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STUDIES ON MARINE GAMMARIDEAN AMPHIPODA OF THE SETO INLAND SEA. I[1)]

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With 15 Text-figures

CONTENTS

PART I. SYSTEMATIC ACCOUNT

Introduction

Benthic marine gammaridean amphipods form an important component among small crustaceans of littoral sea bottom, and are one of the important members of benthic communities in company with polychaetes and molluscans quantitatively. It is also well known that gammarideans are frequently found in the stomachs of benthos-feeding fishes as prey-animals. Nevertheless, the

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systematic knowledge of the marine gammaridean amphipods on the coast of Japan is very insufficient. The caprellidean and hyperidean amphipods have hitherto been reported by Huzio UTINOMI (1947) and Haruhiko IRIE (1959) respectively, and the terrestrial, subterranean, and fresh water gammarideans by W.M. TATTERSALL, Masuzo UÉNO, Kôzô AKATSUKA, Taku KOMAI, and by other several authors. As a matter of fact, the poverty of the systematic knowledge has much interrupted the advance in ecological researches of the littoral area. The gammaridean fauna of the littoral area is rich both in the number of species and in quantity, and as far as I examine, it is reasonable that a fairly good numbers of endemic species were found in the present study, though benthic amphipods have been generally deemed to show a wide range of distribution.

Recently J. L. BARNARD (1959) gave a very interesting figure concerning the number of families, genera, and species of suborder Gammaridea of the world described up to the year 1956:

Families	57
Genera	605
Species	3146

According to habitat, they are divided as follows:

Marine and brackish species	2376
Stream and lake species	400
Lake Baikal species	232
Terrestrial species	88
Subterranean species	50

About 200 species of gammarideans are now kept in my hand, taken from the coast of Japan. It is interesting to put them in systematic order, but frustrating, especially, when there are no available references in Japan. I have, therefore, requested available copies of benthic amphipods to the colleagues in the foreign countries. However, it seems to be very hard to accomplish the work very soon. I am now examining a large number of specimens from the various localities of the Japanese coast, which are sent to me by several ecologists for identification. On completing the present study it will afford an information to the geographical distribution of the fauna, and will give a basic knowledge to the study of benthic communities being undertaken by some ecologists.

Most of material for the taxonomical study have been taken from the Seto Inland Sea. The species from the Seto Inland Sea were usually found also on all the other Japanese coasts, from the west coast of Kyûshû to Mutsu Bay, the northernmost bay of Honshû. These inland bays belong to "warm temperate" area, so far as the water temperature is concerned. I believe

that almost all the species commonly found in the Japanese inshore waters are represented in this paper.

Material

The sources of material here dealt with are summarised as follows (see Fig. 1):

Area I: Kasaoka Bay, material composed of 284 specimens taken by Ekman-Lenz bottom sampler (0.02 sq. m.) during the periods from Jan. 1953 to Mar. 1956; depth, 2.1–15.5 m; collected by R. KITAMORI & S. KOBAYASHI.

Area II: Fukuyama inlet, 50 specimens from 13 collections carried out seasonally between Mar. 1954 and Jan. 1955; depth, 2.2–4.5 m; collecting gear and members both the same as above.

Area III: Hiuchi Mada, 27 specimens from 10 stations by Okayama-maru (Okayama Pref. Fish. Exper. Stat.), Mar. 22–26, 1954; depth 2.2–25.0 m, both collecting gear and members are the same as above.

Area IV: Mihara Bay, 31368 specimens from 9 seasonal surveys between Feb. 1956 and Mar. 1957; depths of low-water marks to about 25 m, Ekman-Lenz sampler & bottom-layer net (see NAGATA 1960, fig. 1), collected by R. KITAMORI, S. KOBAYASHI, and the writer.

Area V: Estuary of the Ôta, Hiroshima Pref., 399 specimens from 4 seasonal surveys between Mar. 1956 and Oct. 1956; depth 0.4–11.6 m, Ekman-Lenz sampler, collected by R. KITAMORI & S. KOBAYASHI.

Area VI: Hosonosu, north of Hoso Shima, Hiroshima Pref.; 629 specimens from 4 seasonal surveys between Oct. 1956 and Feb. 1957; depth, shallower than 3.0 m; Ekman-Lenz sampler & bottom-layer net, collected by R. KITAMORI, S. KOBAYASHI, and the writer.

Area VII: Inshore waters of Momo Shima, Hiroshima Pref., 766 specimens, Jan. 23, 1957; depth, 1.5–10.5 m, Ekman-lenz sampler & bottom-layer net, collected by R. KITAMORI & S. KOBAYASHI.

Area VIII: Estuaries of the Kanzaki (Mar. 28 and 31, 1958) and the Yodo (Aug. 29, 1958), Ôsaka Bay, 20 specimens from the polluted wate area; depth, shallower than 10 m, Ekman-Lenz, collected by R. KITAMORI & Z. KÔBE.

Area IX-a: Front of Ôno-Branch of our laboratory, Ônoura, Hiroshima Pref., intertidal area, May 27, 1959; 25 specimens found among eelgrass (*Zostera nana*) exposed in low water, collected by K. FUNAE.

Area IX-b: The same area as above, *Zostera* belt near low-water marks, 911 specimens obtained at a depth of 0.5 m in low water, by pushing a coarse net strongly so as to drag the sea-floor; May 11, 1960, collected by K. FUNAE & the writer.

Area IX-c: The same *Zostera* belt as above, July 27 and 28, 1961; 56

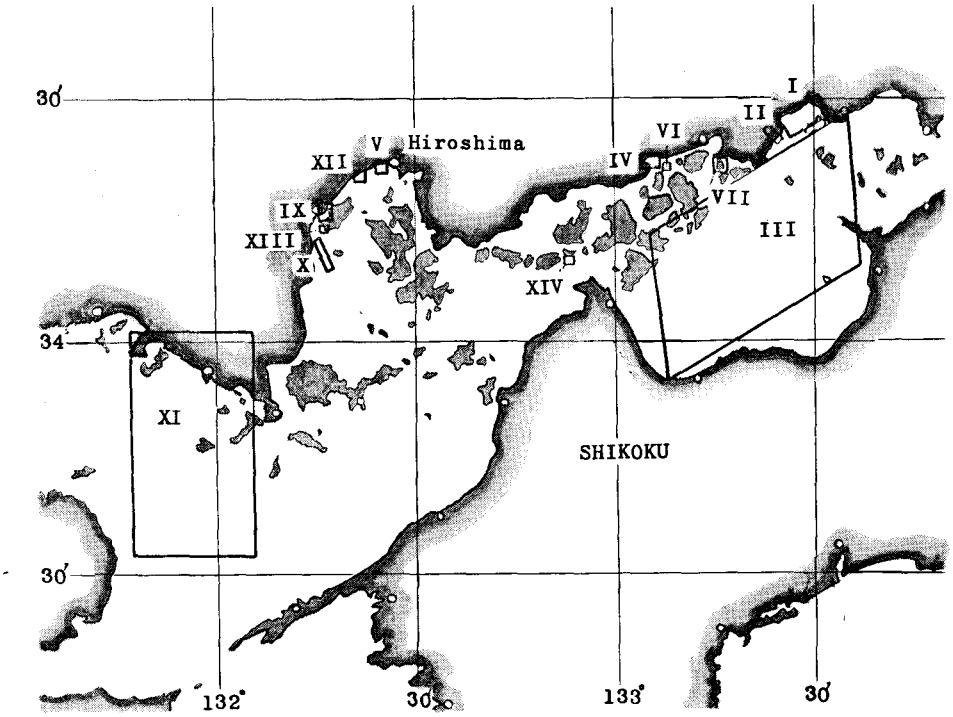

Fig. 1. Map of Seto Inland Sea showing the collecting area of materials dealt with in this paper, excluding "Area VIII".

specimens, collecting method as above, collected by K. FUNAE & the writer.

Area IX-d: The same belt as above, 1671 specimens by nocturnal surveys between Aug. 30 and Oct. 10 in 1962; horizontal-tow by plankton net along the surface waters of 0.8–3.9 m in depth in high water (see Part II).

Area X: Neighbouring waters of Atata Shima, hiroshima Bay; 328 specimens from 4 collections by bottom-layer net; June 2–3, 1959; 15.0–13.0 m in depth; collected by R. KITAMORI, K. FUNAE, and the writer.

Area XI-a: Eastern area of Suô Nada, 5673 specimens from 14 collections by bottom-layer net, between June 12–16, 1959; depths about 30–60 m; collected by R. KITAMORI (see Fig. 47, and Table 4).

Area XI-b: The second survey of the same area as above, 3689 specimens from 29 collections by bottom-layer net, between Sept. 2–5, 1960; depths ca. 10–60 m; collected by R. KITAMORI (see Fig. 47, and Table 5).

Area XII: Front of the beach of Itsukaichi, Hiroshima Pref., Oct. 19, 1960; 185 specimens found together with the excrements of oyster in the experimental basket suspended from the oyster-raft at a depth about 10 m from the bottom; collected by U. KOBAYASHI.

