ADDITIONAL REPORT ON CALANOID COPEPODS FROM THE IZU REGION
PART 3-A. *EUAETIDEUS, AETIDEOPSIS, CHIRIDIUS, GAIDIUS,* AND *GAETANUS*

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With 11 Text-figures

In the family Aetideidae the copepods belonging to *Euchirella* and *Pseudochirella* have been reported in the previous paper (TANAKA and OMORI, 1969). The present report deals with taxonomy of the remaining 32 species in 10 genera obtained from Sagami and Suruga Bays and their southern waters (Table 1). And in this first half (A) of the present report Part 3, 24 species in 5 genera are explained. The sampling data of 29 samples, taken in 1964 and 1965, have been given in Part 1 of the report. All specimens have been deposited in the Ocean Research Institute, University of Tokyo.

Table 1. List of species

1. *Euaetideus acutus* (FARRAN)	17. *Gaetanus armiger* GIESBRECHT
2. *E. bradyi* (A. SCOTT)	18. *G. brevicornis* ESTERLY
3. *Aetideopsis cristata* TANAKA	19. *G. kruppii* GIESBRECHT
4. *A. multiserrata* (WOLFENDEN)	20. *G. latifrons* SARS
5. *A. rostrata* SARS	21. *G. miles* GIESBRECHT
6. *Chiridius armatus* (BOECK)	22. *G. minispinus* TANAKA
7. *C. gracilis* FARRAN	23. *G. minor* FARRAN
8. *C. molestus* TANAKA	24. *G. pileatus* FARRAN
9. *C. poppei* GIESBRECHT	25. *Chirundina streetsii* GIESBRECHT
10. *Gaidius brevispinus* (SARS)	26. *Undeuchaeta magna* TANAKA
11. *G. pungens* GIESBRECHT	27. *U. major* GIESBRECHT
12. *G. robustus* (SARS)	28. *U. plumosa* (LUBBOCK)
13. *G. tenuispinus* (SARS)	29. *Pseudeuchaeta brevicauda* SARS
14. *G. variabilis* BRODSKY	30. *Valdiviella insignis* FARRAN
15. *G.* species	31. *V. origarthra* STEUER
16. *Gaetanus ?antarcticus* WOLFENDEN	32. *Chiridiella macrodactyla* SARS

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Among the specimens examined, *Chiridius armatus, Gaetanus antarcticus, Gaetanus brevicornis, Gaetanus latifrons,* and *Gaetanus minispinus* have not previously been recorded from Japanese waters.

Regarding *Gaidius,* the genus seems to be composed of 12 species: *G. affinis* SARS, *G. brevicaudatus* SARS, *G. brevispinus* (SARS), *G. inermis* (SARS), *G. intermedius* WOLFENDEN, *G. robustus* (SARS), *G. brevirostris* BRODSKY, *G. columbiae* PARK, *G. minutus* SARS, *G. pungens* GIESBRECHT, *G. tenuispinus* (SARS), and *G. variabilis* BRODSKY. The first 6 species each have a 3-segmented exopod in the 1st leg; the remaining species have an incompletely 2-segmented exopod. Except *G. brevicaudatus,* the species belonging to the first group have a lamella on the anterior margin of the 1st basal segment of the maxilliped. The species of the latter group lack this lamella. TANAKA (1957a) reported *G. brevispinus, G. minutus, G. tenuispinus,* and *G. moderatus* from the Izu region. In addition, TANAKA and OMORI (1967) found *G. robustus* (as *Pseudogaetanus robustus*). Except for *G. minutus,* these species were obtained in the present collection. The examination of these specimens revealed that *G. moderatus* is identical with *G. variabilis,* and the male described as *G. tenuispinus* by TANAKA is the male of *G. pungens.* As pointed out by PARK (1967), *G. minutus* from the Izu region is *G. columbiae.*

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EUAETIDEUS SARS, 1925

Euaetideus acutus (FARRAN, 1929)

Aetideus acutus FARRAN, 1929, p. 228, fig. 5; TANAKA, 1957a, p. 36, fig. 25.
Euaetideus acutus (Farran).-VERVOORT, 1957, p. 51, figs. 28–30; BRODSKY, 1962, p. 119, fig. 22; PARK, 1968, p. 545, pl. 5, figs. 8–14.

Occurrence: Sta. 93–1, 1♀; Sta. 97–2, 1♀; Sta. 115–1, 1♀; Sta. 115–2, 1♀; Sta. 117–1, 1♀.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm)	
			♀	♂
FARRAN, 1929	South Atlantic	0	1.68–1.80	–
FARRAN, 1936	Great Barrier Reef	225	1.56–1.62	1.23–1.30
TANAKA, 1957a	Izu region	0	1.66	–
VERVOORT, 1957	Malay Archipelago	–	1.70	–
BRODSKY, 1962	Northwestern Pacific	0	1.57–1.68	–
GRICE, 1962	Tropical Pacific	61–146	1.55–1.70	–
PARK, 1968	Central North Pacific	0–140	1.65–1.78	–
Present record	Izu region	0–620	1.56–1.78	–

Euaetideus bradyi (A. SCOTT, 1909)

Aetideus bradyi A. SCOTT, 1909, p. 38, pl. 5, figs. 1–12; TANAKA, 1957a, p. 34, fig. 24.
Euaetideus bradyi (A. SCOTT).-WILSON, 1950, p. 202, pl. 7, figs. 70, 71; VERVOORT, 1957, p. 48, figs. 20b, 21–23.

Occurrence: Sta. 114, 1♀.

Distribution and *size variation*:

Author	Locality	Depth (m)	Length (mm) ♀	♂
A. SCOTT, 1909	Malay Archipelago	0–700	1.8	–
WILSON, 1950	Off British Columbia	0–550	–	1.50
TANAKA, 1957a	Izu region	0	1.46	–
VERVOORT, 1957	East Indian Ocean	–	1.69	–
GRICE, 1962	Tropical Pacific	72–146	1.60–1.70	–
VERVOORT, 1963	Gulf of Guinea	0–100	1.38–1.67	–
Present record	Izu region	0–930	1.50	–

AETIDEOPSIS SARS, 1903

Aetideopsis cristata TANAKA, 1957

Aetideopsis cristata TANAKA, 1957a, p. 42, fig. 28.

Occurrence: Sta. 93–2, 1♀; Sta. 108, 28♀, 1♂.

Distribution and *size variation*:

Author	Locality	Depth (m)	Length (mm) ♀	♂
TANAKA, 1957a	Izu region	0–1000	3.84	3.25
Present record	Izu region	0–1000	3.60–3.80	3.80

Aetideopsis multiserrata (WOLFENDEN, 1904)

Faroella multiserrata WOLFENDEN, 1904, p. 117, pl. 9, figs. 26–28.
Aetideopsis multiserrata (WOLFENDEN).-SARS, 1925, p. 43, pl. 14, figs. 4–8; TANAKA, 1957a, p. 37, fig. 26.
Chiridius nasutus WITH, 1915, p. 81, text-fig. 18, pl. 2, fig. 4.

Occurrence: Sta. 83, 4♀; Sta. 84–2, 7♀; Sta. 93–1, 1♀; Sta. 94, 2♀; Sta. 98, 1♀; Sta. 108, 2♀; Sta. 111–1, 1♀; Sta. 112, 1♀; Sta. 113, 1♀; Sta. 114, 2♀; Sta. 115–2, 1♀.

Remarks: In the present specimens the integument is finely granulated, as

VERVOORT (1951) observed in *Aetideopsis minor* WOLFENDEN. The specimen agrees quite well with the description by WITH (1915) in the proportional length of the outer marginal spine of the 1st segment of the exopod of the 1st leg. The numbers of teeth on the terminal spine of the exopod of the 2nd to 4th legs are 30 to 40, as WITH (1915) reported. The cutaneous pores are observed on the exopodal segments of the 2nd to 4th legs.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm) ♀	♂
WOLFENDEN, 1904	North Atlantic	366–1100	3.54	–
WITH, 1915	North Atlantic	500– 600	2.88	–
SARS, 1925	West of the Azores	0–1200	2.80	–
FARRAN, 1926	Bay of Biscay	915–2290	2.64	–
BRODSKY, 1950	Central Arctic	100–1400	2.8 –3.5	–
TANAKA, 1957a	Izu region	0–1000	3.13	3.04
VERVOORT, 1963	Gulf of Guinea	0– 100	2.80	–
GRICE and HULSEMANN, 1965	Northeast Atlantic	2000–3000	2.20	–
Present record	Izu region	0– 520	2.75–3.40	–

Aetideopsis rostrata SARS, 1903

(Fig. 1, a-g)

Aetideopsis rostrata SARS, 1903, p. 160, suppl. pls. 4, 5; WITH, 1915, p. 86, text-fig. 22, pl. 2, fig. 6.
Aetideopsis divergens TANAKA, 1957a, p. 40, fig. 27.

Occurrence: Sta. 93–1, 1♀; Sta. 93–2, 1♀.

Descriptive notes: Female, 3.14 mm. The cephalothorax and abdomen are in the proportional lengths 73:27. The integument is finely granulated. The head is separated from the 1st thoracic segment. The frontal margin of the head is produced when viewed from the dorsal. The rostrum is bifurcate; its rami are widely separated and very strong; they are directed downward and then upward. The lateral expansions of the last thoracic segment extend to the middle of the genital segment.

The abdominal segments and furca are in the following proportional lengths:

segment	1–2	3	4	5	furca	
	37	19	14	12	18	=100

The genital segment is produced moderately below; it is about as long as wide. The first 3 segments are fringed with fine teeth on the distal margin: the furca is

1.5 times as long as wide.

The 1st antenna extends to the distal margin of the 3rd abdominal segment: the segments are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8–9	10	11	12	13	14	15
	57	68	26	26	26	29	29	65	26	26	26	35	39	42

16	17	18	19	20	21	22	23	24	25
42	45	48	57	65	41	51	57	55	19=1000

In the 2nd antenna the exopod is longer than the endopod: the endopod is

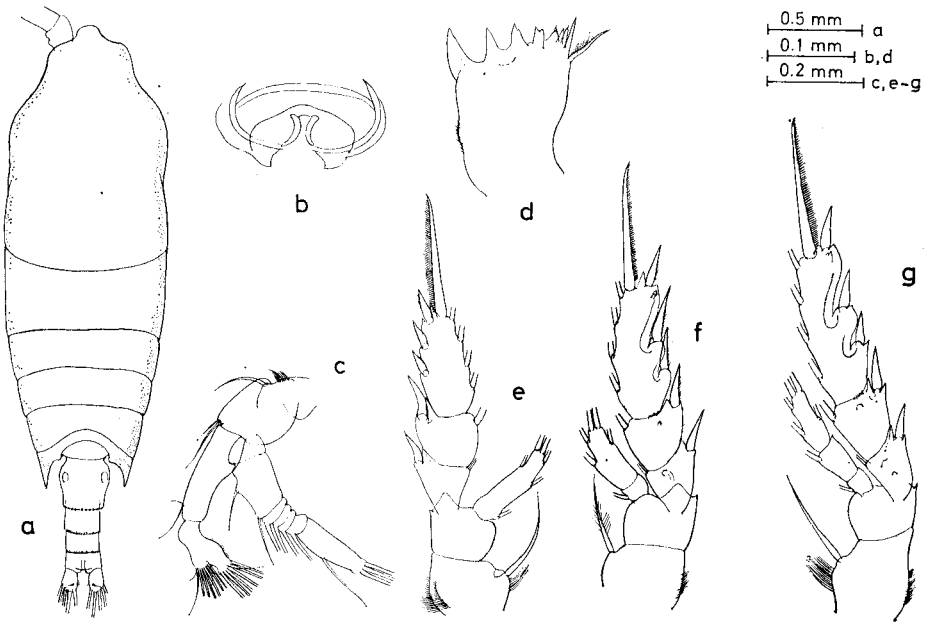

Fig. 1. *Aetideopsis rostrata* (SARS), female: a, whole body, dorsal view; b, genital area; c, 2nd antenna; d, cutting blade of mandible; e, 1st leg; f, 2nd leg; g, 3rd leg.

furnished with 6 long setae and 1 small appendicular seta on the outer lobe and 9 setae on the inner lobe: the 2nd segment of the exopod has 2 marginal setae. In the mandible the endopod is about half as long as the exopod; the 1st and 2nd segments of the endopod have 2 and 10 setae respectively; the cutting blade bears 8 teeth and a marginal spine. The 1st maxilla has the following number of setae on the various lobes: 9 on the outer lobe, 10 on the exopod, 6+3+4 on the 3rd to 1st segments of the endopod, 5 on the 2nd basal segment, 4 on the 3rd inner lobe, 4 on the 2nd inner lobe, and 14 on the 1st inner lobe. The 2nd maxilla has 6 long setae on the endopod. In the maxilliped the 1st basal segment is shorter than the 2nd,

and has a small seta on the 1st lobe.

