

Copepods in the Mountain Waters of Kyushu, Tsushima and Ryukyu Islands, Southwestern Japan

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This report is a result of a faunistic study on the copepods gathered by the author from the mountain waters of Kyushu, Tsushima I. and Ryukyu Is. (Fig. 1, 13 samples, April 1987 to March 1989). Having examined these specimens, I was able to determine 17 species of cyclopoids and 16 species of harpacticoids. Nine of the harpacticoid species (Ishida 1987) are common to Hokkaido, and 13 (Ishida 1989a) to Honshu. Of these species I remark on the distribution and habitats, and offer some illustrations for diagnosis.

The methods of sampling in the fields and sorting in the laboratory are same as those reported in my previous report (Ishida 1987).

The following species were found in the samples examined :

	Number of individuals obtained		
	Kyushu	Tsushima	Ryukyu Is.
Cyclopoida			
1. <i>Halicyclops</i> sp.	4	—	2
2. <i>Macrocyclus fuscus</i> (Jurine)	—	18	2
3. <i>Macrocyclus albidus</i> (Jurine)	9	10	137
4. <i>Macrocyclus</i> sp.	3	—	—
5. <i>Ectocyclus phaleratus</i> (Koch)	1	—	5
6. <i>Eucyclus serrulatus</i> (Fisher)	32	189	222
7. <i>Paracyclus fimbriatus</i> (Fisher)	16	9	25
8. <i>Paracyclus affinis</i> (Sars)	—	—	11
9. <i>Ochridacyclus</i> sp.	1	—	—
10. <i>Tropocyclus prasinus</i> (Fisher)	4	10	32
11. <i>Diacyclus languidus</i> (Sars)	—	2	—
12. <i>Mesocyclus leuckarti</i> (Claus)	—	—	7
13. <i>Megacyclus viridis</i> (Jurine)	23	—	—
14. <i>Microcyclus varicans</i> (Sars)	1	6	15
15. <i>Microcyclus bicolor</i> (Sars)	—	—	1
16. <i>Metacyclus</i> sp.	—	—	12
17. <i>Speocyclus yezoensis</i> Ito	5	1	—

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Harpacticoida

1. <i>Nitocra platypus bakeri</i> Chappuis	—	—	9
2. <i>Canthocamptus staphylinus</i> (Jurine)	37	—	—
3. <i>Canthocamptus</i> sp. 3	138	—	—
4. <i>Canthocamptus</i> sp. 5	255	44	—
5. <i>Canthocamptus morimotoi</i> Miura	—	7	—
6. <i>Attheyella coiffaiti</i> Chappuis	79	240	—
7. <i>Attheyella nakaii</i> (Brehm)	38	—	9
8. <i>Attheyella crassa</i> (Sars)	2	1	—
9. <i>Attheyella</i> sp. M	1	2	—
10. <i>Moraria varica</i> (Graeter)	—	—	1
11. <i>Bryocamptus zschokkei</i> (Schmeil)	81	138	62
12. <i>Bryocamptus calvus</i> (Brehm)	165	59	15
13. <i>Bryocamptus nivalis</i> (Willey)	—	—	20
14. <i>Elaphoidella bidens</i> (Schmeil)	—	—	12
15. <i>Elaphoidella grandidieri</i> (Guerne & Richard)	1	—	1
16. <i>Onychocamptus vitiospinulosa</i> (Shen & Tai)	—	—	71

Abbreviations: The following abbreviations are used in Fig. 2 and plates; P1–P5 = legs 1–5, Enp. = endopodite, Fu = caudal rami with a part of the abdomen, f = female, m = male.

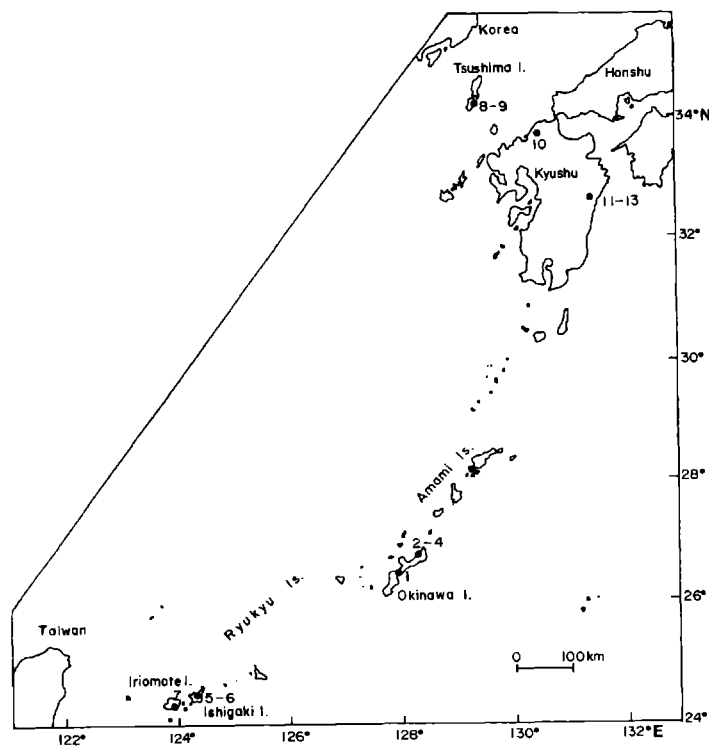


Fig. 1. Sampling localities.