Area XIII-a: Near Kanematsuhana, south coast of Miyajima, Hiroshima Bay; *Sargassum* zone, 2-4 m in depth; Dec. 8, 1961; 35 specimens found by formalin-washing of algea taken by "ebikogi" net; collected by R. OKAMOTO & K. FUNAE.

Area XIII-b: The same location as above, Jan. 8, 1962; 220 specimens found among algae obtained by the same net as above; collected by R. OKAMOTO & K. FUNAE.

Area XIV: Beach of Okamura-jima, Aki Nada; 61 specimens; May 31, 1962; among algae or under stones near low-water marks; collected by K. FUNAE.

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I wish to express my sincere gratitude to Professor Otohiko TANAKA of Kyûshû University for his deep interest and great attainments on this amphipod work followed by his critical reading of the manuscript. On the other hand, I am deeply grateful to the following persons for their continuous encouragements and many valuable advices throughout the course of this work: Prof. Huzio UTINOMI of Seto Marine Biological Laboratory, Kyôto University; Prof. Sadayoshi MIYAKE of Kyûshû University; Prof. Haruhiko IRIE of Nagasaki University.

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Historical Review of Systematic Works

Records of the gammaridean group in the systematic works from the coast of Japan have hitherto been only made fragmentally by STEBBING (1888), STEPHENSEN (1932, 1933, 1938, 1944), IWASA (1934, 1939), DAHL (1945), SHIINO (1948), and IRIE (1956). STEBBING described 3 species in "Challenger Report" of 1888; *Ampithoe japonica* was found at "Bay of Kôbe", Seto Inland Sea, and the other two were collected from "Kuroshio" region. STEPHENSEN in his 4 papers mentioned above described 23 species, of which 14 were directly recorded from marine inshore localities of the Japanese coast. IWASA in 1934 and 1939 described 13 species and 2 subspecies of only two families (Talitridae and Hyalidae), two species of which were terrestrial amphipods. DAHL in 1945 reported on 4 species of only Ampeliscidae. In 1948, SHIINO described a new boring amphipod, *Chelura brevicaudata*, and in 1956, IRIE reported on two species, *Ericthonius brasiliensis* and *Corophium acherusicum* belonging to the family Corophiidae.

Following is a list of all the marine and brackish water species from the coast of Japan described by several authors mentioned above;

Anonyx ampulloides BATE, STEBBING (1888).

Orchomene musculosus, n. sp. by STEBBING (1888).

(now falls to)→*Orchomenella chilensis* (HELLER) by K.H. BARNARD (1925 and 1932).

* *Ampithoe japonica*, n. sp. by STEBBING (1888)

→*A. lacertosa* BATE, herein by the writer.

Elasmopus japonicus, n. sp. by STEPHENSEN (1932).

* *Corophium uenoi*, n. sp. by STEPHENSEN (1932).

Ceinina japonica, n. sp. by STEPHENSEN (1933).

Parhyale kurilensis, n. sp. by IWASA (1934); IWASA (1939)
→*P. ochotensis* (BRANDT) by GURJANOVA (1951).

* *Grandidierella japonica*, n. sp. by STEPHENSEN (1938).

Orchestia platensis KRØYER; IWASA (1939); STEPHENSEN (1944).

* *Orchestia platensis* japonica (TATTERSALL); IWASA (1939); STEPHENSEN (1944); was *Talorchestia japonica* in TATTERSALL (1922).

Orchestia ditmari DERJAVIN; IWASA (1939); STEPHENSEN (1944)
→*O. ochotensis* BRANDT by BULYCHEVA (1957).

Orchestia tenuimana, n. sp. by IWASA (1939); STEPHENSEN (1944)
→*O. pyatakovi* DERJAVIN by BULYCHEVA (1957).

Talorchestia brito STEBBING; IWASA (1939); STEPHENSEN (1944).

* *Hyale novaezealandiae* THOMSON; IWASA (1939)
→*H. grandicornis* (KRØYER) by K.H. BARNARD (1916).

* *Hyale schmidti* (HELLER); IWASA (1939).

Hyale dollfusi CHEVREUX; IWASA (1939); STEPHENSEN (1944).

Hyale gracilis, n. sp. by IWASA (1939)
→*H. iwasai* SHOEMAKER on account of "homonym".

* *Allorchestes malleolus* STEBBING; IWASA (1939)
→*A. angustus* DANA by J.L. BARNARD (1954a).

Allorchestes malleolus carinatus, n. subsp. by IWASA (1939)
→*A. angustus carinatus* automatically.

* *Allorchestes plumicornis* (HELLER); IWASA (1939); STEPHENSEN (1944).

* *Melita koreana*, n. sp. by STEPHENSEN (1944).

Anisogammarus (*Anisogammarus*) *dybovski* (DERJAVIN); STEPHENSEN (1944)
→*A.* (*A.*) *pugettensis* (DANA) by J.L. BARNARD (1954a).

Anisogammarus (*Eogammarus*) *kygi* (DERJAVIN); STEPHENSEN (1944).

* *Anisogammarus* (*Eogammarus*) *annandalei* (TATTERSALL); STEPHENSEN (1944); was *Gammarus* in TATTERSALL (1922).

* *Ampithoe shimizuensis*, n. sp. by STEPHENSEN (1944)
→*A. valida* SMITH by J.L. BARNARD (1954a).

* *Ampithoe macrurus*, n. sp. by STEPHENSEN (1944)
→*A. lacertosa* BATE by J.L. BARNARD (1954a).

Sunamphithoe plumosa, n. sp. by STEPHENSEN (1944).

* *Ampelisca bocki*, n. sp. by DAHL (1945).

* *Ampelisca misakiensis*, n. sp. by DAHL (1945).

* *Ampelisca* sp. cf. *brevicornis* (COSTA) by DAHL (1945)
→*A. brevicornis* (COSTA) by the writer.

* *Byblis japonicus*, n. sp. DAHL (1945).

Chelura brevicaudata, n. sp. by SHIINO (1948)
→*Nippochelura brevicaudata* (SHIINO) by J.L. BARNARD (1959-b).
* *Ericthonius brasiliensis* DANA ; IRIE (1956)
→*E. pugnax* DANA, herein by the writer.
* *Corophium acherusicum* COSTA ; IRIE (1956).

The species which has been afterwards revised are indicated with a mark of arrow, and those described herein are marked with an asterisk.

Orchomene musculosus mentioned above was at first transferred into the genus *Orchomeneopsis* by STEBBING himself (1906), then fallen to a synonym of *O. chilensis* (HELLER) by K.H. BARNARD (1925), after that, the genus *Orchomeneopsis* was fused under the genus name of *Orchomenella* by K.H. BARNARD (1932), and thus the present name of the species is *Orchomenella chilensis* (HELLER). Concerning *Parhyale kurilensis* designated as a new species by IWASA, SHOEMAKER says in his peper of 1956, "DERJAVIN (1937) made IWASA's species a synonym of BRANDT's species *Allorchestes ochotensis*, which was made the genotype of a new genus *Parallorchestes* by SHOEMAKER (1941). DERJAVIN at the same time transferred BRANDT's species to *Parhyale*, making it *Parhyale ochotensis*." *Melita koreana* is a record from Makinoshima, Fuzan, Korea described by STEPHENSEN, but known also from the Japanese coasts by the writer, and *Anisogammarus* (*E.*) *kygi* and *A.* (*E.*) *annandalei* are recorded from fresh water localities in his paper of 1944, but the two species are both found also from the brackish waters along the coasts of Japan.

As far as the writer knows, the specific information mentioned above are all of the taxonomic records prior to the writer's work from Japan.

List of the Species Described in This Series of Papers

Lysianassidae

1. *Anonyx nugax pacificus* GURJANOVA
2. *Orchomenella littoralis*, sp. nov.
3. *Lepidepecreum vitjazi* GURJANOVA
4. *Endevoura mirabilis* CHILTON
5. *Aristias pacificus* SCHELLENBERG
6. *Scopelocheirus hopei* (COSTA)
7. *Socarnes vahli* (KRØYER)
8. *Ichnopus taurus* COSTA

Ampeliscidae

9. *Ampelisca brevicornis* (COSTA)
10. *Ampelisca cyclops* WALKER
11. *Ampelsca bocki* DAHL
12. *Ampelisca misakiensis* DAHL
13. *Ampelisca miharaensis* NAGATA
14. *Ampelisca naikaiensis* NAGATA
15. *Byblis japonicus* DAHL

Argissidae

16. *Argissa hamatipes* (NORMAN)

Haustoriidae

17. *Urothoe pulchella* (COSTA)

Phoxocephalidae

18. *Paraphoxus oculatus* (SARS)
19. *Leptophoxus falcatus* SARS
20. *Harpinia miharaensis* NAGATA

Amphilochidae

21. *Gitanopsis vilordes* J. L. BARNARD

Leucothoidae

22. *Leucothoe incisa* ROBERTSON
23. *Leucothoe alata* J. L. BARNARD

Stenothoidae

24. *Stenothoe gallensis* WALKER

Liljeborgiidae

25. *Liljeborgia japonica*, sp. nov.
26. *Liljeborgia serrata*, sp. nov.
27. *Idunella chilkensis* CHILTON
28. *Idunella curvidactyla*, sp. nov.