The 1st leg has a 3-segmented exopod and 1-segmented endopod; the exopod is furnished with long and slender spines on the 1st to 3rd segments respectively; the spine on the 2nd segment reaches almost the middle of the 3rd segment. The 2nd leg has a 3-segmented exopod and 2-segmented endopod; the terminal spine of the exopod has about 55 teeth; a cutaneous pore is found on each segment of the exopod. The 3rd and 4th legs have 3-segmented exopods and endopods; the terminal spines of the exopod of these legs have 43 and 45 teeth respectively.

Remarks: *Aetideopsis rostrata* resembles *A. minor* WOLFENDEN or *A. trichechus* VERVOORT both in general appearance and in the structure of the mouthparts and swimming legs. However, it differs from *A. minor* in the shape of the rostrum which is more divergent than in *A. minor*. VERVOORT (1949) stated that *A. minor* is entirely an Antarctic form. *A. rostrata* differs from *A. trichechus* in having long outer marginal spines on the 1st and 2nd segments of the exopod of the 1st leg.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm)	
			♀	♂
SARS, 1903	Norwegian Sea	500–1000	4.40	–
WITH, 1915	North Altantic	0– 800	3.4 –3.9	–
BRODSKY, 1950	Arctic Ocean	400–2000	4.0 –4.4	–
TANAKA, 1957a	Izu region	0– 200, 600–1000	3.01	3.13
Present record	Izu region	0– 620	3.10–3.14	–

CHIRIDIUS GIESBRECHT, 1892

Chiridius armatus (BOECK, 1872)

(Fig. 2, a-k)

Euchaeta armata BOECK, 1872, p. 39.

Chiridius armatus (BOECK).-SARS, 1903, p. 27, pls. 15, 16; WITH, 1915, p. 77, text-fig. 17, pl. 2, fig. 3; WILSON, 1950, p. 189, pl. 22, fig. 310; MATTHEWS, 1964, p. 6, figs. 2, 4–6.

Pseudaetideus armatus (BOECK).-WOLFENDEN, 1904, p. 115, pl. 9, figs. 29–31; BRODSKY, 1950, p. 154, fig. 70.

Occurrence: Sta. 93–1, 1♀; Sta. 108, 1♀.

Descriptive notes: Female, 3.84 mm. The cephalothorax and abdomen are in the proportional lengths 77:23. The integument is finely granulated. The head is fused with the 1st thoracic segment; the 4th and 5th segments are partially fused; the lateral expansions of the last thoracic segment extend nearly to the distal one-third of the genital segment. The frontal margin of the head is obtusely rounded.

The rostrum is small, bifurcate; the rami are set close together; the basal part is not hollowed.

The abdominal segments and furca are in the following proportional lengths:

segment	1–2	3	4	5	furca	
	46	15	15	9	15	=100

The genital segment is 1.2 times as long as wide; all but the anal segment are striated on the distal margin; the furca is a little longer than wide.

The 1st antenna extends to the distal margin of the 2nd abdominal segment. The segments are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8–9	10	11	12	13	14	15
	72	69	29	26	29	29	29	61	26	29	29	32	35	37

16	17	18	19	20	21	22	23	24	25	
43	43	40	60	66	40	52	58	49	17	=1000

In the 2nd antenna the exopod is 1.3 times as long as the endopod; the endopod has 7 setae on the outer lobe, and 9 setae on the inner lobe. The mandibular palp has 2 marginal setae: there is a ridge with a row of spinules. The 1st maxilla has 7 long and 2 short setae on the outer lobe, 10 setae on the exopod, 6+3+4 setae on the 3rd to 1st segments of the endopod, 5 setae on the 2nd basal segment, 4 setae on each of the 3rd and 2nd inner lobes, and 14 setae on the 1st inner lobe. The 2nd maxilla has 6 long and 3 short setae on the apical portion; 3 setae on each of the 1st to 5th lobes. In the maxilliped the 2nd basal segment is longer than the 1st basal segment; the 1st lobe is represented by a very small seta.

The 1st leg has a 3–segmented exopod and 1–segmented endopod; the 1st segment of the exopod has an outer marginal spine reaching the distal margin of the 2nd segment. The 2nd leg has a 3–segmented exopod; the endopod is incompletely fused; the anterior surface of the exopod is provided with 3 cutaneous pores on the 3rd segment, 3 pores on the 2nd segment, and 1 pore on the 1st segment; the endopod has 2 minute pores on the distal portion; the terminal spine of the exopod is furnished with 36 teeth. The 3rd leg has a 3–segmented exopod and 2–segmented endopod; the exopod has 3, 2 and 1 pores on the 3rd to 1st segments respectively; there are no pores on the endopod; the terminal spine of the exopod has 33 teeth. The 4th leg has a 3–segmented exopod and endopod; the terminal spine of the exopod has 33 teeth.

Remarks: Although the present specimens have slightly shorter furcal rami, they agree fairly well with those described by SARS (1903) and WITH (1915). Dr. J. BRADFORD (personal communication) of the New Zealand Oceanographic Institute has called attention to the number and position of the cutaneous pores on the

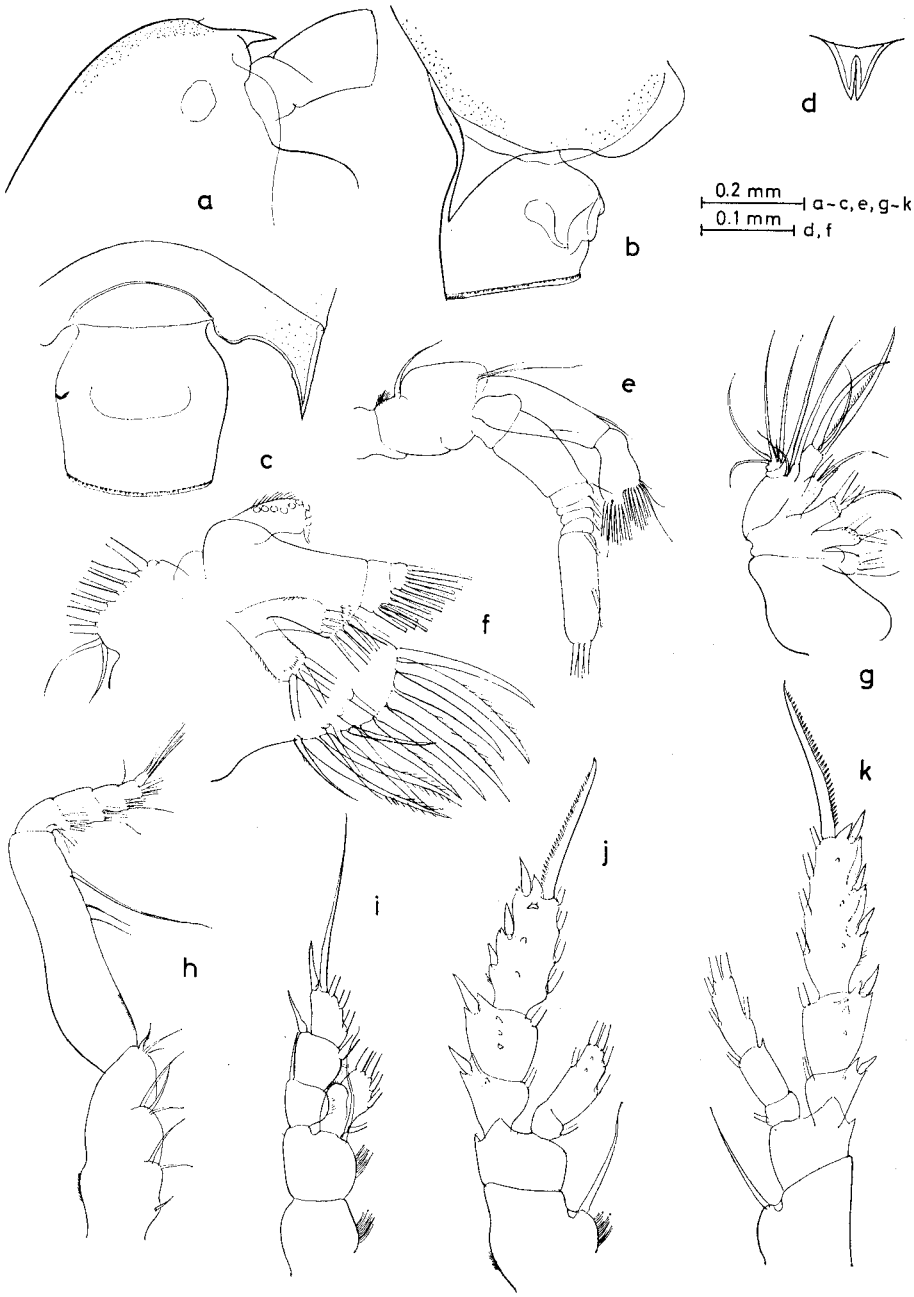

Fig. 2. *Chiridius armatus* (BOECK), female: a, head, lateral view; b, last thoracic segment and genital segment, lateral view; c, the same, dorsal view; d, rostrum; e, 2nd antenna; f, 1st maxilla; g, 2nd maxilla; h, maxilliped; i, 1st leg; j, 2nd leg; k, 4th leg.

swimming legs of copepods, and has stressed the importance of the pores for the identification of the species of *Chiridius* and *Aetideopsis*. Recently, MATTHEWS (1964) showed several interesting biological features, i.e., annual cycle, development and seasonal size-fluctuations, of *Chiridius armatus* near the 240 m sea-floor off Bergen, Norway. He proposed that the name *Pseudaetideus* should be transferred to the genus *Chiridius*, because the characters given by WOLFENDEN (1904) are insufficient for the establishment of the new genus.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm) ♀	♂
SARS, 1903	Norwegian waters	183–550	4.0	4.0
FARRAN, 1903	Off Ireland	0	4.0	–
WOLFENDEN, 1904	Faröe Channel	–	3.68	<3.68
WITH, 1915	North Atlantic	0–300	3.60–4.43	3.66
FARRAN, 1926	Bay of Biscay	366–730	3.2 –3.6	–
WILSON, 1950	Off Galapagos Is.	0–550	–	–
BRODSKY, 1950	Arctic Ocean	<200	3.3 –4.2	2.9 –4.0
VERVOORT, 1963	Gulf of Guinea	0–100	3.20–3.60	–
MATTHEWS, 1964	Off Bergen	near bottom(240)	2.8 –3.6*	2.4 –3.1*
Present record	Izu region	0–620	3.33–4.00	–

*metasome length

Chiridius gracilis FARRAN, 1908

Chiridius gracilis FARRAN, 1908, p. 30, pl. 2, figs. 1–3; TANAKA, 1937, p. 256, fig. 6; TANAKA, 1957a, p. 48, fig. 30; VERVOORT, 1957, p. 55.