List of Localities and the Species Obtained

No. 1. Yaka, Okinawa I. (26°27.5'N, 125°51.9'E), a small stream, 2 April 1987. *Macrocylops albidus* 16 ♀, 3 ♂; *Macrocylops fuscus* 1 ♀, 1 ♂; *Ectocylops phaleratus* 2 ♀, 1 ♂; *Eucyclops serrulatus* 30 ♀, 5 ♂; *Paracyclops fimbriatus* 2 ♀, 5 ♂; *Paracyclops affinis* 2 ♀; *Tropocyclops prasinus* 2 ♀, 1 ♂; *Mesocyclops leuckarti* 5 ♀, 1 ♂; *Microcyclops varicans* 4 ♀; *Microcyclops bicolor* 1 ♀; *Metacyclops* sp. 8 ♀, 1 ♂; *Nitocra platypus bakeri* 1 ♀; *Moraria varica* 1 ♂; *Bryocamptus zschokkei* 38 ♀, 18 ♂; *Bryocamptus calvus* 4 ♀, 1 ♂; *Elaphoidella bidens* 4 ♀; *Elaphoidella grandidieri* 1 ♀; *Onychocamptus vitiospinulosa* 14 ♀, 1 ♂.

No. 2. Kunigamison, Okinawa I. (26°42.4'N, 128°11.3'E), upper reaches of a stream, 10 January 1989. *Macrocylops albidus* 43 ♀, 15 ♂; *Ectocylops phaleratus* 1 ♀; *Eucyclops serrulatus* 47 ♀, 7 ♂; *Paracyclops fimbriatus* 1 ♂; *paracyclops affinis* 1 ♂; *Microcyclops varicans* 1 ♀, 1 ♂.

No. 3. Kunigamison, Okinawa I. (26°42.4'N, 128°11.3'E), a trickle, 10 January 1989. *Macrocylops albidus* 14 ♀, 19 ♂; *Eucyclops serrulatus* 49 ♀, 1 ♂; *Paracyclops fimbriatus* 2 ♀; *Microcyclops varicans* 1 ♀; *Metacyclops* sp. 3 ♂; *Attheyella nakaii* 2 ♀, 1 ♂; *Bryocamptus zschokkei* 3 ♀, 3 ♂; *Bryocamptus calvus* 9 ♀, 1 ♂; *Elaphoidella bidens* 2 ♀.

No. 4. Kunigamison, Okinawa I. (26°43.2'N, 128°10.5'E), lower reaches of a stream, 10 January 1989. *Macrocylops albidus* 26 ♀, 5 ♂; *Ectocylops phaleratus* 1 ♂; *Eucyclops serrulatus* 53 ♀, 13 ♂; *Paracyclops fimbriatus* 6 ♀, 7 ♂; *Paracyclops affinis* 5 ♀, 3 ♂; *Mesocyclops leuckarti* 1 ♀; *Microcyclops varicans* 7 ♀; *Nitocra platypus bakeri* 8 ♀; *Elaphoidella bidens* 6 ♀; *Onychocamptus vitiospinulosa* 12 ♀, 2 ♂.

No. 5. Ishigaki I. (24°24.0'N, 124°10.0'E), a stream, 11 January 1989. *Halicyclops* sp. 1 ♀; *Eucyclops serrulatus* 16 ♀, 1 ♂; *Bryocamptus nivalis* 1 ♂; *Onychocamptus vitiospinulosa* 37 ♀, 5 ♂.

No. 6. Ishigaki I. (24°25.4'N, 124°12.0'E), a stream, 11 January 1989. *Halicyclops* sp. 1 ♂; *Tropocyclops prasinus* 2 ♀; *Attheyella nakaii* 4 ♀, 1 ♂; *Bryocamptus nivalis* 15 ♀, 3 ♂.

No. 7. Iriomote I. (24°17.8'N, 123°51.4'E), a stream, 13 January 1989. *Macrocylops albidus* 4 ♀, 1 ♂; *Paracyclops fimbriatus* 1 ♀, 1 ♂; *Tropocyclops prasinus* 22 ♀, 5 ♂; *Microcyclops varicans* 1 ♀; *Attheyella nakaii* 1 ♀; *Bryocamptus nivalis* 1 ♀.