Oedicerotidae

29. *Pontocrates altamarinus* (BATE & WESTWOOD)
30. *Bathymedon longimanus* (BOECK)
31. *Monoculodes limnophilus japonicus*, subsp. nov.

Synopiidae

32. *Synopia ultramarina* DANA

Tironidae

33. *Syrrhoites pacificus*, sp. nov.

Calliopiidae

34. *Leptamphopus novaezealandiae* (THOMSON)

Pleustidae

35. *Pleustes panopla* (KRØYER)
36. *Parapleustes bicuspoides*, sp. nov.

Atylidae

37. *Atylus japonicus* NAGATA

Melphidippidae

38. *Melphidippa borealis* BOECK
39. *Melphidippa globosa*, sp. nov.
40. *Melphidippella sinuata*, sp. nov.
41. *Melphisana japonica*, sp. nov.

Pontogeneiidae

42. *Pontogeneia rostrata* GURJANOVA

Cammaridae

43. *Anisogammarus* (*Eogammarus*) *annandalei* (TATTERSALL)
44. *Melita koreana* STEPHENSEN
45. *Melita denticulata*, sp. nov.

46. *Melita tuberculata*, sp. nov.
47. *Melita japonica*, sp. nov.
48. *Maera serratipalma*, sp. nov.
49. *Maerella tenuimana* (BATE)
50. *Ceradocus* (*Denticeradocus*) *capensis* SHEARD
51. *Eriopisa elongata* (BRUZELIUS)
52. *Eriopisella sechellensis* (CHEVREUX)
53. *Megaluropus agilis* HOECK

Dexaminidae

54. *Paradexamine flindersi* (STEBBING)
55. *Paradexamine barnardi* SHEARD

Talitridae

56. *Orchestia platensis japonica* (TATTERSALL)

Hyalidae

57. *Hyale grandicornis* (KRØYER)
58. *Hyale schmidti* (HELLER)
59. *Allorchestes angustus* DANA
60. *Allorchestes plumicornis* (HELLER)

Aoridae

61. *Aora typica* KRØYER
62. *Aoroides columbiae* WALKER
63. *Aoroides secunda* CURJANOVA

Photidae

64. *Photis reinhardi* KRØYER
65. *Photis longicaudata* (BATE & WESTWOOD)
66. *Eurystheus japonicus* NAGATA
67. *Eurystheus utinomii* NAGATA
68. *Podoceropsis nitida* (STIMPSON)

Ampithoidae

69. *Ampithoe lacertosa* BATE
70. *Ampithoe valida* SMITH
71. *Ampithoe ramondi* AUDOUIN
72. *Ampithoe orientalis* DANA

Ischyroceridae

73. *Jassa falcata* (MONTAGU)
74. *Microjassa cumbrensis* (STEBBING & ROBERTSON)

Corophiidae

75. *Corophium volutator* (PALLAS)
76. *Corophium acherusicum* COSTA
77. *Corophium crassicorne Bruzelius*
78. *Corophium uenoi* STEPHENSEN
79. *Ccrophium insidiosum* CRAWFORD
80. *Corophium kitamorii* sp. nov.
81. *Ericthonius pugnax* DANA
82. *Crandidierella japonica* STEPHENSEN
83. *Cerapus tubularis* SAY
84. *Unciolella lunata* CHEVREUX

Podoceridae

85. *Podocerus inconspicuus* (STEBBING)

Types are preserved in my hand for the present (KN No.).

Systematics

Key to the families described in this paper

1. Antenna 1, peduncular article 1 stout, with accessory flagellum; mandible with cutting edge almost smooth, with palp; article 3 of gnathopod 2 elongate.....Lysianassidae
1. These characters not combined..... 2
2. Head tapering, truncate; eyes externally simple, with 2–4 corneal lenses; antenna 1 without accessory flagellum; telson more or less cleft.....Ampeliscidae
2. These characters not combined..... 3
3. Coxal paltes 1–3 decreasing gradually in size.....Argissidae
3. Coxal plates 1–3 not decreasing in size..... 4
4. Antenna 1 with accessory flagellum; mandible with palp normal; peraeopods 3–5 adapted for burrowing by expansion of joints and armature of many spines and setae 5
4. These characters not combined 6
5. Peraeopod 4 not greatly longer than peraeopod 5 .....Haustoriidae
5. Peraeopod 4 greatly longer than peraeopod 5.....Phoxocephalidae
6. Upper lip incised; maxillipeds normal; uropod 3 biramous; telson elongate, tapering, entire.....Amphilochidae
6. These characters not combined..... 7
7. Antenna 1 without accessory flagellum; maxillipeds more or less abnormal; telson entire..... 8
7. These characters not combined..... 9
8. Gnathopod 1 chelate; uropod 3 biramous .....Leucothoidae
8. Gnathopod 1 not chelate; uropod 3 with a single 2-jointed ramus .....Stenothoidae
9. Mandible with molar weak or wanting; maxillipeds, inner plate small; gnathopods 1 and 2 strongly subchelate; telson more or less divided .....Liljeborgiidae
9. These characters not combined..... 10
10. Head produced into a deflexed rostrum, or front of head bent down at right angles to dorsal line; eyes, when present, dorsally contiguous or confluent 11
10. These characters not combined 13
11. Antenna 1 without accessory flagellum; article 3 of mandibular palp large; peraeopod 5 much longer than peraeopod 4; telson entire .....Oedicerotidae
11. Antenna 1 with accessory flagellum; article 3 of mandibular palp small; peraeopod 5 not much longer than peraeopod 4; telson cleft 12
12. Peraeopods 1 and 2 with articles 4 and 5 dilated .....Synopiidae
12. Peraeopods 1 and 2 with articles 4 and 5 narrow .....Tironidae
13. Coxal plate 4 usually excavated behind; peraeopods 1 and 2 not glandular; telson variable; animal usually not domicolous..... 14
13. Coxal plate 4 usually not excavated behind; peraeopods 1 and 2 frequently glandular; telson entire; animal usually domicolous 22
14. Mandible with palp..... 15
14. Mandible without palp 20
15. Telson entire 16
15. Telson eleft..... 17

16. Rostrum weak; mandible with molar well developed ..... Calliopiidae
16. Rostrum usually well marked; mandible, molar feeble ..... Pleustidae
17. Pleon segments 5 and 6 coalesced ..... Atylidae
17. Pleon segments 5 and 6 not coalesced 18
18. Antenna 1 without accessory flagellum ..... Pontogeneiidae
18. Antenna 1 with accessory flagellum 19
19. Peraeopods and uropods long and very slender ..... Melphidippidae
19. Peraeopods and uropods not very slender ..... Gammaridae
20. Uropod 3, both rami well developed ..... Dexaminidae
20. Uropod 3, one ramus wanting or very small 21
21. Antenna 1 shorter than peduncle of antenna 2 ..... Talitridae
21. Antenna 1 longer than peduncle of antenna 2 ..... Hyalidae
22. Uropods 2 and 3, one or other wanting or rudimentary ..... Podoceridae
22. Uropods 2 and 3 developed 23
23. Pleon usually depressed; uropod 3 uniramous ..... Corophiidae
23. Pleon compressed; uropod 3 biramous 24
24. Uropod 3 not uncinate 25
24. Uropod 3, outer ramus uncinate 26
25. Gnathopod 1 larger than gnathopod 2 ..... Aoridae
25. Gnathopod 1 not larger than gnathopod 2 ..... Photidae
26. Lower lip with principal lobes notched ..... Ampithoidae
26. Lower lip with principal lobes not notched ..... Ischyroceridae

Family LYSIANASSIDAE

Key to the species of Lysianassidae

1. Peraeopod 1 powerful, chelate ..... *Endevoura mirabilis*
1. Peraeopod 1 normal, simple 2
2. Coxa 1, lower front angle concealed ..... *Aristias pacificus*
2. Coxa 1, lower front angle not concealed 3
3. Branchial vesicles pleated on both or one side 4
3. Branchial vesicles simple 6
4. Gnathopod 1 subchelate ..... *Anonyx nugax pacificus*
4. Gnathopod 1 simple 5
5. Epimeral plate 3, lower hind corner rounded ..... *Socarnes vahli*
5. Epimeral plate 3, lower hind corner toothed ..... *Ichnopus taurus*
6. Mandibular palp attached not behind the molar ..... *Scopelocheirus hopei*
6. Mandibular palp attached behind the molar 7
7. Pleon segment 4 with a triangular dorsal carina prominetly projected ..... *Lepidepecreum vitjazi*
7. Pleon segment 4 without such a projection ..... *Orchomenella littoralis*

Anonyx nugax pacificus GURJANOVA

Anonyx nugax pacificus GURJANOVA 1962, p. 219, figs, 68a–b.
Anonyx ampulloides, (non BATE), NAGATA 1960, p. 166, pl. 13, figs. 1–6.