Occurrence: Sta. 83, 8♀; Sta. 84–2, 9♀; Sta. 93–1, 3♀; Sta. 93–2, 1♀; Sta. 94, 5♀; Sta. 95, 2♀; Sta. 96, 1♀; Sta. 97–2, 2♀, 2♂; Sta. 98, 8♀; Sta. 108, 9♀, 2♂; Sta. 109, 3♀; Sta. 110, 1♀, 1♂; Sta. 111–1, 4♀; Sta. 111–2, 2♀; Sta. 113, 3♀; Sta. 115–1, 1♀; Sta. 120, 1♀; Sta. 122, 1♀.

Remarks: *Chiridius gracilis* closely resembles *C. poppei*. The differences between these two species are discussed by VERVOORT (1957).

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm) ♀	♂
FARRAN, 1908	Irish waters	510–1830	2.4 –2.8	–
A. SCOTT, 1909	Malay Archipelago	0–1000	2.4	–
WITH, 1915	North Atlantic	0–1500	2.69	–
SEWELL, 1929	Arabian Sea	0–1280	2.2	–

FARRAN, 1936	Great Barrier Reef	0– 600	2.70	–
TANAKA, 1937	Suruga Bay	250– 500	2.57–2.64	–
WILSON, 1950	Philippine waters	0	–	–
TANAKA, 1957a	Izu region	0–1000	2.55	2.32
VERVOORT, 1957	Sub-antarctic	0– 750	2.79	–
Present record	Izu region	0– 360	2.40–2.87	2.03–2.25

Chiridius molestus TANAKA, 1957

Chiridius molestus TANAKA, 1957a, p. 53, fig. 33.

Occurrence: Sta. 93–1, 2♂.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm)	
			♀	♂
TANAKA, 1957a	Izu region	0–1000	–	2.36
Present record	Izu region	0– 620	–	2.02–2.13

Chiridius poppei GIESBRECHT, 1892

Chiridius poppei GIESBRECHT, 1892, p. 224, pl. 14, figs. 14–18, pl. 36, figs. 10–12; TANAKA, 1937, p. 254, fig. 5; 1957a, p. 50, fig. 31; GRICE, 1962, p. 192, pl. 8, figs. 5–7.

Occurrence: Sta. 83, 13♀, 1♂; Sta. 84–2, 1♀; Sta. 93–2, 6♀; Sta. 98, 1♀, 1♂; Sta. 108, 1♀; Sta. 109, 1♀, 1♂; Sta. 110, 2♀, 1♂; Sta. 111–1, 1♀; Sta. 111–2, 2♀; Sta. 112, 1♀; Sta. 113, 1♀; Sta. 115–2, 1♀; Sta. 116, 2♀.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm)	
			♀	♂
GIESBRECHT, 1892	Mediterranean Sea	–	1.8	–
A. SCOTT, 1909	Tropical Atlantic	0–1536	1.8	–
WOLFENDEN, 1911	North Atlantic	0–3000	1.9	–
SARS, 1925	North Atlantic	0–2025	2.0	–
FARRAN, 1926	Bay of Biscay	183	1.92	–
FARRAN, 1929	Off New Zealand	0	1.92–2.00	–
ROSE, 1937	Mediterranean Sea	–	–	1.7
TANAKA, 1957a	Izu region	200– 400	1.83–1.87	1.52
GRICE, 1962	Tropical Pacific	72– 146	1.59–1.83	–
VERVOORT, 1963	Gulf of Guinea	0– 10	2.20	–
Present record	Izu region	0– 400	1.76–2.26	1.65–2.13

GAIDIUS GIESBRECHT, 1895

Gaidius brevispinus (SARS, 1900)

Chiridius brevispinus SARS, 1900, p. 68, pl. 19, figs. 1–11.
Gaidius brevispinus (SARS).-SARS, 1903, p. 162, suppl. pl. 6, fig. 2; WITH, 1915, p. 94, text-fig. 24, pl. 2, fig. 7, pl. 3, fig. 1; TANAKA, 1957a, p. 62, fig. 38 a-e (♀ only).
Gaidius major WOLFENDEN, 1904, p. 114, pl. 9, figs. 7, 8.

Occurrence: Sta. 83, 1♀; Sta. 84–2, 1♀; Sta. 108, 3♀; Sta. 110, 1♀; Sta. 111–1, 1♀; Sta. 111–2, 1♀; Sta. 112, 1♀; Sta. 115–2, 1♀; Sta. 117–2, 1♀; Sta. 121–2, 2♀.

Remarks: In the 2nd antenna of the female the exopod is about 1.5 times as long as the endopod; the endopod has 6 setae on the outer lobe and 7 setae on the inner lobe. The maxilliped has a lamella on the 1st basal segment. The 1st leg has 3–segmented exopod. The examination of the male specimen described by TANAKA (1957a) as *G. brevispinus* indicated that it was not *G. brevispinus*; it lacks the minute marginal spine on the 3rd segment of the exopod of the left 5th leg. The TANAKA's male specimen may be *G. brevicaudatus* or *G. intermedius*.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm) ♀	♂
SARS, 1900	Arctic Ocean	–	4.80	–
WOLFENDEN, 1904	Faröe Channel	–	4.65	3.10
WITH, 1915	Denmark Strait	0–1800	4.05	3.34
BRODSKY, 1948	Sea of Japan	200– 500	3.9 –4.8	3.01–3.35
TANAKA, 1957a	Izu region	0–1000	4.4	–
Present record	Izu region	0– 740	4.30–4.90	–

Gaidius pungens GIESBRECHT, 1895

(Fig. 3, a-i)

Gaidius pungens GIESBRECHT, 1895, p. 248, pl. 1, figs. 1–4; VERVOORT, 1949, p. 10, fig. 4.
Gaidius tenuispinus (♂).-TANAKA, 1957a, p. 60, fig. 37 f-k.

Occurrence: Sta. 114, 1♂; Sta. 117–1, 1♂.

Descriptive notes: Male, 2.28 mm. The cephalothorax and abdomen are in the proportional lengths 77:23. The cephalothorax is 2.3 times as long as wide. The last thoracic segment has lateral dorsal spines; the spines are slender, reaching the proximal one-third of the 1st abdominal segment. The rostrum is uni-acuminate, though bifid at the apex; it is small and directed downward.

The abdominal segments and furca are in the following proportional lengths:

segment	1	2	3	4	5	furca	
	20	28	20	15	4	13	=100

The 2nd to 4th segments are fringed with fine teeth on the distal margin; the furca is a little longer than wide.

The 1st antenna extends to the distal margin of the 4th abdominal segment; the segments are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8–9–10	11	12–13	14	15	16
right	54	49	28	22	28	28	28	65	22	60	38	44	49
left	56	52	28	23	28	28	28	73	22	62	40	46	52

17	18	19	20–21	22	23	24–25	
54	54	65	107	70	65	70	=1000
46	52	69	108	64	58	64	=1000

In the 2nd antenna the exopod is slightly longer than the endopod; the 2nd segment of the exopod has 2 inner marginal setae; the endopod has 6 long setae on the outer lobe, and 5 long and 2 short setae on the inner lobe. The mandibular palp is small but robust, and has a marginal seta; the endopod has 9 setae. In the 1st maxilla the outer lobe has 7 setae; the exopod has 11 setae; the endopod including the 2nd basal segment has 10 setae; the 1st to 3rd inner lobes are reduced. The 2nd maxilla is considerably reduced. The maxilliped is slender; the 2nd basal segment is longer than the 1st basal segment; the endopod has 4, 4, 3, 3+1, and 4 setae on the 1st to 5th segments respectively.

In the 1st leg the 1st and 2nd segments of the exopod are fused; the 2nd segment of the exopod is furnished with a minute spine and a small process on the outer distal margin; the 3rd segment of the exopod is furnished with a small process on the outer margin. The 2nd leg has a 3-segmented exopod and 1-segmented endopod; the terminal spine of the exopod has 27 teeth. The 3rd and 4th legs each have a 3-segmented exopod and endopod. The 5th pair of legs has a structure similar to that in *G. tenuispinus*; the endopod of the left leg is longer than half the length of the 1st segment of the exopod of the same leg, and has a fine seta at the apex; the 2nd segment of the exopod of the left leg is swollen on the inner margin; the distal end of the same segment has a small brush of hairs.

Remarks: The male closely resembles *G. tenuispinus* or *G. variabilis*. However, it differs from them in its small size and in having a 1-segmented endopod in the 2nd leg. The endopod of the left 5th leg is much shorter in proportion when compared with those of the latter 2 species.

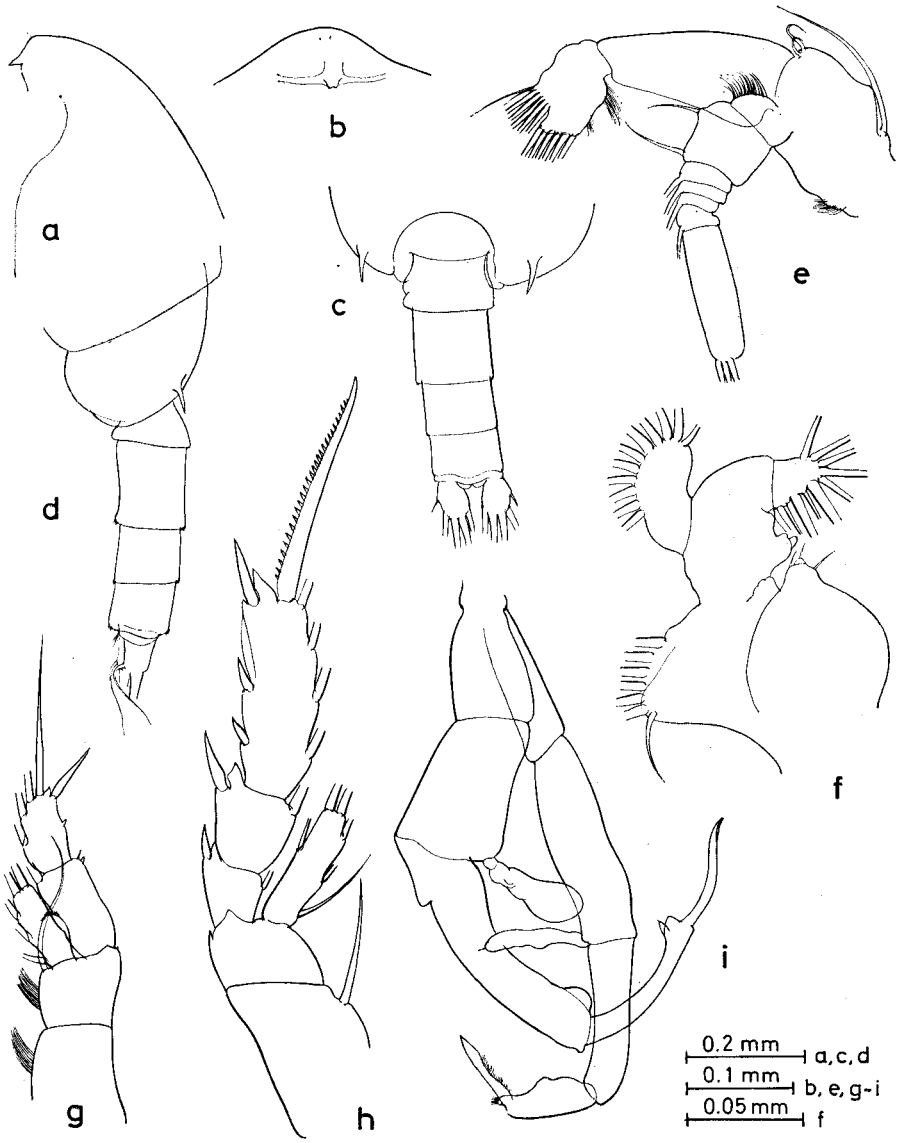

Fig. 3. *Gaidius pungens* GIESBRECHT, male: a, head, lateral view; b, rostrum, ventral view; c, last thoracic segment and abdomen, dorsal view; d, the same, lateral view; e, 2nd antenna; f, 1st maxilla; g, 1st leg; h, 2nd leg; i, 5th pair of legs.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm) ♀	♂
GIESBRECHT, 1895	Off California	0– 550	3.2	–
VERVOORT, 1949	Flores Sea	0–2000	2.65	–
TANAKA, 1957a	Sagami Bay	0–1000	–	2.07
Present record	Izu region	0– 930	–	2.08–2.28

Gaidius robustus (SARS, 1905)

(Fig. 4, a-h)

Gaetanus robustus SARS, 1905, p. 11; SARS, 1925, p. 63, pl. 19, figs. 1, 2.
Gaidius robustus (SARS).-GRICE and HULSEMANN, 1967, p. 24, figs. 60–64.
Mesogaidius maximus (WOLFENDEN).-WOLFENDEN, 1911, p. 224, text-fig. 13, pl. 26, figs. 3–6.
Pseudogaetanus robustus BRODSKY, 1950, p. 168, fig. 86.
not *Gaidius robustus* VERVOORT, 1949, p. 12, figs. 5, 6.