No. 8. Izuohara, Tsushima I. (34°13.5'N, 129°17.4'E), trickles, 7 March 1989. *Macrocylops albidus* 10 ♀; *Macrocylops fuscus* 13 ♀, 5 ♂; *Eucyclops serrulatus* 161 ♀, 28 ♂; *Paracyclops fimbriatus* 5 ♀; *Tropocyclops prasinus* 10 ♀; *Microcyclops varicans* 3 ♀; *Canthocamptus* sp. 5 ♀, 2 ♂; *Canthocamptus morimotoi* 3 ♀, 4 ♂; *Attheyella coiffaiti* 13 ♀, 10 ♂; *Attheyella crassa* 1 ♀; *Attheyella* sp. M 1 ♀; *Bryocamptus zschokkei* 2 ♀; *Bryocamptus calvus* 1 ♀, 1 ♂.

No. 9. Izuohara, Tsushima I. (34°13.5'N, 129°17.4'E), a small pathside flow, 7 March 1989. *Paracyclops fimbriatus* 3 ♀, 1 ♂; *Diacyclops languidus* 2 ♀; *Microcyclops varicans* 2 ♀, 1 ♂; *Speocyclops yezoensis* 1 ♂; *Canthocamptus* sp. 5 ♀, 3 ♂; *Attheyella coiffaiti* 120 ♀, 97 ♂; *Attheyella* sp. M 1 ♀; *Bryocamptus zschokkei* 120, 16 ♂; *Bryocamptus calvus* 53 ♀, 4 ♂.

No. 10. Sasaguri, Fukuoka Pref. (33°38.4'N, 130°34.6'E), trickles, 7 March 1989. *Paracy-*

clops fimbriatus 6 ♀; *Megacyclops viridis* 1 ♀; *Speocyclops yezoensis* 5 ♀/*Canthocamptus* sp. 3 ♀, 55 ♂; *Canthocamptus* sp. 5 ♀, 195 ♀, 55 ♂; *Attheyella nakaii* 9 ♀, 5 ♂; *Attheyella coiffaiti* 48 ♀, 31 ♂; *Attheyella* sp. M 1 ♀; *Bryocamptus zschokkei* 62 ♀, 15 ♂; *Bryocamptus calvus* 61 ♀, 11 ♂.

No. 11. Hosomi, Nobeoka, Miyazaki Pref. (32°35.7'N, 131°35.6'E), trickles, 8 March 1989. *Macrocyclus* sp. 2 ♀, 1 ♂; *Eucyclops serrulatus* 5 ♀, 1 ♂; *Paracyclops fimbriatus* 5 ♀, 1 ♂; *Ochridacyclops* sp. 1 ♀; *Tropocyclops pracinus* 4 ♀/*Canthocamptus* sp. 3 ♀, 1 ♂; *Canthocamptus* sp. 5 ♀, 4 ♂, 1 ♂; *Attheyella nakaii* 11 ♀, 12 ♂; *Attheyella crassa* 1 ♂; *Bryocamptus zschokkei* 3 ♀; *Bryocamptus calvus* 36 ♀, 5 ♂.

No. 12. Hosomi, Nobeoka, Miyazaki Pref. (32°35.7'N, 131°35.6'E), a stream, 8 March 1989. *Halicyclops* sp. 4 ♀; *Macrocyclus albidus* 6 ♀; *Paracyclops fimbriatus* 1 ♀/*Bryocamptus calvus* 37 ♀, 5 ♂.

No. 13. Hosomi, Nobeoka, Miyazaki Pref. (32°34.6'N, 131°36.2'E), a ditch by a forest edge, 8 March 1989. *Macrocyclus albidus* 3 ♀; *Ectocyclops phaleratus* 1 ♀; *Eucyclops serrulatus* 23 ♀, 3 ♂; *Paracyclops fimbriatus* 2 ♀, 1 ♂; *Megacyclops viridis* 13 ♀, 9 ♂; *Microcyclus varicans* 1 ♀/*Canthocamptus staphylinus* 32 ♀, 5 ♂; *Attheyella nakaii* 1 ♂; *Attheyella crassa* 1 ♀; *Bryocamptus zschokkei* 1 ♀; *Bryocamptus calvus* 9 ♀, 1 ♂; *Elaphoidella grandidieri* 1 ♀.

Cyclopoida

1. *Halicyclops* sp.

Remarks: This species was previously reported occurring in the Chitose River at a 70 km distance from the estuary (Ishida 1984) and in the tidal reaches of Yoichi River, Hokkaido (Ishida 1989b). As in the case of the Chitose River, this species occurred far from the estuary in the mountain streams of Kyushu and Ishigaki I. (Loc. No. 5, 6 and 12).

2. *Macrocyclus* sp.

