter than lamellar seta, never reaching rostral margin. (3) Mutual distance il-il nearly equal

*M. brasiensis (Sellnick, 1923) was not included in this key.

to, or slightly longer than, $la-la$. (4) Adanal fissures $iad$ located almost in the level of anal setae. (5) Aspis with minute teeth on the surface between bothridia.

**Measurement.** Notogaster (L) 577–670 $\mu$, notogaster (H) 375–460 $\mu$, aspis (L) 320–340 $\mu$.

**Elementary chaetotaxy.** Body setae: ntg: (14+14); g: (6+6); ag: (2+2); an: (1+1); ad: (3+3). Leg setae: I (1–3–6–5–19), II (1–3–4–4–15), III (1?–3–3–3–12), IV (2–3–2–3–9). Solenidia: I (2–1–3), II (1–1–2), III (1–1–0), IV (0–1–0). Heterotridactyle.

**Description.** Aspis: A low, but distinct median ridge is present. A single lateral carina on each side of aspis reaching anteriorly the lateral margin of rostrum, but not reaching posteriorly bothridium. The arrangement of prodorsal setae quite peculiar: Rostral setae inserted almost in the middle part of aspis and far remote from rostral margin; lamellar and interlamellar setae situated laterally; $la$ anterior to $il$;
la longest and thickest, il shortest and finest among them. Exobothridial setae distinctly developed, but shorter than il. Sensillus knife-shaped, comprising of an eccentric core and a more hyaline distal portion. Bothridial scale nearly triangular, being situated under bothridium. A group of several light spots found between bothridium and il. Two transverse line exist between interlamellar setae; the posterior part of aspis behind the posterior transverse line finely and densely punctured, while the part anterior to the line almost glabrous (Fig. 27E). In addition, about 40 minute teeth arranged along this line.—Notogaster: Fourteen pairs of notogastral setae fine and characteristically bent to form an elbow-like angle at basal 1/4 along their length (Fig. 27B, C). Many, granular structures of irregular shapes assemble around insertion pore of each notogastral seta. Lateroabdominal gland opening shows a complicated structure resembling “lips” (Fig. 27D). One of the two pores in the vicinity of this opening must be im; fissure la situated between seta cp and fissure im; ih between im and seta h3.—Genito-anal region: Genital plate in ventral view has nearly same width throughout its length; the plate bears 6 setae and anterior carina without seta. Aggenital seta ag2 distinctly longer than ag1. Anal plate with 1 seta anteriorly. Among the 3 pairs of adanal setae, ad1 the longest and thickest, ad4 the shortest and thinnest. adanal fissures iad located in the same level of anal setae.—Palps: Four-segmented. Setal formula (0-2-2-9). Seta cm strongly barbed.—Legs: Heterotridactyle; the lateral claws distinctly thinner than the median claw. All solenidia on genua I~III and tibiae I~IV each coupled with a seta; the coupled setae far shorter than solenidia except for the seta coupled with solenidion on tibia I; this seta distinctly longer than the solenidion. On tarsus I, w1 inserted more distally than the mid-distance along its length; distance w1-w2 2.5× as long as w2-w3; w1> w2> w3 in length; ft" inserted at mid-distance between w1 and w2. Famulus coupled with w2, bending anteriorly and provided with a short, distinct branch projecting at right angles from the main stem (Fig. 27G). Solenidia on tarsus II without seta accompanied. Ultimate setae on tarsi I~IV normal.


Distribution. Japan (Yaku Island).

Mesotritia okuyamai* sp. n.

[Okuyama-irekodani*]

(Fig. 28)

Diagnosis. (1) Anal plate with a single seta. (2) Rostral seta longer than lamellar seta, reaching rostral margin. (3) Mutual distance il-il a little shorter than la-la. (4) Adanal fissures iad located somewhat anterior to the level of anal setae.

* The name of the new species is dedicated to Dr. Haruki Okuyama who collected and kindly offered me moss sample containing the new species.
Fig. 28. *Mesotritia okuyamai* sp. n.—A: Famulus on tarsus I. B: Aspis. C: Lateral. D: Sensillus. E: Genito-anal region.