Occurrence: Sta. 117–1, 1♀; Sta. 117–2, 3♀.

Descriptive notes: Female, 8.95 mm. The cephalothorax and abdomen are in the proportional lengths 82:18. The abdominal segments and furca are in the following proportional lengths:

segment	1–2	3	4	5	furca	
	43	14	10	10	23	=100

The 1st antenna extends to the end of the caudal furca; the segments are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8–9	10	11	12	13	14	15
	71	50	29	29	29	27	32	53	24	29	29	50	47	50

16	17	18	19	20	21	22	23	24–25	
47	53	50	63	58	45	58	50	27	=1000

In the 2nd antenna the exopod is 1.2 times as long as the endopod. The 1st maxilla has 9 setae on the outer lobe, 11 setae on the exopod, 7+4+4 setae on the 3rd to 1st segments of the endopod, 5 setae on the 2nd basal segment, 4 setae on the 3rd inner lobe, 5 setae on the 2nd inner lobe, and 14 setae on the 1st inner lobe. The maxilliped has a rounded lamella on the 1st basal segment.

In the 1st leg the 1st and 2nd segments of the exopod are partially fused; the 2nd segment has an outer marginal spine. The 2nd leg has a 3–segmented exopod and 2–segmented endopod. The 3rd and 4th legs each have a 3–segmented exopod and endopod; in the 4th leg the 1st basal segment has 36 fine spinules on the inner margin.

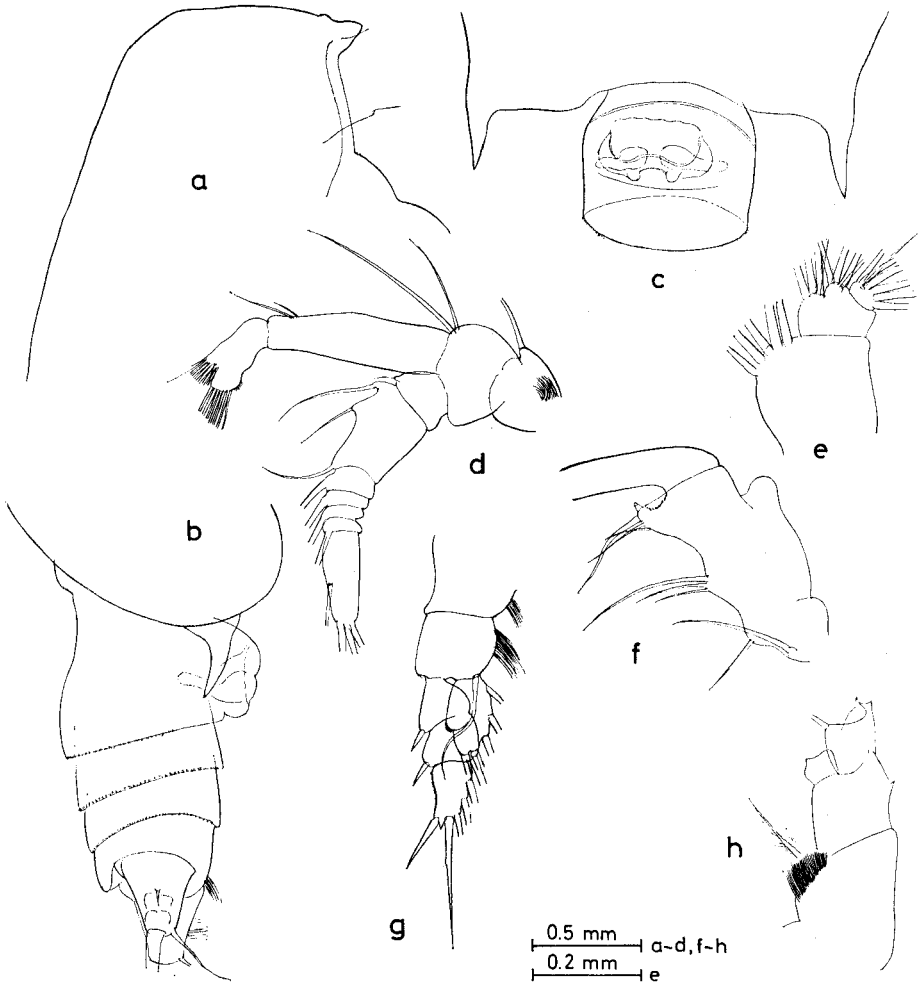

Fig. 4. *Gaidius robustus* (SARS), female: a, head, lateral view; b, last thoracic segment and abdomen, lateral view; c, genital segment, ventral view; d, 2nd antenna; e, endopod and 2nd basal segment of 1st maxilla; f, 1st basal segment of maxilliped; g, 1st leg; h, proximal part of 4th leg.

Remarks: VERVOORT (1952a, b) redefined the genera *Gaidius* and *Gaetanus*. Accordingly some species, including *Gaidius robustus*, described as *Gaetanus* should be transferred to the genus *Gaidius*. The species has been reported from the northwestern Pacific as *Pseudogaetanus robustus* (BRODSKY, 1950; TANAKA and OMORI, 1967). GRICE and HULSEMANN (1967) stated that *Gaidius robustus* VERVOORT is identical with *G. intermedius* WOLFENDEN.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm) ♀	♂
WOLFENDEN, 1911	South Atlantic	0–3000	7.5 –8.0	–
SARS, 1925	North Atlanctic	0–1500	8.00	–
BRODSKY, 1950	Northwestern Pacific	1000–4000	7.5 –9.0	7.0
GRICE and HULSEMANN, 1967	Arabian Sea	350–1470	–	–
Present record	Izu region	0–1100	8.95, 9.65	–

Gaidius tenuispinus (SARS, 1900)

(Fig. 5, a-n)

Chiridius tenuispinus SARS, 1900, p. 67, pl. 18, figs. 1–12.
Gaidius tenuispinus (SARS).-SARS, 1903, p. 162, suppl. pl. 6, fig. 1; WITH, 1915, p. 89, text-fig. 23, pl. 2, fig. 8, pl. 3, fig. 2; VERVOORT, 1949, p. 15, fig. 7; TANAKA, 1957a, p. 60, fig. 37 a–e (♀ only).

Occurrence: Sta. 83, 2♀; Sta. 84–2, 1♀; Sta. 94, 1♀; Sta, 112, 1♀; Sta. 122, 1♂.

Descriptive notes: Female, 3.65 mm. The cephalothorax and abdomen are in the proportional lengths 79:21. The frontal margin of the head is rounded in dorsal view. The lateral spines of the last thoracic segment extend posteriorly to the distal margin of the genital segment. The rostrum is directed downward.

The abdominal segment and furca are in the following proportional lengths:

segment	1–2	3	4	5	furca	
	40	16	13	11	20	=100

The genital segment is as long as wide; the genital opening is well-developed.

The 1st antenna reaches the posterior margin of the 3rd abdominal segment. The segments are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8–9	10	11	12	13	14	15
	57	48	26	29	31	31	31	52	20	26	23	40	37	46

16	17	18	19	20	21	22	23	24	25	
49	49	50	63	57	46	63	57	49	20	=1000

The exopod of the 2nd antenna is about 1.3 times as long as the endopod; the endopod is furnished with 6 long setae and an appendicular seta on the outer lobe, and 8 long setae and an appendicular seta on the inner lobe. The exopod of the mandible palp is much longer than the endopod; the endopod is furnished with 8 long setae and a slender seta. The 1st maxilla has 9 setae on the outer lobe, 11

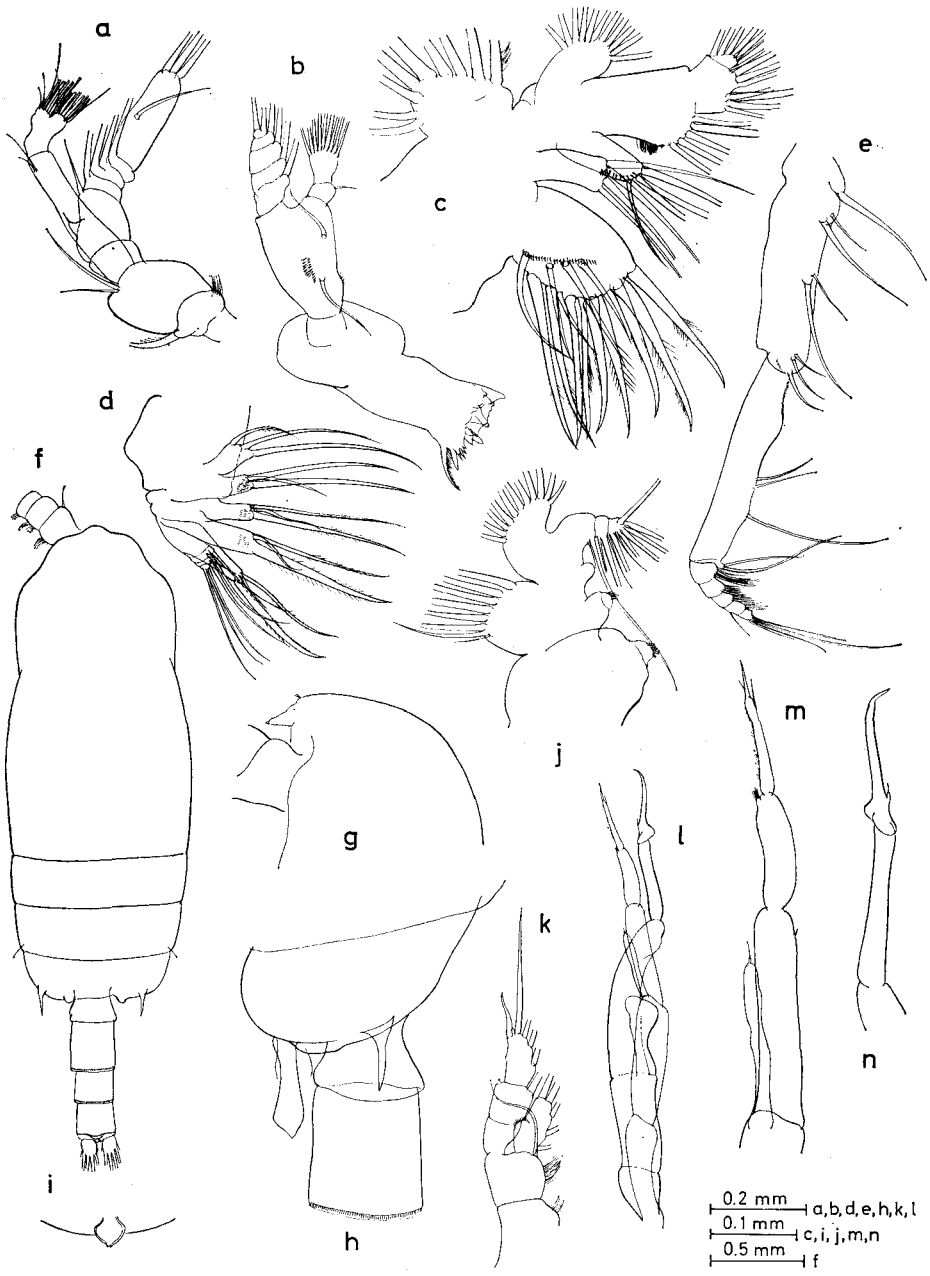

Fig. 5. *Gaidius tenuispinus* (SARS), female: a, 2nd antenna; b, mandible; c, 1st maxilla; d, 2nd maxilla; e, maxilliped. male: f, whole body, dorsal view; g, head, lateral view; h, last thoracic segment and abdominal segments, lateral view; i, rostrum; j, 1st maxilla; k, 1st leg; l, 5th pair of legs; m, distal part of left 5th leg; n, distal part of right 5th leg.

setae on the exopod, 6+4+4 setae on the 3rd to 1st segments of the endopod, 5 setae on the 2nd basal segment, 4 setae on the 3rd inner lobe, 4 setae on the 2nd inner lobe, and 14 setae on the 1st inner lobe. The 2nd maxilla has 6 long setae on the endopod; the 1st to 5th lobes each have 3 setae. In the maxilliped there is no trace of a lamella on the anterior margin of the 1st basal segment.