Remarks: The occurrence of this *Macrocyclus* species (Ishida 1989a) in Kyushu has been revealed by the sampling at mountain trickles of Loc. No. 11.

Harpacticoida

1. *Nitocra platypus bakeri* Chappuis, 1930 (Plate 1)

Nitocra platypus bakeri Chappuis, 1930, p. 143 (not consulted).

Nitocra platypus bakeri Chappuis. Lang 1948, p. 817; Miura 1962, p. 95; Miura 1984, p. 505.

Materials illustrated: Hichi River, Okinawa I. (Loc. No. 4), 10 January 1989.

Remarks : This species was reported by Miura (1962) from caves of Tokunoshima I., Amami Is., and Okinawa I. Miura (1984) also reported its occurrence in Ishigaki I. In my samples it was found in the streams of Okinawa I. (Loc. No. 1 and 4).

2 . *Canthocamptus staphylinus* (Jurine)

Remarks : The species was found only at a ditch by a forest edge in Kyushu (Loc. No. 13). This is the present known southernmost occurrence in Japan.

3 . *Canthocamptus* sp. 3

Remarks : This species occurred abundantly at trickles in the northwestern part of Kyushu (Loc. No. 10). As was seen in the range of *Canthocamptus* sp. 5 near Kyoto City (Ishida 1989a), this species shows a sympatric distribution with *C.* sp. 5 in this region. Only one individual was caught at trickles in the eastern part of Kyushu (Loc. No. 11).

4 . *Canthocamptus* sp. 5

Remarks : The present study clarified that Kyushu and Tsushima I. are the main distribution ranges of this species, where it occurs abundantly and predominantly (Loc. No. 8., 9, 10 and 11). The isolated population of *Canthocamptus* sp. in a narrow range near Kyoto City, contrary to the ancient glacial relict of *C. mirabilis* suggested by Ishida (1989a), may be the interglacial relict of this species.

5 . *Canthocamptus morimotoi* Miura, 1969

(Plate 2)

Canthocamptus morimotoi Miura, 1969, p. 243.

Materials illustrated : Izuhara, Tsushima I. (Loc. No. 8), 7 March 1989.

Remarks : This species was reported by Miura (1969) from a cave of South Korea. The occurrence in Tsushima I. (Loc. No. 8) is the first record in Japan. As far as the present survey shows, *C. morimotoi* is dominated by the abundant *C.* sp. 5 in Tsushima I.

6 . *Attheyella coiffaiti* Chappuis

Remarks : In the northwestern part of Kyushu and Tsushima I., the predominant *Attheyella* species is replaced by *Attheyella coiffaiti* (Loc. No. 8, 9 and 10).

7 . *Attheyella nakaii* (Brehm)

Remarks : This species occurred widely in Kyushu and Ryukyu Is. (Loc. No. 3, 6, 7, 10, 11

and 13). The species has the widest distribution range among the Japanese endemic harpacticoids, i. e. from the southwestern part of Hokkaido, Northern Japan, to Iriomote I., the southernmost island of Japan.

8. *Attheyella crassa* (Sars)

Remarks : Only a few individuals were caught on Kyushu and Tsushima I. (Loc. No. 8, 11 and 13).

9. *Attheyella* sp. M

Remarks : Only a few individuals were caught on Kyushu and Tsushima I. (Loc. No. 8, 9 and 10).

10. *Moraria varica* (Graeter)

Remarks : Only one individual was caught at Yaka, Okinawa I. (Loc. No. 1). This is the record of the southernmost distribution in Japan.

11. *Bryocamptus zschokkei* (Schmeil)

Remarks : This species was found commonly in Kyushu, Tsushima I. and Okinawa I. (Loc. No. 1, 3, 8, 9, 10, 11 and 13). No individuals were caught at Ishigaki I. and Iriomote I.

12. *Bryocamptus calvus* (Brehm)

Remarks : As for the previous *B.* species, *Bryocamptus calvus* occurred abundantly in Kyushu, Tsushima I. and Okinawa I. (Loc. No. 1, 3, 8, 9, 10, 11, 12 and 13), and no individuals were caught at Ishigaki I. and Iriomote I.

13. *Bryocamptus nivalis* (Willey)

Remarks : A considerable number of *Bryocamptus nivalis* were caught in streams on Ishigaki I. and Iriomote I. (Loc. No. 5, 6 and 7). As Fig. 2 shows, the individuals of both sexes are lacking the spinular rows on the 4th thoracic segment. However, the ornamentation of the endopodites of legs 2-4 of the female, an important characteristic of the species, has no variation.

14. *Elaphoidella bidens* (Schmeil)

Remarks : This cosmopolitan was caught in the streams on Okinawa I. (Loc. No. 1, 3 and 4).