Material examined: Area IV (484 specimens), VI (2), XI-b (1); up to 14.9 mm in length; depths of 3–52 m. Nearly all of them were obtained from

Sts. 6–8 of Mihara Bay, deeper than 10 m in depth.

Remarks: As I have mentioned in my preceding paper, I felt it difficult to identify the specimens with certainty either as *A. nugax* or as *A. ampulloides*, because of having no opportunity actually comparing the specimens of the two species; *A. ampulloides* was recorded at 34°58′N, 139°29′E, off the Pacific coast of Japan by "Challenger" Expedition. According to GURJANOVA's key of the genus *Anonyx* (1962, p. 211), the present specimens fall into the present subspecies, therefore the specimens reported under the name *A. ampulloides* in my preceding paper should be attributed to this subspecies of *A. nugax*. The subspecies is particularly distinguished from BATE's *ampulloides* by the shape and color of eyes, and the structure of male uropod 2.

This subspecies is also known by me from the other coasts of Japan, e.g. the shallower waters of Mutsu Bay, and the Japanese coast of Japan Sea; they are both the same form as that of Seto Inland Sea in characters. The present specimens are, however, not entirely agreed with GURJANOVA's figures of the species taken from the Japan Sea. Mandibular palp normal in shape; its article 2 not so stout. Front lower corner of the first pleonal epimeron not so strongly produced but rather similar to that of his figure of *A. nugax nugax* (1962, fig. 67a). Lower hind corner of the third pleonal epimeron with the tooth of variable shape, usually acutely produced in the smaller specimens 6–8 mm long, while produced to a short, broad tooth in the larger ones of 12–14 mm long. Peraeopod 3, article 4 surely stout and similar proportion of length to its article 5, but in peraeopod 4, article 4 not so short in proportion to its article 3. Peduncular article 5 of antenna 2 usually subequal in length to article 4, but rather longer in the larger of 13mm long. Eyes flask-shaped, but the lower posterior corner usually less produced backwards, rather similar to that of the specimens of this subspecies from Okhotsk Sea figured by GURJANOVA (1962, fig. 69). The most remarkable character of the present specimens is that article 5 of gnathopod 1 is fairly long, comparing with its article 6 (see NAGATA 1960, pl. 13, fig. 3).

Distribution: Japan Sea and Okhotsk Sea.

Orchomenella littoralis, sp. nov.

Orchomenella sp., NAGATA 1960, p. 167, pl. 13, figs. 7–18.

Material examined: Areas I (2), IV (258), V (70), VI (20), VII (66), IX–b (7), IX–c (4), XI–a (2), XI–b (6), XIII–b (2). Total: 437 specimens, up to 6.5 mm in length; from depths of low-water mark to 56 m.

Description: Lateral lobes of head in female triangularly produced, in male rather more narrowly produced. Eyse oval, slightly widened below, moderate in size, and its facets of light red reticulated with milk-like white

in fresh, composed of about 10–11 in number, but entirely vanishing away and imperceptible in spirits. Coxa 1 of nearly uniform width bearing 3–4 setae in a oblique row on the surface of inside; coxa 4 of a harmonious boot-like shape, right-angularly excavated behind, the excavation relatively shallow comparing to the total depth of the coxa, the lower hind lobe relatively long, narrowing towards the apex; coxa 5 of equal breadth and depth, produced downwards behind; coxae 6–7 like in those of *O. lepidula* (GURJANOVA 1962, fig. 44b). Pleonal epimera 1–3 with the posterior margin minutely serrate, in the first and third epimera only in the lower half of the margin. Pleon segment 4 in female with a wide, shallow dorsal depression, in male narrowly and steeply depressed (in female of 6.2 mm long, rather resembles the outline of figure (pl. 13, fig, 16) shown as a male of 4.7 mm long in my preceding paper, while in male of 6.5 mm long still more narrow, deep, and steep). Epistome with a broadly rounding lobe projection forwards beyond the upper lip. Antenna 1 in male, the first peduncular article more stouter and somewhat shorter than in female; antenna 2, flagellum in male distally thread-like, reaching the full length of the animal.

Gnathopod 1 short and stout, article 5 subequal or a little shorter than article 6, not produced to a linguiform posterior lobe; article 6 with the anterior and posterior margin nearly parallel each other, the palm nearly transverse and slightly concave, bearing a minutely comb-like margin, and defined by a spiniform angle accompanied with two stout spines at the base; article 7 with an accessory tooth on the inner edge like in *O. nana* (KRØYER) (CHEVREUX & FAGE 1925, p. 71, fig. 62). Gnathopod 2, article 5 about two times as long as article 6, of which the distal end subacutely produced, showing a minute cheliform with the finger. Peraeopods 3–5, article 2 shorter than the rest of the limb, the hind margin minutely serrated; the shape in peraeopod 3 as seen in the figure of my preceding paper, pretty constant through many specimens at my hand, but in peraeopods 4–5 they are somewhat of variable shape, usually similar to those of *O. lepidula* (l.c.). All fingers of peraeopods 1–5 do not show such a strong form as seen in GURJANOVA's figures for *O. intermedia* (GURJANOVA 1962, fig. 45b).

Uropod 2, inner ramus not constricted; uropod 3 with the rami fully longer than the peduncle, inner ramus subequal to the basal article of outer ramus, the second article of the outer ramus short and small, the inner margin of the outer ramus in male lined with many marginal plumose setae. Telson rather slender, more than 1.5 times as long as broad, tapering towards the apex, cleft to three fourths the length, each lobe bearing an apical spine and a lateral spinule. Integument comparatively indurated, partly coloring with light red in fresh, but entirely whitish in spirits.

Holotype: KN No. 3111, male, 4.9 mm. *Type locality*: St. 2, north coast of Momo Shima (Area VII), Jan. 23, 1957; 4 m in depth, *Zostera* belt, Mud, W.T.

9.8°C, Cl. 18.16‰ at bottom-layer respectively.

Remarks: I have thoroughly referred to all of the known species belonging to this genus listed by J.L. BARNARD (1958, p. 96), in which 30 species are reported until the end of 1956 from the world, but no species agreed well with the present new one; particularly among them, *O. nana* (KRØYER) known from the European coasts, Mediterranean, and Ceylon, is the most nearest to the new species. Recently, GURJANOVA in his paper of 1962 described five new species from the north-western parts of the Pacific, in which three species (*O. lepidula, O. intermedia,* and *O. minuscula*) are related to the new one. However, the present new species could not still satisfy me in referring it to any of them. This new one is commonly found in the inshore waters of the inland bay along the coasts of Japan, from Mutsu Bay to the west coast of Kyûshû, which belong to "warm temperate" area of Japan. It may be one of the distinctive species representing the endemic feature of these areas.

Lepidepecreum vitjazi GURJANOVA

Lepidepecreum vitjazi GURJANOVA 1962, p. 338, fig. 112.

Material examined: Areas I (1), IV (72), VI (1). All up to 7.4mm long, from depths of 3–25 m.

Remarks: The specimens are wonderfully well allied to GURJANOVA's description and figures of *L. vitjazi,* except for the following minor details: there is no oblique row of setae on the first coxal plate; marginal setae on article 6 of gnathopod 1 not hooked at apex; there are only five pairs of dorsal spinules on talson; the dorso-posterior end of pleon segment 3 feebly carinate and shows no such an attractive projection as to be upturnedly raised. The shape of dorsal projection on pleon segment 4 rather more resembles that of *L. longicorne* figured by CHEVREUX & FAGE (1925, p. 63, figs. 50–51). The present specimens are closely related to *L. longicorne* (BATE & WESTWOOD), except for the appearance of carinae both on the dorsal line and on the peduncular article 1 of antenna 1; the difference appeared to be not essential in character but to be only a variable character caused by the discrepancy of localities, so 1 have assigned the specimens to *L. longicorne* in my memorandun for a long time. However, in closer examination of *L. longicorne,* accessory flagellum of antenna 1, strange to say, entirely wanting, and telson strongly tapering towards the apex and more longer, nearly three times as long as broad. The specimens have also a close resemblance with *L. eoum* GURJANOVA (1951, p. 277, figs. 146–147) taken from the shallow waters, 15 m in depth of the Russian coast of the Japan Sea, but the discrepancy of the dorsal appearance can not still satisfy me in referring them to *L. eoum*

Distribution: Bering Sea, near Olyutorskogo, 40 m.

Endevoura mirabilis CHILTON

(Figs. 2-3)

Endevoura mirabilis CHILTON 1921, p. 44, figs. 4 a-q.

Material examined: Areas XI-a (1), XI-b (4). Length, 3.5-10.5 mm, all probably male; depths, 32-56 m.