In the 1st leg the 1st and 2nd segments of the exopod are fused; there is a small marginal spine on the 2nd segment; the endopod is 1-segmented. The 2nd leg has a 3-segmented exopod and 2-segmented endopod; the terminal spine of the exopod has 24 teeth. The 3rd and 4th legs each have a 3-segmented exopod and endopod; the terminal spine of the exopod of the 3rd leg has 21 teeth, and that of the 4th leg has 24 teeth; the 1st basal segment of the 4th leg has 12 tube-like spinules on the inner margin.

Male, 3.43 mm. The cephalothorax and abdomen are in the proportional lengths 74:26. The cephalothorax is slender; it is 2.6 times as long as wide; the lateral spines of the last thoracic segment are long, reaching about the distal margin of the 1st abdominal segment. The rostrum is directed downward, and is bifid at the apex.

The abdominal segments and furca are in the following proportional lengths:

segment	1	2	3	4	5	furca	
	20	29	21	15	3	12	=100

The furca is slightly longer than wide.

The 1st antenna is short, reaching only the distal margin of the 3rd thoracic segment; the segments of the left antenna are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8–9–10	11	12	13	14	15
	70	47	27	30	27	29	29	68	25	27	29	34	38

16	17	18	19	20–21	22	23	24–25	
45	47	55	68	111	68	62	64	=1000

The proximal 6 segments are fringed with scattered hairs on the posterior margin.

In the 2nd antenna the endopod has 6 setae on the outer lobe, and 7 setae on the inner lobe. The 1st maxilla has 7 long setae and a small seta on the outer lobe, 11 setae on the exopod, 12 setae on the endopod including the 2nd basal segment; the 1st to 3rd inner lobes are reduced. The 2nd maxilla is considerably reduced. The maxilliped is slender; the 1st and 2nd basal segments are of equal lengths; there is no lamella on the 1st basal segment.

In the 1st leg the 1st and 2nd segments of the exopod are partially fused; the 2nd segment of the exopod has a minute spine on the outer distal margin; the endopod is 1-segmented. The 2nd leg has a 3-segmented exopod and 2-segmented endopod;

the terminal spine of the exopod has 28 teeth. The 3rd and 4th legs each have a 3-segmented exopod and endopod; the terminal spine of the exopod of these legs each have 22 teeth. The 5th pair of legs agrees well with the description and figures of the same leg given by SARS (1903). In the left leg the endopod extends three-fourths the length of the 1st segment of the exopod; the 2nd segment of the exopod bears several minute setae on the distal margin; the 3rd segment is slender, and about as long as the 2nd segment; it bears minute setae along the inner margin, and is terminated with a fairly long spine; the 3rd segment also has an outer marginal spine on the distal portion.

Remarks: The female is characterized in having long lateral spines on the last thoracic segment, reaching the distal margin of the genital segment. The male described by TANAKA (1957a) as *G. tenuispinus* is *G. pungens*.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm) ♀	♂
SARS, 1900, 1903	Arctic Ocean	–	3.80	2.0
WOLFENDEN, 1911	Atlantic	400	3.25	–
ESTERLY, 1911	Off San Diego	0– 600	–	3.10
WITH, 1915	Denmark Strait	0– 100	3.22–2.84	3.01
FARRAN, 1929	Antarctic waters	500–1750	3.35–3.60	3.25
VERVOORT, 1949	Celebes Sea	0–2500	3.60–3.75	–
VERVOORT, 1957	Antarctic waters	250–1000	3.00–3.75	2.97–3.20
TANAKA, 1957a	Izu region	0–1000	3.44	–
GRICE and HULSEMANN, 1967	Tropical Indian Ocean	1000–2000	–	–
Present record	Izu region	0– 740	3.30–3.65	3.43

Gaidius variabilis BRODSKY, 1950

(Fig. 6, a-k)

Gaidius variabilis BRODSKY, 1950, p. 160, fig. 74.
Gaidius moderatus TANAKA, 1957a, p. 66, fig. 40.

Occurrence: Sta. 83, 1♀; Sta. 84–2, 2♀; Sta. 108, 4♀; Sta. 109, 2♀; Sta. 121–2, 1♀; Sta. 122, 3♀.

Descriptive notes: Female, 3.55 mm. The cephalothorax and abdomen are in the proportional lengths 79:21. The head is fused with the 1st thoracic segment, as are the 4th and 5th thoracic segments. The cephalothorax is 1.6 times as long as wide. The frontal margin of the head is rounded. The lateral spines of the last thoracic segment extend to about one-third the length of the genital segment, though

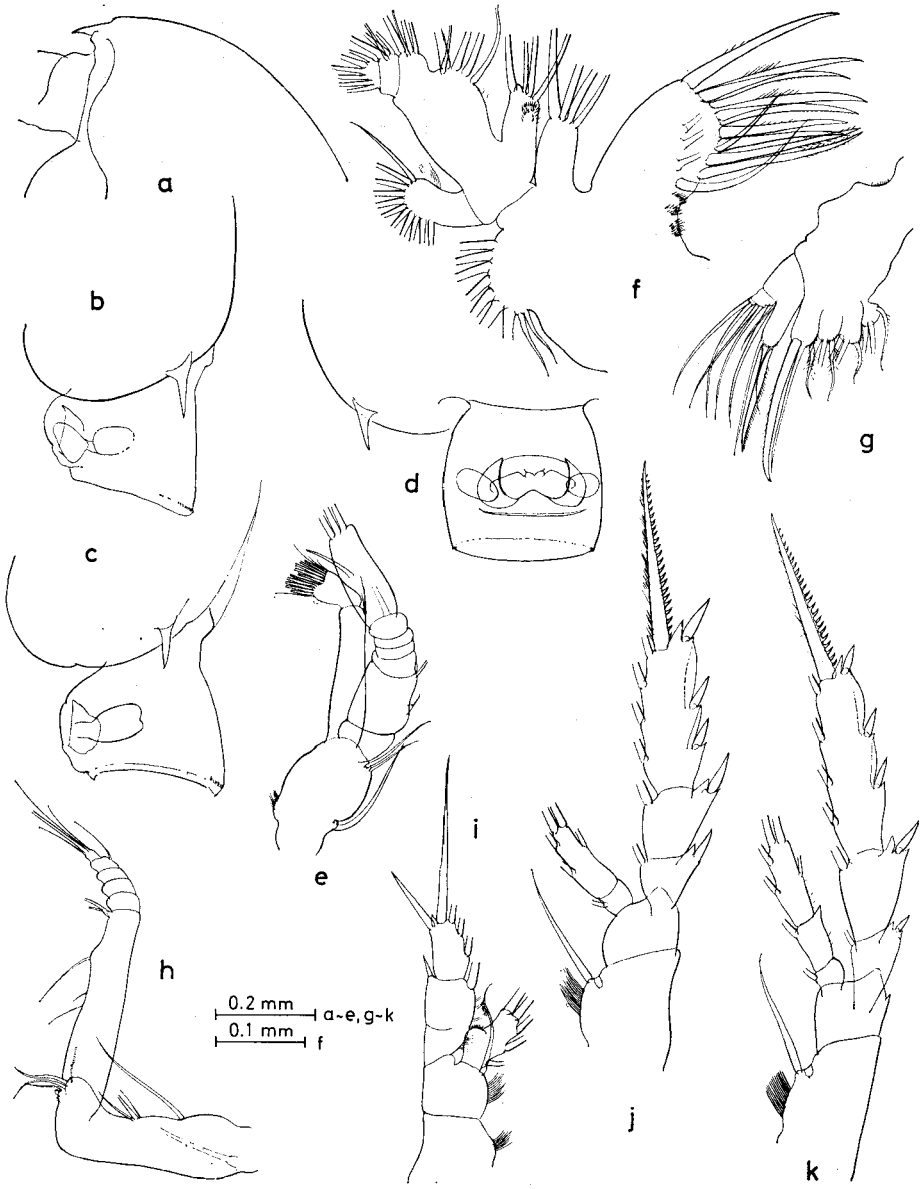

Fig. 6. *Gaidius variabilis* BRODSKY, female: a, head, lateral view; b, last thoracic segment and genital segment, lateral view; c, the same, another specimen; d, genital segment, ventral view; e, 2nd antenna; f, 1st maxilla; g, 2nd maxilla; h, maxilliped; i, 1st leg; j, 2nd leg; k, 4th leg.

they vary somewhat in size as shown in the figures; the spines are wide at the base. The rostrum is rather robust and directed downward.

The abdominal segments and furca are in the following proportional lengths:

segment	1–2	3	4	5	furca	
	40	17	14	11	18	=100

The genital segment is as long as wide; it and the following 2 segments are fringed with teeth on the distal margin; the furca is 1.3 times as long as wide.

The 1st antenna extends to the distal margin of the 3rd abdominal segment; the segments are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8–9	10	11	12	13	14	15
	75	56	25	28	25	25	25	48	22	25	25	40	40	45

16	17	18	19	20	21	22	23	24–25	
45	48	51	62	57	45	63	57	68	=1000

In the 2nd antenna the exopod is a little longer than the endopod; the endopod is furnished with 6+1 setae on the outer lobe, and 8 setae on the inner lobe, of which the innermost is very small. The mandibular palp bears 3 marginal setae; the endopod has 9 setae on the distal margin. The 1st maxilla has 9 setae on the outer lobe, 11 setae on the exopod, 6+4+4 on the 3rd to 1st segments of the endopod, 5 setae on the 2nd basal segment, 4 setae and a small process on the 3rd inner lobe, 4 setae on the 2nd inner lobe, and 14 setae on the 1st inner lobe. The 2nd maxilla is of the usual structure; the endopod has 2 setae on each of the 1st to 3rd segments. In the maxilliped there is no lamella on the outer margin of the 1st basal segment; the proximal seta of the 1st basal segment is long.

In the 1st leg the 1st and 2nd segments of the exopod are fused; there is no trace of the outer marginal spine on the 1st segment; the spine of the 2nd segment extends to the proximal one-third of the next segment. The 2nd leg has a 3–segmented exopod and 2–segmented endopod; the terminal spine of the exopod has 24 teeth. The 3rd and 4th legs each have a 3–segmented exopod and endopod; the terminal spine of the exopod of the 3rd leg has 20 teeth; the 1st basal segment of the 4th leg has 16 tube-like spinules.