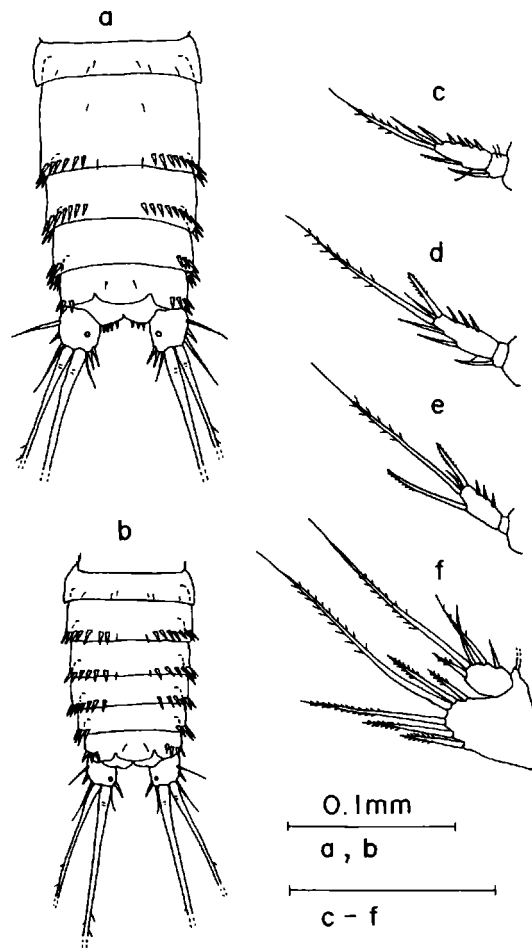


Fig. 2. *Bryocamptus nivalis* (Willey) of Ishigaki I. (Loc. No. 6). a-4th thoracic segment and abdomen of female; b- — of male; c-endopodite of P2 of female; d-endopodite of P3 of female; e-endopodite of P4 of female; f-P5 of female.

15. *Elaphoidella grandidieri* (Guerne & Richard 1893)

(Plate 3)

Canthocamptus grandidieri Guerne & Richard, 1893, p. 234 (not consulted)

Elaphoidella grandidieri (Guerne & Richard). Lang, 1948, p. 1136; Tai & Song 1979, p. 248; Kikuchi 1985, p. 1.

Canthocamptus grandidieri de Guerne & Richard. Hamond 1987, p. 1078.

Materials illustrated : a & g Hosomi, Miyazaki Pref. (Loc. No. 13), 8 March 1989; b-f Yaka, Okinawa I. (Loc. No. 1), 2 April 1987.

Remarks : This lowland water species was caught on Kyushu and Okinawa I. (Loc. No. 1

and 13).

16. *Onychocamptus vitiospinulosa* (Shen & Tai, 1963)
(Plate 4)

Laophonte vitiospinulosa Shen & Tai 1963, p. 423.

Onychocamptus vitiospinulosa (Shen & Tai). Tai and Song 1979, p. 264.

Materials illustrated : Ishigaki I. (Loc. No. 5), 11 January 1989.

Remarks : A number of individuals were caught in the streams on Okinawa I. and Ishigaki I. (Loc. No. 1, 4 and 5).

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九州, 対馬および沖縄諸島の山地水域のかいあし類

石田 昭夫

九州, 対馬および沖縄諸島の山地水域から採集した13試料に含まれていたかいあし類について種の同定と個体数の算定を行った。えられた種はケンミジンコ17種とソコミジンコ16種であった。ソコミジンコは16種中6種が北海道と共通で13種が本州と共通である。それぞれの種について分布域, 密度, 生息場所等についてのべた摘要と, 本研究で新たにえられた種について記述した。