(5) Aspis without minute teeth on the surface.

*Measurement.* Notogaster (L) 925 μ, notogaster (H) 625 μ, aspis (L) 445 μ.

*Elementary chaetotaxy.* Body setae: ntg: (14+14); g: (6+6); ag: (2+2); an: (1+1); ad: (3+3). Leg setae: I (1-3-5-7-19), II (1-3-4-6-12), III (2-3-4-3-11), IV (2-3-2-3-10). Solenidia: I (2-1-3), II (1-1-2), III (1-1-0), IV (0-1-0). Heterotridactyle.

*Description.* Aspis: Median ridge very inconspicuous. A distinct single lateral carina reaching anteriorly the lateral margin of rostrum. Rostral setae inserted far remote from rostral margin, a little behind the level of lamellar setae; the seta every long, the tips reaching, or a little extending beyond, those of *la* as well as the anterior margin of rostrum. Interlamellar setae short and fine. Ratio in length of *ro* : *la* : *il* =100 : 78 : 27. Mutual distance *il*-il somewhat shorter than *la*-la. Sensillus knife-shaped. Bothridial scale is a rounded triangle, being situated under bothridium. Between bothridium and the posterior end of lateral carina found a group of light spots. The posterior part of aspis finely and densely punctured. No teeth-like structures on the surface.—Notogaster: Fourteen pairs of notogastral setae short and fine, the basal portion being characteristically waving; no granular structures found around the insertion pores of the setae. Lyri fissure *im* located close to *gla*; *ia* below the insertion of *cp*.—Genito-anal region: Genital plate has nearly the same width throughout its length, bearing 6 setae. The posterior aggenital seta (*agz*) somewhat
longer than the anterior one \((ad_t)\). Anal plate bears 1 seta anteriorly. Adanal setae
\(ad_s > ad_t > ad_i\) in length. Adanal fissures \(iad\) located a little anterior to the level of
anal setae. — **PALPS:** Four-segmented. Setal formula \((0-2-2-9)\). Setae \(cm\) and \(vt\) distinctly barbed. — **LEGS:** Heterotridactyle. All solenidia on genua I–III and those on
tibiae I–IV each coupled with a seta; the accompanying seta on tibia I almost twice as
long as the solenidia, but the remaining accompanying setae far shorter than solenidia.
Distances \(w_l-0_2\) \(2.5\) x as long as \(w_2-0_2\); \(w_2\) a little longer than \(w_1\); \(w_3\) the shortest.
Famulus coupled with \(w_2\), straight or slightly bending posteriorly and provided with
a short branch near apex (Fig. 28A). Solenidia on tarsus If without accompanying
seta.

**Type-specimen.** **HOLOTYPE** (NSMT–Ac 9131, on slide): Moppu-bara, Mt. Ode-yama
near Tatebayashi, Tochigi-ken, C. Japan, 2–XI–1969, H. OKUYAMA (J. AOKI), from moss
(JA 1203).

**Distribution.** Japan (Tochigi-ken).

**Genus Maerkelotritia** HAMMER, 1967

[Kishida-irekodani Zoku]

*Maerkelotritia* HAMMER, 1967, p. 6; MÄRKEL, 1968, p. 731; RAMSAY & SHEALS, 1969, p. 112; AOKI,
1977, p. 185.

**Diagnosis** (1) Bothridial scale under bothridium. (2) Aspis without lateral carina.
(3) Adanal plate with 4 setae. (4) Ano-genital cleft short or absent. (5) Trochan-
tera III and IV each with 3 setae. (6) Plicatur with terminal sinus. (7) Aspis without
median apodeme. (8) Legs tridactyle. (9) Genu IV with a solenidion.

**Elementary chaetotaxy.** Body setae: \(ntg: (15+15); g: (7+7), (9+9), (10+10) or (12
+12); ag: (2+2); an: (0+0), (1+1) or (3+3); ad: (4+4).** Legs tridactyle.