Remarks: *Gaidius variabilis* allied to *G. tenuispinus*, but is distinguished from the latter in having short lateral spines on the last thoracic segment which scarcely extend one-third the length of the genital segment.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm) ♀	♂
Brodsky, 1950	Bering Sea	<200	3.2 –3.6	3.0 –3.2
Tanaka, 1957a	Izu region	0–1000	3.53	3.19
Present record	Izu region	0– 740	3.20–3.82	3.65

Gaidius species

(Fig. 7, a-f)

Occurrence: Sta. 121–2, 1♂.

Descriptive notes: Male, 3.65 mm. The cephalothorax and abdomen are in the proportional lengths 73:27. The cephalothorax is robust and 2.3 times as long as wide. The frontal margin of the head is more obtusely rounded than that of *G. tenuispinus*. The lateral spines of the last thoracic segment extend a little beyond the middle of the 1st abdominal segment. The rostrum is one-pointed, and bifid at the apex; it is directed downward.

The abdominal segments and furca are in the following proportional lengths:

segment	1	2	3	4	5	furca	
	16	29	24	15	3	13	=100

The 2nd and 3rd segments are striated with fine spinules on the distal margin; the furca is about 1.4 times as long as wide.

The 1st antenna extends about to the distal margin of the thorax; the segments of the left antenna are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8–9–10	11	12–13	14	15	16
	90	46	23	23	29	26	29	65	23	54	29	40	46

17	18	19	20–21	22	23	24–25	
50	54	64	105	68	68	68	=1000

The proximal 6 segments are each fringed with scattered spinules on the posterior margin.

The 2nd antenna has the exopod nearly as long as the endopod; the 1st segment of the exopod has hairs on the inner margin; the endopod has 6 setae on the outer lobe and 7 setae on the inner lobe. The mandible is robust; the 2nd basal segment has a small marginal seta; the endopod has 9 setae on the distal margin. The 1st maxilla is similar to that of *G. tenuispinus*. The 2nd maxilla is considerably reduced. The maxilliped has a similar structure to that of *G. tenuispinus*; the endopod has 4, 4, 3, 3+1, and 4 setae on the 1st to 5th segments.

In the 1st leg the 1st and 2nd segments of the exopod are fused; there is a minute distal spine on the outer margin of the 2nd segment of the exopod. In the 2nd leg the endopod is 2–segmented; the terminal spine of the exopod has 25 teeth. The 3rd and 4th legs each have 20 teeth on the terminal spine of the exopod. The 5th pair of legs resembles closely that of *G. tenuispinus*, but differs from that of the latter in the structure of the endopod of the left leg; the 3rd segment of the exopod has no outer marginal spine.

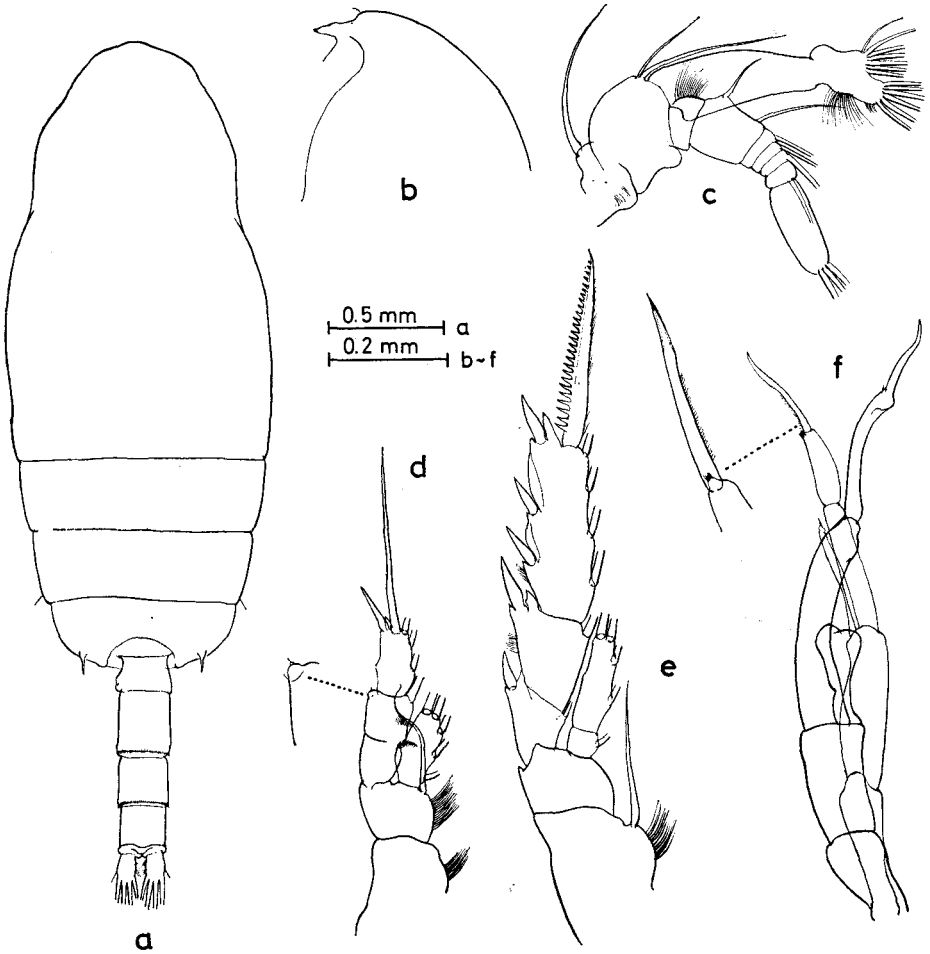

Fig. 7. *Gaidius* species, male: a, whole body, dorsal view; b, head, lateral view; c, 2nd antenna; d, 1st leg; e, 2nd leg; f, 5th pair of legs.

GAETANUS GIESBRECHT, 1888

Gaetanus ?antarcticus WOLFENDEN, 1905

(Fig. 8, a-e)

Gaetanus antarcticus WOLFENDEN, 1905, p. 7, pl. 3, fig. 1; WOLFENDEN, 1908, p. 30, pl. 3, fig. 6; SEWELL, 1947, p. 65, text-fig. 11; VERVOORT, 1957, p. 62, figs. 41–43.

Occurrence: Sta. 115–2, 1♂ (juv.).

Remarks: Copepodite V stage male, 6.60 mm. The specimen has a damaged cephalic spine. The abdomen is 4–segmented. The 5th pair of legs is asymmetrical, and the left leg is robust. The large size and the shape of the cephalic spine and

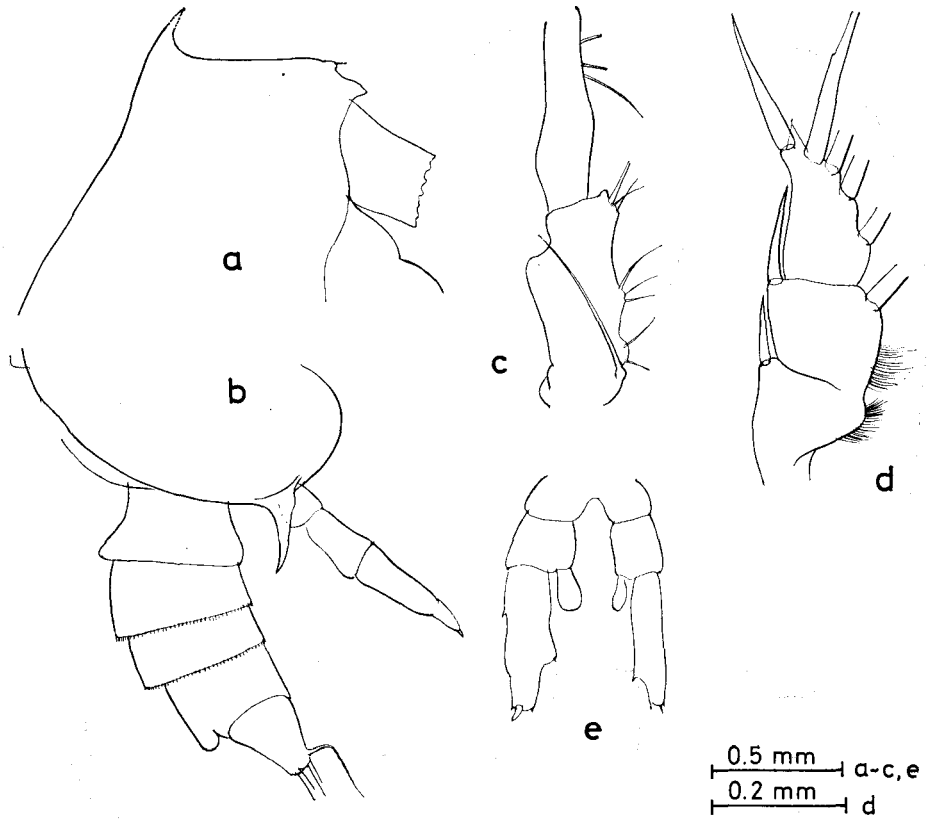

Fig. 8. *Gaetanus ?antarcticus* WOLFENDEN, immature male: a, head, lateral view; b, last thoracic segment and abdomen, lateral view; c, maxilliped; d, exopod of 1st leg; e, 5th pair of legs.

the lateral spines of the last thoracic segment appear to be good characters of the immature male of *G. antarcticus*. The occurrence of the present species is the first record in Japanese waters.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm) ♀	♂
WOLFENDEN, 1911	Antarctic waters	0–2000	8.0	–
FARRAN, 1929	Antarctic waters	0–1000	–	6.1 (juv.)
SEWELL, 1947	Arabian Sea	0–1500	7.60–8.25	–
VERVOORT, 1957	Antarctic waters	800–1000	8.40–8.78	–
GRICE and HULSEMANN, 1968	Southeastern Pacific	0– 600	–	–
Present record	Izu region	0–1100	–	6.60 (juv.)

Gaetanus armiger GIESBRECHT, 1888

Gaetanus armiger GIESBRECHT, 1888, p. 335; GIESBRECHT, 1892, p. 219, pl. 14, figs. 19, 20, 22, 23, 26, 28, 29, pl. 36, figs. 2, 4, 5; A. SCOTT, 1909, p. 45, pl. 8, figs. 16–22; MORI, 1937, p. 40, pl. 17, figs. 8–13; TANAKA, 1957b, p. 172, fig. 42 a-d.
Gaetanus simplex BRODSKY, 1950, p. 163, fig. 77.

Occurrence: Sta. 97–2, 1♀.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm) ♀	♂
GIESBRECHT, 1892	Central Pacific	0–1800	3.2	–
A. SCOTT, 1909	Malay Archipelago	0– 900	3.5	–
SARS, 1925	North Atlantic	0–5000	3.00	–
SEWELL, 1929	Bay of Bengal	0– 730	–	–
JESPERSEN, 1934	Davis Strait	0– 800	4.5 –4.7	–
MORI, 1937	Off Cape Kinkazan	0– 100	3.5	–
DAVIS, 1949	Northeastern Pacific	0–1100	3.0 –4.7	–
BRODSKY, 1950	Northwestern Pacific	–	3.2	3.1
TANAKA, 1957b	Sagami Bay	0–1000	3.37	–
VERVOORT, 1963	Gulf of Guinea	0– 600	2.95–3.05	–
Present record	Izu region	0– 800	3.20	–

Gaetanus brevicornis ESTERLY, 1906

(Fig. 9, a-g)

Gaetanus brevicornis ESTERLY, 1906, p. 56, pl. 9, fig. 4, pl. 12, fig. 55; SEWELL, 1947, p. 60, fig. 9.
Gaetanus rectus WOLFENDEN, 1911, p. 232, fig. 18, pl. 26, figs. 14–16.
Gaetanus ascendens ESTERLY, 1913, p. 182, pl. 10, figs. 1, 3, 6, pl. 11, fig. 39, pl. 12, fig. 56.