Remarks: Tne present specimens somewhat differ from CHILTON's description and figures of *E. mirabilis*. Lateral lobes of head more narrowly produced. Coxa 4 not abruptly upturned at the lower hind corner. Mandibular palp

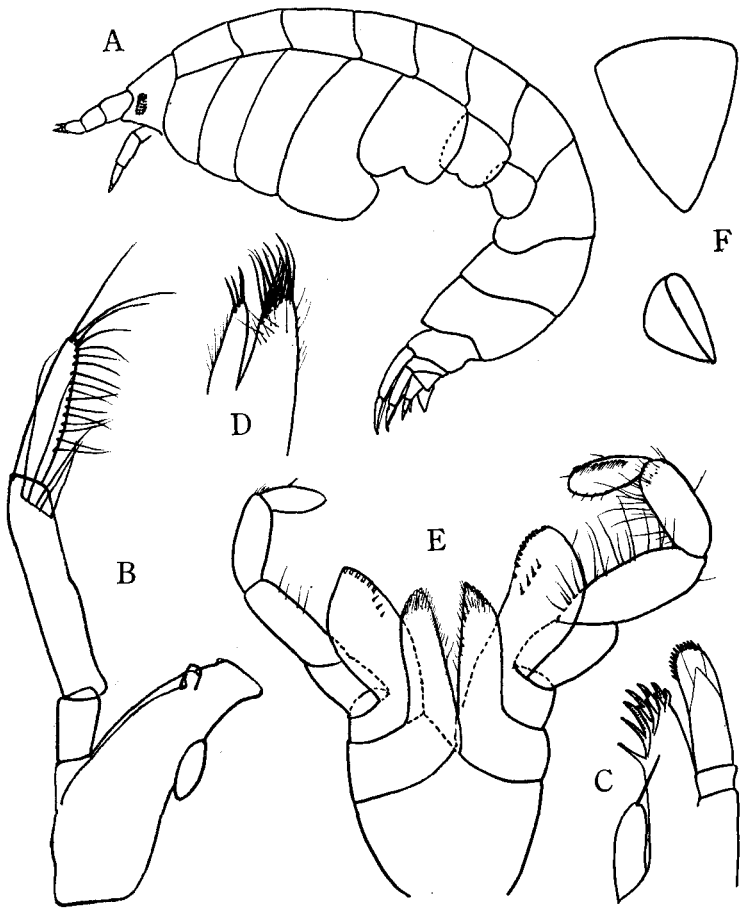


Fig. 2. *Endevoura mirabilis* CHILTON. Male, 10.5 mm : A, lateral view of body. Male, 7.1 mm : B, mandible ; C, maxilla 1 ; D, maxilla 2 ; E, maxillipeds ; F, telson (upper and lateral view).

more elongate, armed with more long setae on articles 2 and 3. Gnathopod 1, articles 5 and 6 combined are much longer than article 2; article 2 proximally broad, with the anterior margin roughly dentate, the denticles become smaller and denser by degrees towards the proximal portion; finger minutely dentate on the middle of the inner edge.

Peraeopod 1 has the most prominent character on the distal portion of the leg; article 6 shows a echelon-formation, the postero-proximal portion produced backwards to the posterior end of article 4, while the postero-distal end projecting forwards and forming a chela with the finger; the palm evenly convex, regularly and minutely dentate, and defined by a stout tooth (sometimes entirely evanescent), accompanied with a pretty distinctive spine.

The third pleonal epimeron with such a minute point at the lower pos-

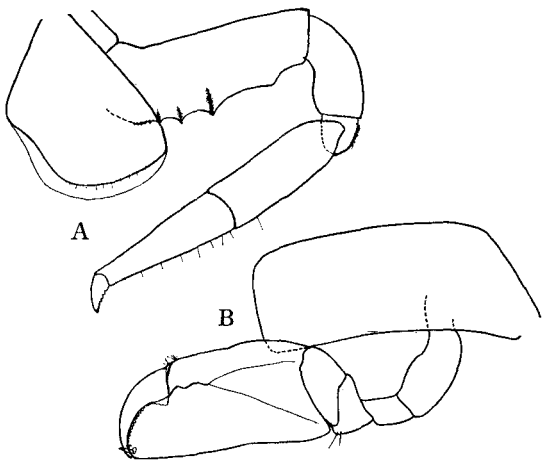


Fig. 3. *Endevoura mirabilis* CHILTON. Male, 7.1 mm : A, gnathopod 1 ; B, peraeopod 1.

terior corner, that it is apt to be overlooked, but the hind margin not serrate below, unlike in CHILTON's figure. Telson tapering, longer than broad, the apex narrowly rounded. Among the differences mentioned above, the shape of article 6 of peraeopod 1 and of telson are truely remarkable. The rounded shape of telson in CHILTON's specimen may have happened to be observed when it was depressed down with a cover-glass. Article 6 of peraeopod 1 is invariable in shape among the specimens at hand, between 3.5–10.5 mm in length. The present specimens are, however, quite well conformed with *mirabilis* in all the other major characters, so that 1 could not consider the specimens to be essentially distinctive from *E. mirabilis*.

Distribution: Australian seas (east coast of Frinders Island, Bass Strait).

Aristias pacificus SCHELLENBERG

Aristias pacificus SCHELLENBERG 1936, p. 153.

Material examined: Area XI-a, 4 specimens (see Table 4); up to 2.5 mm in length; depths, 20–50 m.

Remarks: The present specimens, though they are all small, appear to agree well with SCHELLENBERG's description. This species has surely some agreements both with *A. tumidus* and *A. neglectus* (SARS 1895, pl. 17, fig. 2 and pl. 18, fig. 1, respectively). In the specimens at hand, coxa 6 has also the lower hind lobes produced below to a long curved process as in *A. falcatus* described and figured by STEPHDNSEN (1923, p. 73, fig. 14), who says in the paper, "the feature is also found among the materials of *A. tumidus* and *A. neglectus*."

Such a "ganz kleinen stumpfen Zahn" as described by SCHELLENBERG for *A. pacificus*, is not found at the lower hind corner of the third pleonal epimeron. Peraeopods 1–5, article 6 produced at the tip to a short tooth-like process, and this character is described also in STEBBING's diagnosis of 1906 for *A. neglectus* (p. 50). Telson cleft to two-thirds the length. The other points like in SCHELLENBERG's description, except in the number of flagellar articles of antennae. However, a little hesitation remains behind for the identification of these specimens, as no figures of this species are given by SCHELLENBERG, and if the more larger specimens be accepted in future, the specific characters will be more confirmed.

Distribution: N.E. of Union Bay, east side of Vancouver Is., 12–16 fm.

Scopelocheirus hopei (COSTA)

Callisoma krφyeri, DELLA VALLE 1893, pl. 26, figs. 1–15; SARS 1895, p. 54, pl. 19, fig. 2.
Scopelocheirus hopei, STEBBING 1906, p. 62; CHEVREUX & FAGE 1925, p. 55, figs. 39–40; GURJANOVA 1951, p. 241, fig. 106.

Material examined: Area XI-b, 2 female specimens; 7.1 and 7.8 mm in length; from depths of 40–52 m.

Remarks: The specimens well agree with this species figured in the references cited above; the shape of coxa 4 especially with that of DELLA VALLE's one. The shape of epistome is used by DAHL (1959, p. 221) as one of the distinctive characters among the genera of the *Scopelocheirus* group; *Scopelocheirus*, *Paracallisome*, *Aroui*, *Scopelocheiropsis*, and *Bathycallisoma*, but the protruding form of epistome beyond upper lip is not always a proper character for the genus *Scopelocheirus*; it projects really in *S. crenatus* (SARS 1895, pl. 19, fig. 1), but not projects in *S. hopei*, as obviously seen in CHEVREUX & FAGE's figure for this species. It is confirmed also in the present specimens, therefore

a revision may be needed in STEBBING's diagnosis of 1906. The outer plate of maxillipeds in the present specimens also nearly reaching to the end of article 2 of the palp, and article 4 of the palp not so slender as in *S. crenatus*.

Distribution: North Atlantic, North Sea, Skagerrak, Kattegat, Baltic (Great Britain, Norway, Sweden), and Mediterranean.

Socarnes vahli (KRØYER)

Socarnes vahli SARS 1895, p. 44, pl. 16, fig. 2; STEBBING 1906, p. 57; GURJANOVA 1951, p. 226, fig. 91; GURJANOVA 1962, p. 308.

Material examined: Area XIII-b, 3 female specimens; 3.8–11.7 mm in length; from depths of 2–4 m.

Remarks: The specimens agree well with SARS' figures. Eyes reniform, black. Lateral lobes of head with the smooth distal margin. Oral parts entirely like in Sars' figures. Antenna 1, flagellum 4–14 jointed, accessory flagellum with 2–6 joints. Antenna 2, peduncular article 5 shorter than article 4; flagellum with 3–13 joints. Gnathopod 1, finger simple, and smooth at the base. Third pleonal epimeron with the postero-lateral corner rounding, rather similar to that of CHEVREUX & FAGE's figure of *S. erythrophthalmus* ROBERTSON (1925, fig. 34). Telson scarcely reaching to the distal end of peduncle of uropod 3. Branchial vesicles pleated on both sides.