**Type-species.** *Maerkelotritia alaskensis* HAMMER, 1967.

**Distribution.** Kodiak Island, N. America, Tien Shan and Japan (Hokkaido, Tochigi-
ken and Nagano-ken).

**Key to the species of the genus Maerkelotritia**

1. Anal setae are absent; 7 pairs of genital setae......... *M. krivolutskii* MÄRKEL, 1968
   — Anal setae are present; more than 7 pairs of genital setae .......... 2
2. Three pairs of anal setae.......................... *M. gibbera* (WALKER, 1964)
   — One pair of anal setae.......................... *M. kishidai* (AOKI, 1958)

**Maerkelotritia kishidai** (AOKI, 1958)

[Kishida-irekodani]

(Figs. 29–30)

*Oribotri~ia kishidai* AOKI, 1958, p. 18, figs. A–D; BULANOVA-ZACHVATKINA et al., 1975, p. 378, pl. 141,
fig. 956.


*Maerkelotritia alaskensis* Hamm, 1967, p. 8, fig. 1.

Diagnosis. (1) One pair of anal setae. (2) More than 8 setae on genital plate. (3) Ano-genital cleft short and rounded at end.
Measurement. Notogaster (L) 624-1510 µ, notogaster (H) 444-1005 µ, aspis 347-720 µ.

Elementary chaetotaxy. Body setae: ntg: (15+15); g: (9+9)~(12+12); ag: (2+2); an: (1+1); ad: (4+4) (rarely 3+3). Leg setae (ascertained on the Japanese material): I (1-4-6-6-21), II (1-4-4-6-17), III (3-3-4-3-14), IV (3-3-3-3-11). Solenidia: I (1-1-3), II (1-1-2), III (1-1-0), IV (1-1-0). Tridactyle.

Description. Aspis: Median ridge almost lacking or very weakly developed as a short, low ridge near the anterior margin of aspis. Lateral carinae completely absent. Rostral, lamellar and interlamellar setae smooth or weakly and sparsely barbed; mutual distance il-il larger than la-la or ro-ro; la-la nearly equal to, or somewhat shorter than, ro-ro; lamellar seta 75-90% in length of interlamellar seta; rostral seta 53-70% in length of interlamellar seta (Table 8). Exobothridial seta much variable in length, being 17-67% in length of interlamellar seta. Sensillus slender, weakly thickened in the middle portion. Bothridial scale rounded triangular and located under bothridium;

Table 8. Observation on genital setae, aspal setae and bothridial scale of the five different forms (forma A~forma E) of M. kishidai.

<table>
<thead>
<tr>
<th>Forma</th>
<th>Locality</th>
<th>Genital setae</th>
<th>Relative length of prodorsal setae*</th>
<th>Bothridial scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>ro</td>
<td>la</td>
</tr>
<tr>
<td>Forma A</td>
<td>Alaska (Kodiak Island)</td>
<td>9+9 10+10</td>
<td></td>
<td>78</td>
</tr>
<tr>
<td>Forma B</td>
<td>Mt. Shiga (Nagano-ken)</td>
<td>12+12</td>
<td>64</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>C. Japan</td>
<td>12+12</td>
<td>67</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>Nikko (Tochigi-ken)</td>
<td>10+9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Form C</td>
<td>N. Japan</td>
<td>12+12</td>
<td>68</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>Mt. Poroshiri** (Hokkaido)</td>
<td>9+11 12+12</td>
<td></td>
<td>71</td>
</tr>
<tr>
<td>Forma D</td>
<td>N. Japan</td>
<td>11+12</td>
<td>66</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>Mt. Poroshiri*** (Hokkaido)</td>
<td>10+9 11+12</td>
<td></td>
<td>67</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10+9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>11+10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>11+12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forma E</td>
<td>N. America (California)</td>
<td>9+9 11+12</td>
<td></td>
<td>63</td>
</tr>
</tbody>
</table>