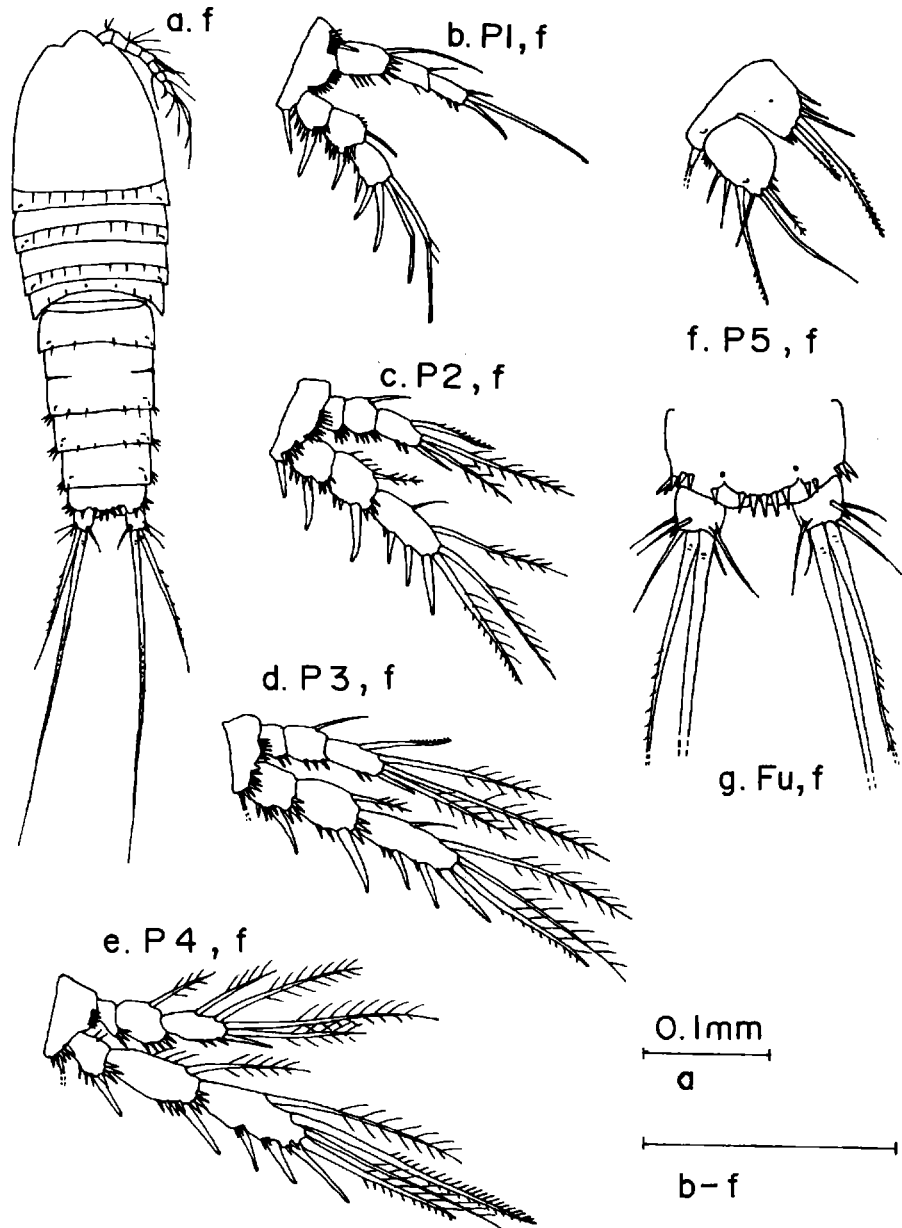


Plate 1. *Nitocra platypus bakeri* Chappuis.