These specimens are undoubtedly assigned to the present species. It is noteworthy that such a boreo-arctic form is found in Seto Inland Sea.

Distribution: In North Atlantic it descends southerly to the south end of Greenland, and Iceland; in the North Pacific it extends, through Okhotsk Sea and Bering Sea, south to Japan Sea (3–5 to 240 m in depth).

Ichnopus taurus COSTA

Ichnopus, taurus, DELLA VALLE 1893, pl. 3, fig. 1, pl. 27, figs. 1–22; WALKER 1904, p. 238, pl. 1, fig. 3; STEBBING 1906, p. 53; K. H. BARNARD 1916, p. 123; CHEVREUX & FAGE 1925, p. 48, fig. 30.

Ichnopus spinicornis, SARS 1895, pl. 15; STEBBING 1906, p. 52; CHEVREUX & FAGE 1925, p. 47, figs. 28–29; GURJANOVA 1951, p. 220, fig. 86.

Ichnopus serricrus WALKER 1909, p. 328, pl. 43, fig. 1.

Material examined: One male specimen, 8.4 mm long from the stomach of benthos-feeding fish caught in the area of Bungo Suidô (about 40–60 m), Jan. 20, 1960.

Remarks: Though found from the stomach of fish, the specimen is not so damaged and fully available for identification. It agrees well with SARS' figures for *I. spinicornis*, except for gnathopod 1 and peraeopod 3.

Antenna 1, the distal dentiform process of peduncle presents only on the

first article. Gnathopod 1 much shorter than gnathopod 2, while the finger with the expanded base, at which is armed with spines of variable size like in CHEVREUX & FAGE's figure for *I. taurus*. Article 2 of peraeopod 3 with the hind margin more deeply serrated than in the figure given by WALKER for *I. serricurus*. The closer examination of the present specimen makes me approve of K. R. BARNARD's opinion that the above-mentioned three species are together conspecific.

Distribution: Faroes, Norwegian coast, coasts of Ireland and France, and Mediterranean; South Africe, Seychelles, Ceylon, and Java Sea.

Family AMPELISCIDAE

Key to the species of Ampeliscidae

1. Peraeopod 5. finger spiniform ..... *Byblis japonicus*
1. Peraeopod 5, finger lanceolate 2
2. Corneal lenses of two pairs 3
2. Corneal lenses of one pair only 6
3. Third pleonal epimeron bisinuate ..... *Ampelisca brevicornis*
3. Third pleonal epimeron not bisinuate 4
4. Antenna 1, peduncular article 2 subequal to article 1 in length ..... *Ampelisca bocki*
4. Antenna 1, peduncular article 2 clearly longer than article 1 5
5. Antenna 1 in female not very much shorter than antenna 2 ..... *Ampelisca miharaensis*
5. Antenna 1 in female very much shorter than antenna 2 ..... *Ampelisca naikaiensis*
6. Head produced into a broad rostrum ..... *Ampelisca cyclops*
6. Head produced into a narrow rostrum ..... *Ampelisca misakiensis*

Ampelisca brevicornis (COSTA)

(Fig. 4, 1)

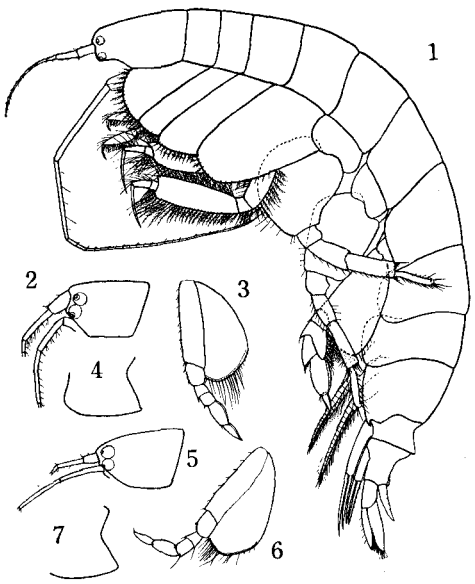
Ampelisca brevicornis, WALKER 1904, p. 253; STEBBING 1906, p. 100; CHEVREUX 1911, 180; STEPHENSEN 1915, p. 43; K. H. BARNARD 1916, p. 132; CHEVREUX & FAGE 1925, p. 77, figs. 67-68; SCHELLENBERG 1928, p. 634; K. H. BARNARD 1932, p. 84; PIRLOT 1936, p. 277; K. H. BARNARD 1937, p. 148; SCHELLENBERG 1942, p. 146, fig. 119; REID 1951, p. 206, figs. 10-15 (with vars.); NAGATA 1959, p. 265, fig. 2; NAGATA 1960, p. 167.
Ampelisca sp. cf. *brevicornis*, DAHL 1945, p. 9, fig. 7.
Ampelisca laevigata, SARS 1895, p. 169, pl. 59, fig. 1.

Material examined: Areas I (30), III (9), IV (105), V (84), X (250), XI-a (2117), XI-b (2162). Total: 4575 specimens, up to 12.0 mm in length; from depths of 5-53 m.

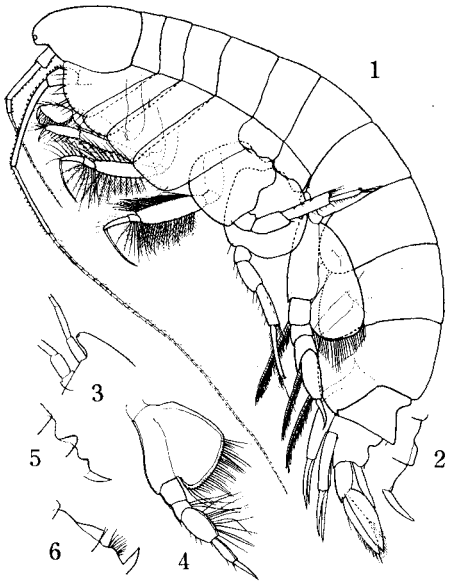
Remarks: The specimens at hand do not necessarily agree in details with DAHL's description for the material from Japan, and it is unable to find any qualitative differences between Japanese and European forms, except that the rami of uropod 3 more broader and the apices more rounded as seen in DAHL's

figure. This species is very common on the littoral sea bottom as seen in Tables 4 and 5, and often found in the stomachs of various benthos-feeding fishes taken from all over the areas of Seto Inland Sea.

Distribution: Northerly from Lofoten Is., along European coasts, to the West and South Africa; into Mediterranean, through Red Sea, Gulf of Aden, the coast of East Africa, to Ceylon, Java Sea, and Japan.



(Fig. 4)



(Fig. 5)

Fig. 4. *Ampelisca brevicornis* (COSTA) : 1. *Ampelisca miharaensis* NAGATA : 2–4. *Ampelisca naikaiensis* NAGATA : 5–7. (1, lateral view ; 2, 5, head and peduncle of antennae; 3, 6, fifth peraeopod ; 4, 7, third pleonal epimeron).

Fig. 5. *Ampelisca cyclops* WALKER : 1, lateral view of male ; 2, female dorsal profile of urosome. *Ampelisca misakiensis* DAHL : 3, front of head ; 4, fifth peraeopod ; 5, 6, male and female dorsal profile of urosome respectively.

Ampelisca cyclops WALKER

(Fig. 5, 1–2)

Ampelisca cyclops WALKER 1904, p. 253, pl. 2, fig. 14; STEBBING 1906, p. 722; PIRLOT 1936, p. 280; K. H. BARNARD 1937, p. 149.
Ampelisca iyoensis NAGATA 1959, p. 274, figs. 9–11.

Material examined: Areas IV (2), XI-a (6), XI-b (31); up to 12.8 mm in length; from depths of 10–53 m.

Remarks: WALKER described the female specimens of this species from

Ceylon, and my female specimens well agree with WALKER's ones, except for the minor details. WALKER says that the head has "2 large confluent crimson spots" at the anterior edge, therefore the corneal lenses are probably not one but two; in the present specimens the pigments of the spots soon fade out in spirits, but the lenses are usually outlined by red pigments for a long time. Antenna 1, the peduncle has the ratio of raticle 2 to article 1 considerably variable in length; in female about 1.5–2.0, in male 2.0 or more. Antenna 2, the peduncular article 4 in both sexes fully longer than article 5. The difference of dorsal profile of pleon segment 4 in both sexes is figured here. And now, I am unable to distinguish qualitatively the present specimens from WALKER's material from Ceylon. It is pretty sure that *A. iyoensis* designated by myself in 1959 is a synonym of *A. cyclops* WALKER.

Distribution: Gulf of Oman, Ceylon, East Indies, and Japan.

Ampelisca bocki DAHL

Ampelisca bocki DAHL 1945, p. 2, figs. 1–3; NAGATA 1959, p. 274.

Material examined: Areas I (2), III (1), IV (18), V (9), X (1), XI–a (269), XI–b (428). Total: 728 specimens, up to 11.0 mm in length; from depths of 10–56 m.