* Length of il as 100
** The summit
*** Kita Cirque, Nanatsu-numa Cirque and Poroshiri Sanso
the margin of the scale smooth or irregularly dentate anteriorly.—Notogaster: Fifteen pairs of notogastral setae nearly straight and slightly barbed, being not so different in length from aspal setae or in some specimens distinctly shorter than the latters. A pore for vestigial seta \( f_1 \) situated anterolateral to the insertion for seta \( h_1 \).—Genito-anal region: Genital plate becoming somewhat narrower anteriorly, provided with 9\~12 setae; the posteriormost genital seta fairly distant from anogenital junction. Two pairs of aggenital setae of equal length, being longer than genital setae. Anogenital cleft (trv) short and transverse, being rounded at the end. Anal plate with a single seta located in the level of \( ad_2 \) or between \( ad_1 \) and \( ad_2 \). Four pairs of anal setae; \( ad_1 \) distinctly longer than the remaining setae; \( ad_3 \) inserted closer to \( ad_4 \) than to \( ad_2 \). Adanal fissure \( iad \) located posterior, sometimes anterior, to \( ad_4 \).—Infra-capitulum: Palp 3-segmented, with a feeble indication of separation at line of fusion of femur and genu (Fig. 29B); palpal tarsus with 9 setae; eupathidia separated at base; solenidion reaching or a little extending beyond the tip of seta \( acm \). Setae \( h, m \) and \( a \) slightly barbed. Setae or densely barbed; \( or_1 \) clavate and shorter than \( or_2 \) as well as \( or_3 \) (Fig. 29E).—Legs: Tarsus I: Solenidion \( \omega_2 \) inserted most anteriorly and the longest among solenidia; \( \omega_1 \) inserted most posteriorly; \( \omega_2 \) inserted between \( \omega_1 \) and \( \omega_2 \), and the shortest; famulus \( \varepsilon \) short and nearly straight, being slightly roughened throughout its length; setae \( u \) and \( tc \) strongly curled at tip. Tibia I: Solenidion accompanied by a very long seta. Genu I: Solenidion accompanied by a short seta. Tarsus II: \( \omega_1 \) and \( \omega_2 \) equal in length; \( \omega_1 \) inserted posterior to \( \omega_2 \); setae \( u, a \) and \( tc \) strongly curled at tip. Tibia II: Solenidion accompanied by a fairly long seta. Genu II: Solenidium without accompanying seta.

Remarks. After the establishment of the genus Maerkelotritia by Hammer (1967) (type species: \( M. alaskensis \) Hammer, 1967), three species were transferred from the genus Oribotritia to the present genus: Oribotritia gibbera Walker, 1964 and \( O. sellnicki \) Walker, 1964 by Markel (1968), and \( O. kishidai \) Aoki, 1958 by Aoki (1973). In addition to them, another species. Maerkelotritia krivolutskii, was described by Markel (1969). Among them, \( M. alaskensis \), \( M. kishidai \) and \( M. sellnicki \) are closely related in having a single pair of anal setae. These three species were considered to be separable by the relative length of notogastral and exobothridial setae, the shape of exobothridial scale and the number of genital setae. However, recent investigation of \( M. kishidai \) in Japan has revealed that this species is much variable in these features. Considering such characters in combination, the separation of the Alaskan, the American and the Japanese into 3 different species must be quite artificial. Though not fully convinced, I treat them here as a single species, \( M. kishidai \), and prefer to separate them into 5 forms (forma A\~E) as shown in Tables 8\~9 and in the key mentioned below.