Occurrence: Sta. 94–1, 1♀; Sta. 114, 1♀; Sta. 121–2, 1♀.

Descriptive notes: Female, 4.84 mm. The cephalothorax and abdomen are in the proportional lengths 79:21. The cephalothorax is 2.6 times as long as wide. The cephalic spine is small, directed downward. The last thoracic segment is provided with short but strong spines which are directed outward in dorsal view, and backward in lateral view.

The abdominal segments and furca are in the following proportional lengths:

segment	1–2	3	4	5	furca	
	47	13	10	10	20	=100

The genital segment is a little longer than wide. The genital to 4th segments are

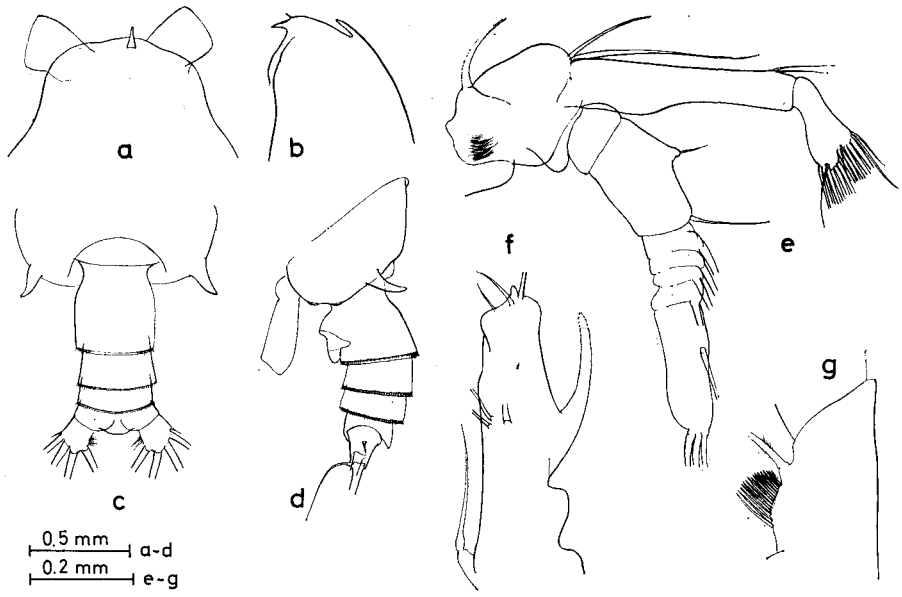

Fig. 9. *Gaetanus brevicornis* ESTERLY, female: a, head, dorsal view; b, the same, lateral view; c, last thoracic segment and abdomen, dorsal view; d, the same, lateral view; e, 2nd antenna; f, 1st basal segment of maxilliped; g, 1st basal segment of 4th leg.

fringed with fine teeth on the distal margin. The furca is slightly longer than wide.

The 1st antenna reaches the end of the furca; the segments are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8–9	10	11	12	13	14	15
	53	49	26	24	28	28	30	45	20	26	30	45	47	49

16	17	18	19	20	21	22	23	24	25
49	51	51	63	55	49	60	55	47	20=1000

In the 2nd antenna the exopod is a little longer than the endopod; the endopod has 7 setae on the outer lobe and 7+1 setae on the inner lobes. The 1st maxilla is furnished with the following number of setae on the various lobes; 9 on the outer lobe, 11 on the exopod, 6+4+4 on the 3rd to 1st segments of the endopod, 5 on the 2nd basal segment, 4 on the 3rd inner lobe, 4 on the 2nd inner lobe, and 13 on the 1st inner lobe. The 2nd maxilla has no characteristic features. The maxilliped is furnished with a long lamella on the anterior margin of the 1st basal segment; according to SEWELL (1947) this process reaches well beyond the distal margin of the segment.

In the 1st leg the 1st and 2nd segments of the exopod are partially fused; there is no marginal spine on the 2nd segment of the exopod. The 2nd leg has a 3-seg-

mented exopod and 2-segmented endopod. The 3rd and 4th legs each have a 3-segmented exopod and endopod. In the 4th leg the 1st basal segment has about 16 tube-like spinules on the inner margin of the 1st basal segment.

Remarks: There is no difference between *Gaetanus brevicornis* and *G. ascendens* ESTERLY in the shape of the head and the lateral spines of the last thoracic segment. Although VERVOORT (1963) pointed out a fairly large discrepancy in size between the two species, *G. ascendens* is apparently a synonym of *G. brevicornis*. This is the first record of occurrence of the species from Japanese waters.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm) ♀	♂
ESTERLY, 1906	Off San Diego	0– 730	4.3	–
SEWELL, 1929	Bay of Bengal	0– 366	3.7	–
SEWELL, 1947	Arabian Sea	0–1500	4.27,4.98	–
VERVOORT, 1963	Gulf of Guinea	0– 600	4.60,4.65	–
Present record	Izu region	0– 930	4.50–4.80	–

Gaetanus kruppii GIESBRECHT, 1903

(Fig. 10, a-g)

Gaetanus kruppii GIESBRECHT, 1903, p. 202, pl. 7, fig. 8, pl. 8, fig. 29; A. SCOTT, 1909, p. 48, pl. 9, figs. 9–15, pl. 10, figs. 1–9; SARS, 1925, p. 61, pl. 18, figs. 5–8; SEWELL, 1947, p. 62, fig. 10; TANAKA, 1957b, p. 169, fig. 41; VERVOORT, 1963, p. 126.

Gaetanus major (WOLFENDEN).-WOLFENDEN, 1904, p. 114, pl. 9, figs. 7, 8.

Occurrence: Sta. 83. 3♀; Sta. 93–2, 3♀; Sta. 94, 1♀; Sta. 95, 1♀; Sta. 97–2, 2♀; 1♂; Sta. 98, 2♀; Sta. 108, 9♀, 1♂; Sta. 111–1, 1♀; Sta. 111–2, 1♀; Sta. 112, 1♀, 1♂; Sta. 113, 2♀; Sta. 114, 1♀, 1♂; Sta. 115–1, 4♀; Sta. 115–2, 4♀; Sta. 117–1, 2♀; Sta. 117–2, 1♀; Sta. 119, 1♀; Sta. 120, 1♀; Sta. 121–1, 2♀; Sta. 121–2, 5♀, 1♂; Sta. 122, 1♀, 1♂.

Discriptive notes: Male, 4.70 mm. The cephalothorax and abdomen are in the proportional lengths 77:23. The cephalothorax is 2.7 times as long as wide. The lateral spines of the last thoracic segment extend about half of the length of the 1st abdominal segment. The rostrum is notched slightly at the apex.

The abdominal segments and furca are in the following proportional lengths:

segment	1	2	3	4	5	furca	
	23	29	18	13	4	13	=100

The 2nd to 4th segments are fringed with fine teeth on the distal margin. The furca is as long as wide.

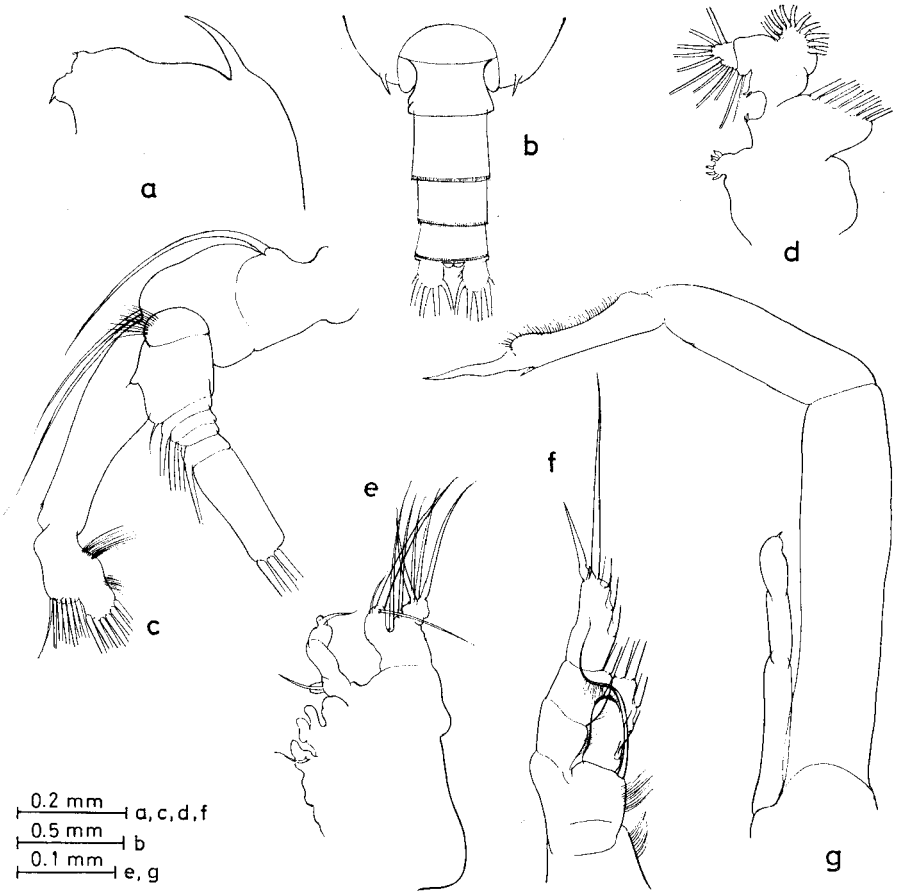

Fig. 10. *Gaetanus kruppii* GIESBRECHT, male: a, head, lateral view; b, last thoracic segment and abdomen, dorsal view; c, 2nd antenna; d, 1st maxilla; e, 2nd maxilla; f, 1st leg; g, distal part of left 5th leg.

The 1st antenna exceeds the end of furca by 2 segments; the segments are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8–9–10	11	12–13	14	15	16
	70	32	24	22	28	28	30	72	26	47	24	47	51

17	18	19	20–21	22	23	24–25	
47	56	70	130	74	66	56	=1000

The proximal 8 segments are provided with long sensory filaments.

In the 2nd antenna the endopod is a little longer than the exopod; the endopod carries 6 setae on the outer lobe and 7 setae on the inner lobe. The mandibular

palp bears a single short seta; the endopod has 9 setae on the distal margin. The 1st maxilla has 7 long setae on the outer lobe, 10 setae on the exopod, 9 setae on the endopod, and 2 setae on the 2nd basal segment; the 1st to 3rd inner lobes are considerably reduced. The 2nd maxilla is reduced; the endopod has 6 setae; the 1st to 5th lobes are quite deformed. The maxilliped is of the usual structure; the 2nd basal segment is longer than the 1st one.

In the 1st leg the exopod is incompletely 3-segmented: there is no marginal spines on the 1st and 2nd segment of the exopod. The 2nd leg has a 3-segmented exopod and 2-segmented endopod. The 3rd and 4th legs each have a 3-segmented exopod and endopod. The terminal spine of the exopod of the 4th leg has 27 teeth. In the left 5th leg the 3rd segment of the exopod has scattered hairs on the outer margin; the endopod is incompletely 3-segmented, and extends seven-tenths the length of the 1st segment of the exopod; the apex of the endopod has a small spine.

Remarks: The female specimens agree quite well with the description given by previous authors. The lamella of the maxilliped is in complete accordance with that described by WITH (1915). The 4th leg has 22 tube-like spinules on the inner margin of the 1st basal segment. On the other hand, the male specimens differ from those described by previous authors in the structure of the left 5th leg. According to WITH (1915) and SEWELL (1947) the 2nd segment of the exopod has several small processes on the outer distal margin. However, these processes are absent in the present specimens. The distal segment of WITH's or SEWELL's specimens is long and simple in structure, but this segment in the present specimens is inflated at the base of the terminal spine, and has scattered hairs on the outer margin. The 1st and 2nd maxillae figured by SEWELL (1947) differ from those of the present male specimens in details of the structure. It is not yet definite if these characters observed in the present specimens represent a Pacific Ocean form.