Remarks: This species is found by DAHL from Kôbe Bay, 12–15 m in depth, and is widely distributed on the littoral sea floor of the southern coasts of Japan as well as Seto Inland Sea.

Distribution: Known only from Japan.

Ampelisca misakiensis DAHL

(Fig. 5, 3–6)

Ampelisca misakiensis DAHL 1945, p. 6, figs. 5–6.

Material examined: Areas IV (14), XI–a (127), XI–b (275). Total: 416 specimens, up to 8.2 mm in length; from depths of 30–56 m.

Remarks: Only one female specimen of this pecies has been reported by DAHL from depths of 30–50 m, Misaki, Kanagawa Pref., and the difference of dorsal profile of urosome in both sexes is figured here.

Distribution: Known only from Japan.

Ampelisca miharaensis NAGATA

(Fig. 4, 2–4)

Ampelisca miharaensis NAGATA 1959, p. 266, figs. 3–5; NAGATA 1960, p. 168.

Material examined: Areas IV (4073), VI (8), VII (1), IX–d (1), XI–a (132),

XI-b (83). Total: 4298 specimens, up to 9.9 mm in length; from depths of 2 to 47 m.

Remarks: The enormous number of material from Mihara Bay (Area IV) are obtained at Sts. 6–8, which are deeper than 10 m in depth.

Distribution: Known only from Japan; Ariake Sea, and Nakaumi (Shimane Pref.) in other localities than the Seto Inland Sea.

Ampelisca naikaiensis NAGATA

(Fig. 4, 5–7)

Ampelisca naikaiensis NAGATA 1959, p. 270, figs. 6–8; NAGATA 1960, p. 168.

Material examined: Areas I (1), III (2), IV (70), XI-a (309), XI-b (141). Total: 523 specimens, up to 8.9 mm in length; from depths of 4–56 m; nearly all of the specimens from the soft bottom deeper than 10 m in depth.

Distribution: Known only from Japan; on the other coasts of Japan, found in Ariake Sea, and Tomioka Bay.

Bybils japonicus DAHL

(Fig. 6)

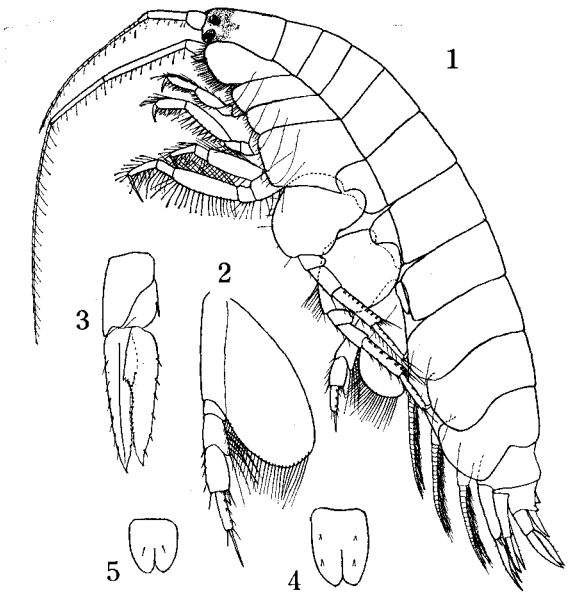


Fig. 6. *Byblis japonicus* DAHL : 1, lateral view ; 2, fifth peraeopod ; 3, third uropod ; 4, 5, telson of male and female respectively.

Byblis japonicus DAHL 1945, p. 14, figs. 8-10; NAGATA 1960, p. 168, pl. 13, figs. 19-23.

Material examined: Areas I (24), II (2), III (10), IV (3302), V (42), VI (45), VII (18), IX-b (6), IX-c (37), IX-d (21), XI-a (451), XI-b (263), XIII-b (1). Total: 4222 specimens, up to 10.0 mm in length; depths of *Zostera* belt near low-water marks to 56 m.

Remarks: This species is found by DAHL from depths 200-400 m off the coast of Misaki, Kanagawa Pref., and is also known by me from the inshore waters of several localities; Tôkyô Bay, Maizuru Bay, and the west coast of Kyûshû. It is one of the most popular inhabitants on a littoral sea bottom, at least, in the southern coast of Japan, together with the species of the genus *Ampelisca* (see Tables 4 and 5).

This species also appears very often from the stomachs of benthos-feeding fishes caught in Seto Inland Sea.

Distribution: Only known from Japan.

Family ARGISSIDAE

Argissa hamatipes (NORMAN)

(Fig. 7)

Argissa hamatipes, SARS 1895, pl. 48; WALKER 1904, p. 246; STEBBING 1906, p. 277; SCHELLENBERG 1927, p. 686, fig. 76; SHOEMAKER 1930, p. 255, figs. 15-16; GURJANOVA 1951, p. 327, fig. 193; STEPHENSEN 1940, p. 41; J. L. BARNARD 1962, p. 151; GURJANOVA 1962, p. 392.

Argissa stebbingi, STEBBING 1906, p. 277; CHEVREUX & FAGE 1925, p. 90, figs. 81-82; REID 1951, p. 220.

Material examined: Area XI-a, 3 female specimens; 4.0-5.0 mm in length; from depths of 39-49 m.

Remarks: The specimens are rather nearer to *A. stebbingi* form. Eyes truely with the typical structure of *A. hamatipes*. A vertical crest which separates both antennae in front of head, forms a thin plate of truncate shape above the epistome, and a emargination on either end of it, as just seen in SHOEMAKER's figure for *A. hamatipes* (l.c.), but the epistome triangularly more produced and reaching fully beyond the end of the second peduncular article of antenna 2. Coxa 1 postero-proximally expanded. Third pleonal epimeron like in SARS' figure. Mandibular palp proportionally longer than in *hamatipes* form, the third article twice as long as the second. The fifth peduncular article of antenna 2 obviously longer than article 3 as shown in *stebbingi* from. Outer ramus of uropod 3 without the minute second article, but somewhat constricted on one side near the acute apex as figured here. The other characters fully coincide with both *hamatipes* and *stebbingi*.

The above distinctive characters which have separated *stebbingi* from *hamatipes* seem to be pretty well represented also in SHOEMAKER's material of *hamatipes* from Gulf of St. Lawrence. As SHOEMAKER suggested in the paper of 1930, I am now unable to see any specific difference between these two species. The wanting of eyes of *stebbingi* in BONNIER's original description is probably no essential peculiarity; CHEVREUX & FAGE described the presence of eyes comprised of 4-8 facets in the specimens of *stebbingi*. In addition, WALKER reported the occurence of *A. hamatipes* from Ceylon, and J. L. BARNARD says that *A. hamatipes* predominatly inbabits in the shallow area of Southern California, though the species has been recorded from relatively deep cold temperate waters. Therefore, *A. hamatipes* shows a very wide distribution, from Arctic to tropical sea, and I believe that the two species are essentially conspecific.

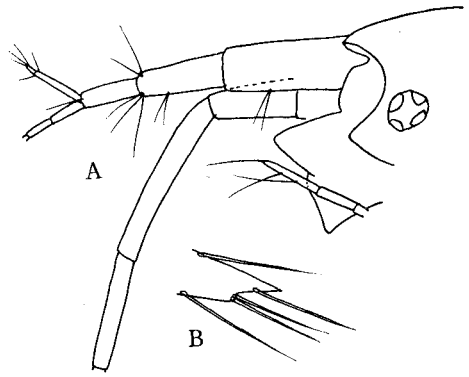


Fig. 7. *Argissa hamatipes* (NORMAN). Female, 4 mm : A, front of head and peduncular articles of antennae ; B, apex of outer ramus of uropod 3.

Distribution: From Baffin Bay through Gulf of St. lawrence to Casco Bay, Maine; northerly from Kola Bay through Norwegian coast, Iceland, Shetland Scotland, Azores, Bay of Biscay, southerly to the west coast of tropical Africa; Bering Sea, Okhotsk Sea, Japan Sea, Southern California, and Ceylon.

Family HAUSTORIIDAE

Urothoe pulchella (COSTA)

Urothoe pulchella, STEBBING 1906, p. 130; CHEVREUX & FAGE 1925, p. 99, fig. 92; K. H. BARNARD 1916, p. 143; K. H. BARNARD 1955, p. 83, fig. 41-a.

Material examined: Area XI-b, 4 female specimens, 2.8-5.3 mm in length; from depths of 54-56 m.

Remarks: The specimens agree pretty well with the figures of this species given by CHDVREUX & FAGE, except for gnathopod 1. A narrow shape of article 6 of gnathopod 1 is rather similar to that of *U. grimaldi* (CHEVREUX & FAGE 1925, p. 99, fig. 93). On the other hand, I have also some specimens assigned by myself to *U. grimaldi* from Tomioka Bay, the west coast of Kyûshû; the shape of the article 6 is, on the contrary, similar to that of *U. pulchella*. The specimens of *grimaldi* are, however, clearly distinguished from the present specimens of *pulchella* by the proportional lengths of peduncular articles of antenna 1, by the typical shape of peraeopod 3, and the relative lengths between articles 5 and 6 of peraeopod 4. In the specimens of *pulchella*, peraeopod 3 has also clear article 7 of the slender form not cultriform, and the front edge entirely smooth or much minutely crenulate.