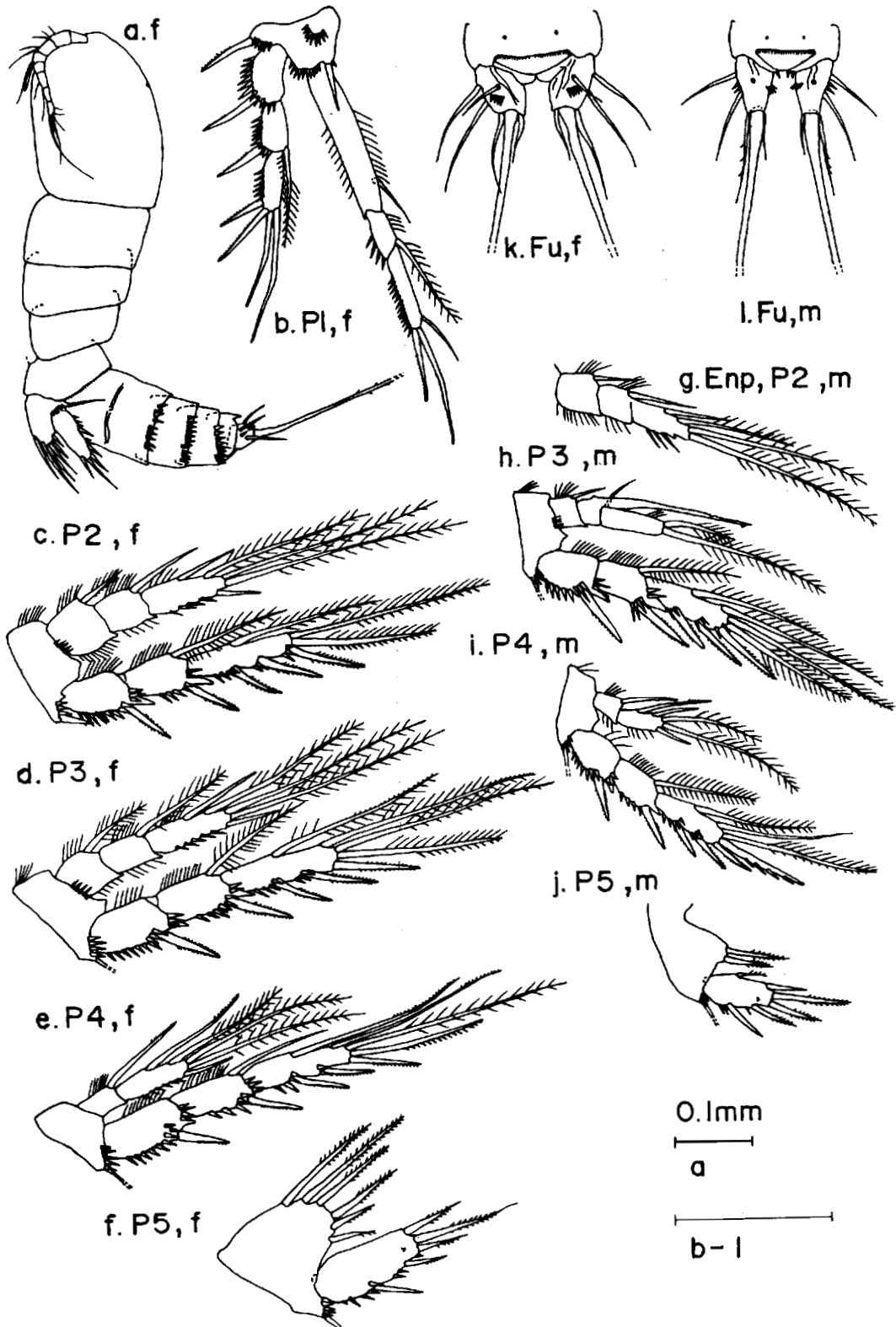


Plate 2. *Canthocamptus morimotoi* Miura.