Distribution and size variations:

Author	Locality	Depth (m)	Length (mm)	
			♀	♂
WOLFENDEN, 1904	Faröe Channel	550	<5.0	4.65
A. SCOTT, 1909	Malay Archipelago	0–1500	5.70	5.60
WITH, 1915	North Atlantic	0– 600	5.40	5.04
SARS, 1925	Atlantic	0–3000	5.2	–
FARRAN, 1926	Bay of Biscay	640–1000	4.45–4.80	–
SEWELL, 1947	Arabian Sea	0–1500	–	5.17
TANAKA, 1957b	Izu region	0–1000	4.95	4.87
VERVOORT, 1963	Gulf of Guinea	0– 600	4.70–5.60	4.20–4.40
Present record	Izu region	0– 970	4.70–5.30	4.50–4.90

Gaetanus latifrons SARS, 1905

(Fig. 11, a-d)

Gaetanus latifrons SARS, 1905, p. 11; A. SCOTT, 1909, p. 49, pl. 10, figs. 10–17; SARS, 1925, p. 57, pl. 17, figs. 7–9.

Gaetanus holti FARRAN, 1905, p. 33, pl. 6, figs. 1–12.

Gaetanus paracurvicornis BRODSKY, 1950, p. 167, fig. 84.

Occurrence: Sta. 115–1, 1♀; Sta. 120, 1♀.

Descriptive notes: Female, 4.75 mm. The cephalothorax and abdomen are in the proportional lengths 79:21. The cephalic spine is of characteristic shape. The abdominal segments and furca are in the following proportional lengths:

segment	1–2	3	4	5	furca	
	37	15	15	14	19	=100

The 1st antenna exceeds the end of furca by 3 segments; the segments have the following proportional lengths:

segment	1	2	3	4	5	6	7	8–9	10	11	12	13	14	15
	69	32	21	19	23	24	24	47	23	26	28	55	53	53

16	17	18	19	20	21	22	23	24	25	
49	49	51	60	60	49	60	53	51	21	=1000

In the 2nd antenna the exopod is slightly longer than the endopod; the endopod carries 7 setae on the outer lobe, and 8 setae on the inner lobe. The 1st maxilla has 8 setae on the outer lobe, 11 setae on the exopod, 7+4+4 setae on the 3rd to 1st segments of the endopod, 5 setae on the 2nd basal segment, 4 setae on the 3rd inner lobe, 5 setae on the 2nd inner lobe, and 13 setae on the 1st inner lobe. The maxilliped has a slender lamella on the 1st basal segment.

The 1st leg has a 3-segmented exopod and 1-segmented endopod; the 1st segment of the exopod has a marginal spine. In the left 4th leg the 1st basal segment bears 21 spinules on the inner margin, whereas it bears 19 spinules in the right leg.

Remarks: The species appears to be distributed widely in the deep waters of the Atlantic, Indian, and Pacific Oceans. The Atlantic Ocean form of *G. latifrons* is well-described by VERVOORT (1952b). The Pacific Ocean form seems to differ somewhat from the Atlantic Ocean form in the shape of the forehead and in having long 1st antenna which extends beyond the furca by at least 3 segments. The present specimens agree quite well in these aspects with the description and figures of the Siboga specimen obtained from the Malay Archipelago (A. SCOTT, 1909). BRODSKY (1950) proposed a new species, *G. paracurvicornis*, for the present Pacific form. In our opinion, the characters given are insufficient for a distinct species, but there is a possibility to establish a new sub-species for the Pacific Ocean form. This is the first record of occurrence in Japanese waters.

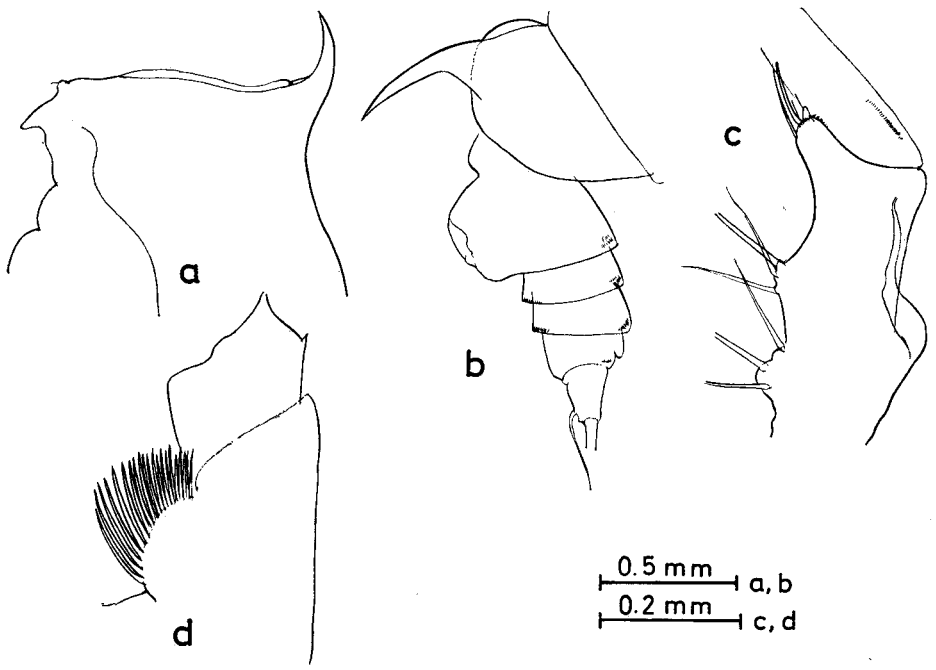

Fig. 11. *Gaetanus latifrons* SARS, female: a, head, lateral view; b, last thoracic segment and abdomen, lateral view: c, 1st basal segment of maxilliped; d, 1st basal segment of left 4th leg.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm) ♀	♂
FARRAN, 1905	Irish Atlantic Slope	600–2100	5.1	–
A. SCOTT, 1909	Malay Archipelago	0– 750	5.4	–
WITH, 1915	North Atlantic	0– 600	5.1	–
SARS, 1925	North Atlantic	0–4500	5.0	–
FARRAN, 1926	Bay of Biscay	641– 915	4.8	–
SEWELL, 1947	Arabian Sea.	0– 500	–	–
BRODSKY, 1950	Northwestern Pacific	1000–4000	4.6 (juv.)	4.1 (juv.)
VERVOORT, 1957	South of Tasmania	500– 750	–	–
VERVOORT, 1963	Gulf of Guinea	0– 600	4.65–5.20	–
Present record	Izu region	0– 921	4.60, 4.75	–

Gaetanus miles GIESBRECHT, 1888

Gaetanus miles GIESBRECHT, 1888, p. 335; GIESBRECHT, 1892, p. 219, pl. 14, figs. 21, 24, 25, 27, 30, pl. 30, figs. 1, 3; A. SCOTT, 1909, p. 44, pl. 8, figs. 1–8; TANAKA, 1957b, p. 174, fig. 42 h–l; GRICE, 1962, p. 192, pl. 8, figs. 8–13.

Occurrence: Sta. 108, 1♀; Sta. 109, 1♀; Sta. 115–2, 1♀.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm) ♀	♂
GIESBRECHT, 1888	Pacific	0–1800	3.50	–
A. SCOTT, 1909	Malay Archipelago	0–2000	4.30	–
WOLFENDEN, 1911	South Atlantic	0–3000	ca. 3.0	–
WITH, 1915	North Atlantic	0– 600	4.21	–
SARS, 1925	Atlantic	0–3000	3.90	–
FARRAN, 1926	Bay of Biscay	275– 366	4.25	–
TANAKA, 1957b	Sagami Bay	0–1000	3.96	–
GRICE, 1962	Equatorial Pacific		3.40–3.52	–
VERVOORT, 1963	Gulf of Guinea	0– 10	3.20 (juv.)	3.00 (juv.)
Present record	Izu region	0– 680	4.20–4.40	–

Gaetanus minispinus TANAKA, 1969

Gaetanus minispinus TANAKA, 1969, p. 260, fig. 4.

Occurrence: Sta. 109, 1♀; Sta. 111–1, 1♀; Sta. 116, 1♀; Sta. 121–2, 1♀.

Remarks: *Gaetanus minispinus* is closely allied to *G. kruppii* but is easily distinguished from the latter in having a very small cephalic spine. The species was first found in the Albatross collection deposited in the U.S. National Museum, among specimens labelled "*Euchirella galeata* GIESBRECHT". The male is unknown.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm) ♀
TANAKA, 1969	Bashi Channel	0–915	5.50
Present record	Izu region	0–680	5.15–5.56

Gaetanus minor FARRAN, 1905

Gaetanus minor FARRAN, 1905, p. 34, pl. 5, figs. 1–11; A. SCOTT, 1909, p. 47, pl. 9, figs. 1–8; TANAKA, 1957b, p. 172, fig. 42 e-g.

Occurrence: Sta. 94–1, 3♀; Sta. 96, 2♀; Sta. 97–2, 1♀; Sta. 108, 1♀; Sta. 115–1, 2♀; Sta. 115–2, 2♀; Sta. 117–1, 2♀; Sta. 119, 1♀.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm) ♀	♂
FARRAN, 1908	Irish Atlantic Slope	730–1830	2.40	–

A. SCOTT, 1909	Malay Archipelago	0–1500	2.30	–
WOLFENDEN, 1911	South Atlantic	0–1500	1.75–2.00	–
WITH, 1915	Atlantic	0– 100	2.30	–
SARS, 1925	Atlantic	0–2000	2.10	–
FARRAN, 1929	Off New Zealand	0	2.16	–
FARRAN, 1936	Great Barrier Reef	0– 600	2.1	–
BRODSKY, 1948	Sea of Japan	1000–2000	2.1 –2.4	–
VERVOORT, 1957	Malay Archipelago	0– 800	2.10	–
TANAKA, 1957b	Sagami Bay	0–1000	2.23	–
DE PAIVA, 1963	Off Cape Verde Is.	–	2.23–2.26	–
Present record	Izu region	0– 360	2.10–2.30	–

Gaetanus pileatus FARRAN, 1903

Gaetanus pileatus FARRAN, 1903, p. 16, pl. 17, figs. 1–11; SARS, 1925, p. 56, pl. 17, figs. 3–6; TANAKA, 1957b, p. 175, fig. 43.
Gaetanus caudani WOLFENDEN, 1904, p. 114, pl. 9, figs. 20–22.

Occurrence: Sta. 108, 1♀; Sta. 114, 1♀; Sta. 115–2, 1♀; Sta. 117–1, 1♀; Sta. 122, 1♀.

Distribution and size variation:

Author	Locality	Depth (m)	Length (mm) ♀	♂
WOLFENDEN, 1904	North Atlantic	0–1100	<5.00	–
A. SCOTT, 1909	Malay Archipelago	0–2000	6.0	–
WITH, 1915	North Atlantic	0– 600	5.74	–
SARS, 1925	Atlantic	0– 500	6.20	4.70
FARRAN, 1926	Bay of Biscay	366–1370	5.3 –5.4	–
SEWELL, 1929	Bay of Bengal	0– 366	4.1	–
SEWELL, 1947	Arabian Sea	400– 645	–	–
WILSON, 1950	Off Peru	0– 550	–	–
TANAKA, 1957b	Sagami Bay	0–1000	6.14	–
VERVOORT, 1963	Gulf of Guinea	0– 600	5.95–6.10	4.80–5.30
OWRE and FOYO, 1967	Florida Current	171	5.0 –5.3	–
Present record	Izu region	0– 900	5.50–6.00	–

(To be continued)