Key to the forms of \( M. kishidai \)
1. Notogastral setae distinctly shorter than aspal setae

\[ M. kishidai \ (Aoki, 1958) \textbf{forma} A \ [=M. alaskensis \textit{Hammer, 1967}] \]
— Notogastral setae nearly equal in length to aspal setae

2. Exobothridial setae long, about half as long as interlamellar setae or more. An-
### Table 9. Comparison of characters in the five forms of *M. kishidai.*

<table>
<thead>
<tr>
<th>Character</th>
<th>Form A (<em>=M. alaskensis</em>)</th>
<th>Form B</th>
<th>Form C</th>
<th>Form D</th>
<th>Form E (<em>M. sellnicki</em>)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of <em>ex</em> compared to <em>il</em></td>
<td>1/2×<em>il</em></td>
<td>1/2×<em>il</em></td>
<td>1/3×<em>il</em></td>
<td>1/3×<em>il</em></td>
<td>1/5×<em>il</em></td>
</tr>
<tr>
<td>Anterior margin of bothridial scale</td>
<td>dentate</td>
<td>dentate</td>
<td>dentate</td>
<td>smooth</td>
<td>smooth</td>
</tr>
<tr>
<td>Position of iad to ad₄</td>
<td>posterolateral</td>
<td>posterolateral</td>
<td>posterolateral</td>
<td>posterolateral</td>
<td>anterolateral</td>
</tr>
<tr>
<td>Notogastral setae in comparison with aspal setae</td>
<td>shorter</td>
<td>subequal</td>
<td>subequal</td>
<td>subequal</td>
<td>subequal</td>
</tr>
<tr>
<td>Number of setae on genital plate</td>
<td>9-10</td>
<td>9-12</td>
<td>9-12</td>
<td>9-12</td>
<td>9</td>
</tr>
<tr>
<td>Length of notogaster (in μ)</td>
<td>800-1000</td>
<td>1040-1130</td>
<td>920-970</td>
<td>1160-1510</td>
<td>624-1143</td>
</tr>
<tr>
<td>Distribution</td>
<td>Kodiak Island</td>
<td>C. Japan</td>
<td>N. Japan</td>
<td>N. Japan</td>
<td>N. America</td>
</tr>
</tbody>
</table>

- Anterior margin of bothridial scale dentate .............. *M. kishidai* (Aoki, 1958) **forma B**
- Exobothridial setae medium long, about 1/3 as long as interlamellar setae. Anterior margin of bothridial scale dentate or smooth ........................................... 3
- Exobothridial setae short, less than 1/5 the length of interlamellar setae ..............

- Anterior margin of bothridial scale dentate .............. *M. kishidai* (Aoki, 1958) **forma E** [= *M. sellnicki* (Walker, 1964)]

3. Anterior margin of bothridial scale dentate .............. *M. kishidai* (Aoki, 1958) **forma C**
- Anterior margin of bothridial scale smooth .............. *M. kishidai* (Aoki, 1958) **forma D**

**Type-locality.** Nikko in Central Japan.

**Collecting data in Japan.** JA46 (3 exs.), JA1364 (3 exs.), JA1366 (4 exs.), JA1368 (1 ex.), JA1632 (5 exs.), JA2195 (1 ex.), JA2196 (24 exs).

**Distribution.** Japan (Hokkaido—forma C and D; Tochigi-ken—forma B; Nagano-ken—forma B), Kodiak Island (forma A) and N. America (forma E).

**Genus Protoribotritia Jacot, 1938**

*[Fuji-irekodani Zoku]*


**Diagnosis.** (1) Aspis highly arched dorsally. (2) Both genital and anal plates separated completely from ventral plate. (3) Neither anogenital cleft, nor interlocking triangle present. (4) Bothridial scale situated below bothridium. (5) No lateral carina on aspis. (6) Legs monodactyle.

**Elementary chaetotaxy.** ntg: (14+14) or (15+15); g: (6+6) or (7+7); ag: (2+2); an: (3+3); ad: (3+3) or (4+4). Monodactyle.

**Type-species.** Protoribotritia canadaris Jacot, 1938.

**Distribution.** N. America, Sweden, Germany and Japan.

**Key to the species of the genus Protoribotritia**

1. Notogaster with 14 pairs of setae; adanal plates with 3 pairs of setae; anal setae longer than genitads; *an₂* situated closer to *an₁* than to *an₃*.
Protoribotritia ensifer AOKI, 1969

[Fuji-irekodani]

(Fig. 31)

Protoribotritia aberrans ensifer AOKI, 1969, p. 27, figs. 1-5; 1977, p. 186, fig. 10.