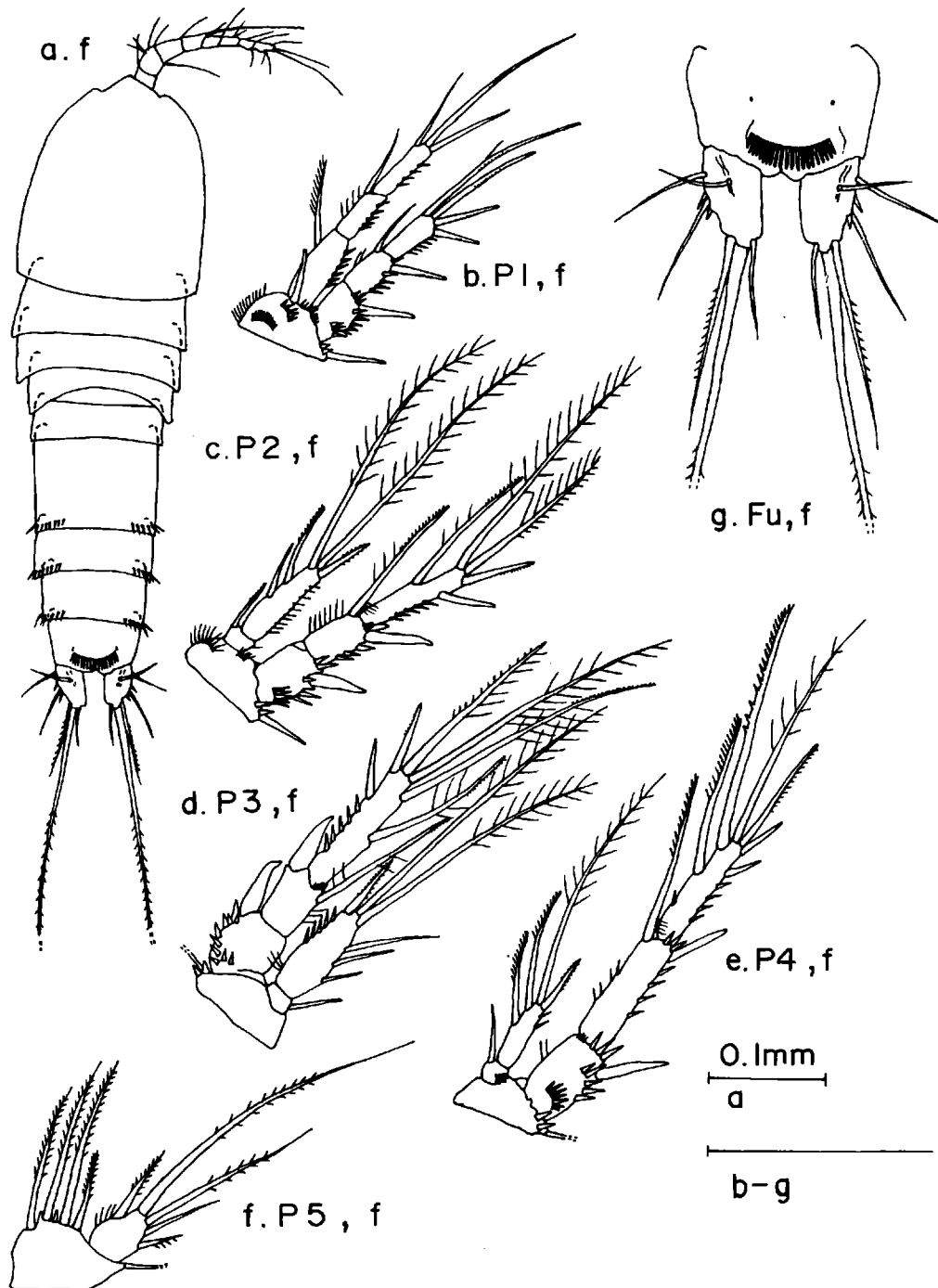


Plate 3. *Elaphoidella grandidieri* (Guerne & Richard).

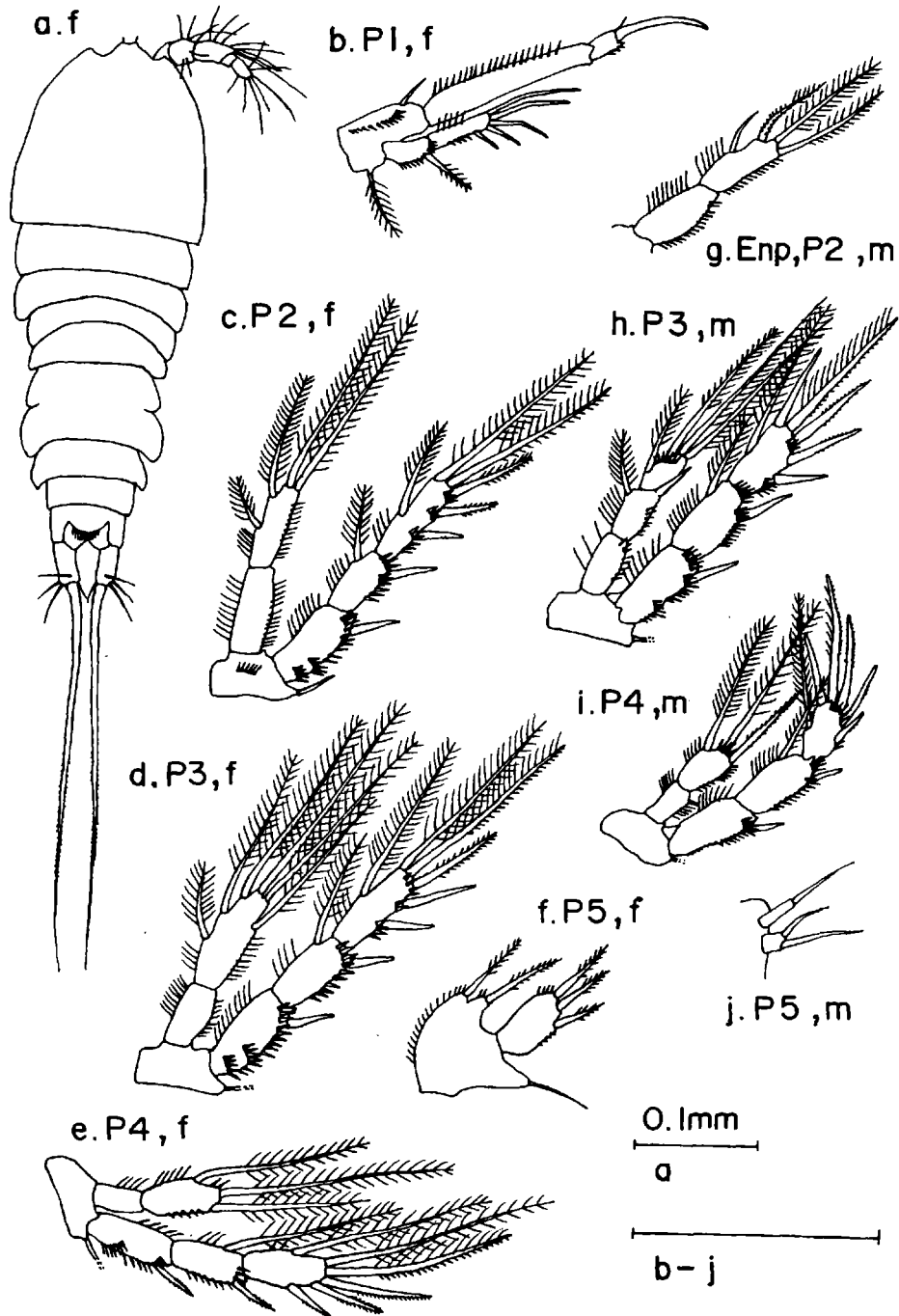


Plate 4. *Onychocamptus vitiospinulosa* (Shen & Tai).