**Diagnosis.** (1) Genital plates with 7 pairs of setae. (2) Palp 4-segmented. (3) Adanal plates with 4 pairs of setae. (4) Notogaster with 15 pairs of setae. (5) Anal seta an2 located closer to an5 than to an1. (6) Mutual distance of lamellar setae subequal in length to that of rostral setae.

**Measurement.** Notogaster (L) 333-340 μ; notogaster (H) 215 μ; aspis (L) 195-200 μ; aspis (H) 85 μ. Prodorsal setae: ro 70 μ, le 60 μ, il 100 μ. Mutual distances: ro-ro 51 μ; le-le 47 μ; il-il 80 μ.

**Elementary chaetotaxy.** ntg: (15+15); g: (7+7); ag: (2+2); an: (3+3); ad: (4+4).

Legs monodactyle.

**Description.** Aspis: Rostral, lamellar and interlamellar setae long and glabrous, attenuating into a fine tip; le and il erect; mutual distance of le subequal in length to that of ro and shorter than that of il; exobothridial seta short and fine. Sensillus gradually thickened distally, being provided with a sharp thorn on each side. Bothridial scale small, ebing located below bothridium. Lateral rim of aspis present.—Notogaster: Fifteen pairs of notogastral setae present; they are short, curved, rather strong and weakly roughened; on the topotype specimen (Fig. 31-A) seta c2 on the left side is markedly longer than the remainder, but c2 on the right side of the same specimen and holotype and paratype specimens have normal size similar to the remaining setae.—Genito-anal region: Genital plate with 7 short setae. Two aggenital setae inserted very close together. Anal plate with 3 setae similar in length to genital setae; an2 situated closer to an5 than to an1. Among 4 pairs of adanal setae ad4 somewhat shorter than the others.—Infracapitulum: Setae a and m subequal in length; seta h distinctly shorter than a or m, nearly as long as adoral setae (or). Palp 3-segmented; the setal formula: 1-2-8.—Legs: Trochantera I-IV each with a single seta; femora I-IV each with 2 setae; coxae I and III each have a very long, whip-like seta; that on coxa I 60 μ and accompanied by a short seta.
**Fig. 31.** *Protoribotritia ensifer* Aoki, 1969.—A: Lateral. B: Sensilli. C: Aspis. D: Ventral view without aspis and legs.

**Type-locality.** Mt. Fuji in Central Japan.

**Collecting data.** JA1191 (2 exs.), JA1192 (2 exs.).

**Distribution.** Japan (Yamanashi-ken).

**Remarks.** Aoki (1969) described the mite as a subspecies of *Protoribotritia aberrans* (Märkel et Meyer, 1959). However, it would better be treated as a good species, having 7 pairs of genital setae and the sensilli of a peculiar shape. In regard to the number of notogastral setae I have confirmed 15 pairs of setae on the holotype and the topotype specimens, but only 14 pairs on the paratype, lacking in a pair of setae ($f_i$).
Addendum

After the completion of the present paper, the author noticed the discussior Hammel (1965) and Parry (1979) on a subdivision of the genus Phthiracarus. Following characters were considered by them to be useful for the subdivision of the genus: The presence or absence of lyrifissures $ip$ and $ips$; the number of setae $f_i$ on femur I and genu IV; the position of vestigial seta $f_i$; condition of adanal setae $ad_1$ and $ad_2$ (well-developed or vestigial). But, they deferred a formal subdivision of the genus until more species of Phthiracarus are investigated in regard to these characters.

In the present paper, however, the genus Phthiracarus was subdivided into genera, Phthiracarus s. str. (p. 9) and Paraphthiracarus gen. n. (p. 15) based on the difference in the condition of $ad_1$ and $ad_2$ which was found by Parry (1979) to be uncorrelated with the remaining characters mentioned above and not so important for the subdivision of the genus Phthiracarus s. lat. A re-examination of the described Japanese species of the genera Phthiracarus, Paraphthiracarus, Metaphthiracarus, Neophthiracarus and Calyptophthiracarus revealed that they have each 4 setae on I and 1 seta on genu IV. The number of notogastral lyrifissures will be re-examined in a future. The author's treatment in the present paper may have been described as rashness as a result.
摘 要

1957年以前に日本から報告されたササラダミ類はわずかに5種類であったが、その後の急速な研究の進歩により、現在のところ約300種が記録されるに至った。しかし、未報告・未記載の種も多く残されており、それらをも含めて日本産のササラダミ類の分類を整理すべき段階に来ている。現在計画中の土壤ダミ類の環境診断への利用の研究を進めるに当っても、まず種名の決定がなされなければならない。

本報告ではイレコダミ科およびタテイレコダミ科の2科に属する28種について、種名の決定、記載概要の作成を行なった。その中には3新属と15新種の記載が含まれる。本報告で取り扱った種は以下のとおりである（* 印は新種）。

イレコダミ属 Phthiracaridae

イレコダミ属 Phthiracarus—ヤマトイレコダミ Ph. japonicus AOKI、ツルイレコダミ Ph. clemens AOKI、ヒュウガツルギイレコダミ* Ph. clemens kyushuensis subsp. n。

チカイレコダミ属* Paraphthiracarus gen. n.—ジョモジイレコダミ* P. lanatus (FEIDER et SUCIU)、サキシマイレコダミ* P. australis sp. n.、セムイレコダミ* P. gibber sp. n。

オオイレコダミ属* Metaphthiracarus gen. n.—オオイレコダミ M. bacillatus sp. n。

ズキノイレコダミ属* Calyptophthiracarus gen. n.—ズキノイレコダミ* C. mitratus sp. n。

ケブカイレコダミ属* Neopthiracarus—ケブカイレコダミ* N. comosus sp. n。

タチゲイレコダミ属 Hoplophthiracarus—コタイレコダミ* H. pavidus (BERLESE)、クグウイレコダミ H. kugohi AOKI、イシカワイレコダミ* H. ishikawai sp. n.、ヨロイレコダミ* H. foveolatus sp. n。

ハナビライレコダミ属 Hoplophorella—ハナビライレコダミ H. cucullata (EWING)、ホソハナビライレコダミ* H. floridae JACOT、トゲイレコダミ* H. spiniger sp. n.、トラバイレコダミ* H. cristata sp. n。

アラメイレコダミ属 Atropacarus—アラメイレコダミ A. striculus (C. L. KOCH)、コンポウアラメイレコダミ* A. striculus var. clavatus var. n。

タテイレコダミ科 Orbirotriidae

タテイレコダミ属 Oribotritia—キタイレコダミ* O. fennica FORSSLUND et MÄRKE1、トクイレコダミ O. tokukoaee AOKI、チチジマイレコダミ* O. chichijimensis sp. n。

ナノウンイレコダミ属* Indotritia—ジャワイレコダミ* I. javensis (SELLNICK)

ミナミイレコダミ属* Austrotritia—ミナミイレコダミ* A. uncinata sp. n.、イシガキイレコダミ* A. ishigakiensis sp. n.、フチバイレコダミ* A. dentata sp. n。

キレミイレコダミ属* Mesotritia—キレミイレコダミ M. spinosa sp. n.、オクヤマイレコダミ* M. okuyamae sp. n。

キシュイレコダミ属 Maerkelotritia—キシュイレコダミ M. kishidai (AOKI)

フジイレコダミ属 Protoribotritia—フジイレコダミ P. ensifer AOKI。

重要な学名の変更は以下のとおりである。

Phthiracarus lanatus FEIDER et SUCIU → Paraphthiracarus lanatus (FEIDER et SUCIU)
Stegamacarus strigulus (C. L. KOCH) → Atropacarus strigulus (C. L. KOCH)
Protoribotritia aberrans ensifer AOKI → Protoribotritia ensifer AOKI。
Literature


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