The present specimens are also related to *U. orientalis* GURJANOVA (1951, p. 354, figs. 211, A–B) in the article 6 of gnathopod 1, but seem to be different from the latter in the structure of peraeopod 3, in the more broader article 5 of gnathopod 2, and in the size of eyes, which is large in his specimen, and similar both in male and in female.

Distribution: Scotland, west coast of France, Senegal, and Mediterranean.

Family PHOXOCEPHALIDAE

Key to the species of Phoxocephalidae

1. Eyes present ..... *Paraphoxus oculatus*
1. Eyes absent 2
   2. Hooded rostrum deflexed at apex ..... *Leptophoxus falcatus*
   2. Hooded rostrum not deflexed at apex ..... *Harpinia miharaensis*

Paraphoxus oculatus (SARS)

Paraphoxus oculatus, SARS 1895, p. 149, pl. 51; STEBBING 1906, p. 137; STEPHENSEN 1925, p. 162; STEPHENSEN 1938a, p. 150; STEPHENSEN 1940, p. 20; GURJANOVA 1951, p. 364, fig. 215; J. L. BARNARD 1960a, p. 240, figs. 27–28.

Paraphoxus maculatus, CHEVREUX 1900, p. 34, pl. 5, fig. 5; STEBBING 1906, p. 138; CHEVREUX 1911, p. 187, pl. 10, figs. 12–13; CHEVEREUX & FAGE 1925, p. 103, fig. 97.

Material examined: Areas IV (96), XI–b (1); 1.9–5.0 mm in length; from 10–56 m in depth.

Distribution: "West of Greenland to 71°N, the Kara Sea (97°N), along the Norwegian Coast, Iceland, East Greenland, around the British Isles, into Mediterranean eastward to Tunisia, at South Africa, Japan, and in the eastern Pacific." (J. L. BARNARD 1960a, p. 243).

Leptophoxus falcatus SARS

Leptophoxus falcatus, SARS 1895, p. 147, pl. 50 ; STEBBING 1906, p. 136 ; STEPHENSEN 1925, p. 161 ; STEPHENSEN 1938a, p. 150 ; J. L. BARNARD 1960a, p. 308.

Material examined: One male specimen, 2.5 mm long from Area IV ; two specimens from the stomachs of fishes caught off the coast of Kôchi, Tosa Bay (June 6, 1958). Depth : 10–60 m.

Distribution: "Greenland, east and west coasts ; Norway ; North Sea ; Skagerrak. Depth : 56 to 2258 m." (J. L. BARNARD 1960a, p. 308).

Harpinia miharaensis NAGATA

Harpinia miharaensis NAGATA 1960, p. 169, pls. 13–14, figs. 24–36.

Material examined: Areas I (1), IV (15), VI (12), XI-a (1), XI-b (1). Total : 30 specimens, up to 3.0 mm in length ; from depths of 2–52 m.

Distribution: Known only from Japan. No specimens have been found in the area other than the Seto Inland Sea.

Family AMPHILOCHIDAE

Gitanopsis vilordes J. L. BARNARD

Gitanopsis vilordes J. L. BARNARD 1962, p. 131, fig. 6.

Material examined: Area IX-d, 10 specimens, up to 2.5 mm in length ; from the surface water in high tide, at low-water mark.

Remarks: In gnathopod 2 of the present specimens, the stout spine were not seen at the postero-distal end of article 2, and also on the anterior margin of article 6. Otherwise they call for no remarks.

Distribution: Lower California, intertidal and subtidal.

Family LEUCOTHOIDAE

Key to the species of Leucothoidae

Third pleonal epimeron, the lower hind corner toothed ..... *Leucothoe incisa*
Third pleonal epimeron, the lower hind corner rounded ..... *Leucotboe alata*

Leucothoe incisa ROBERTSON

(Fig. 8)

Leucothoe incisa, STEBBING 1897, p. 35, pl. 10 ; STEBBING 1906, p. 167 ; CHEVREUX & FAGE 1925, p. 123, figs. 117, 120.

Material examined: Area VII, 3 specimens, 3.0–4.3 mm in length; 4.0 m in depth (St. 2), *Zostera* belt, mud; W.T. 9.8°C; Cl 18.16‰, Jan. 23, 1957.

Remarks: The only peculiar feature is that the third pleonal epimeron bears the double teeth at the lower hind corner, the lower one smaller, and the sinus above the large one not so deep as seen in European form. Otherwise, the specimens hold well with the characters hitherto been described.

Distribution: Scotland, Atlantic coast of France, Mediterranean, and ? West Africa.

Fig. 8. *Leucothoe incisa* ROBERTSON. Sex ?, 3 mm : Lower posterior corner of third pleonal epimeron.

Leucothoe alata J. L. BARNARD

(Figs. 9, 10)

Leucothoe alata J. L. BARNARD 1959c, p. 19, pl. 1.
Leucothoe minima (?), J. L. BARNARD 1952, p. 9, pl. 1.

Material examined: Areas XIII-a (3), XIII-b (1); up to 12.3 mm in length; depths of 2–4 m.

Remarks: The specimens comparatively well agree with J. L. BARNARD's description and figures, except for the following points: Article 4 in peraeopods 1–5 somewhat more robust and well developed. Coxa 1 not so broad at the antero-distal corner; coxa 4 in lateral view is poor in my drawing, and the actual shape is nearly straight or rather slightly concave at the frontal margin. Gnathopod 1, article 2 stout and robust, much expanded proximally in the larger specimens (11.0–12.3 mm long); article 6 not narrow at the proximal portion, but tapering towards the distal end. Uropod 3 with the peduncle much powerful, about 1.5 times as long as the rami. Telson more shorter and broader. Maxilla 2 in my specimens is typical as seen in SARS' figure of *L. spinicarpa* (1895, pl. 100); it may be unusual form in BARNARD's specimen.

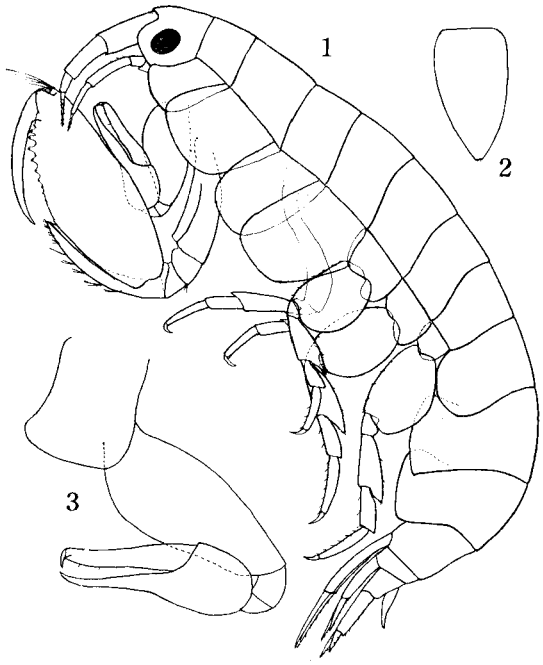


Fig. 9. *Leucothoe alata* J. L. BARNARD : 1, lateral view ; 2, telson ; 3, first gnathopod.

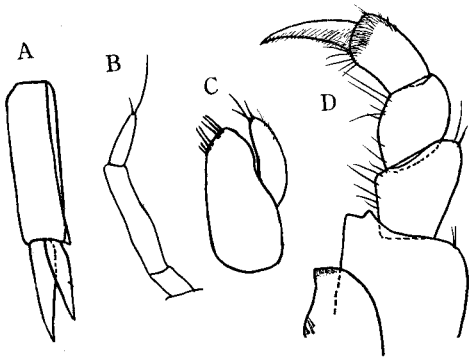


Fig. 10. *Leucothoe alata* J. L. BARNARD. Female ovig., 11 mm : A, uropod 3 ; B, mandibular palp ; C, maxilla 2 ; D, maxilliped.

Unfortunately, I could not refer to SCHELLENBERG's description and figures of *L. minima* known from the tropical coast of West Africa. This species is also found by me from Tomioka Bay, the west coast of Kyûshû.

Distribution: California (Morro Bay and Newport Bay).

Family STENOTHOIDAE

Stenothoe gallensis WALKER

Stenothoe gallensis WALKER 1904, p. 261, pl. 3, fig. 19 ; WALKER 1909, p. 331 ; K. H. BARNARD 1916, p. 154 ; SCHELLENBERG 1928, p. 640 ; K. H. BARNAKD 1937, p. 153 ; REID 1951, p. 228, fig. 27 ; J. L. BARNARD 1955, p. 3, fig. 1.
Stenothoe crenulata CHEVREUX 1907, p. 471, figs. 1–3.

Material examined: Areas IX–d (7), XII (19); up to 4.7 mm in length. Both collections taken from the surface water at depths of 3–10 m.

The specimens agree quite well with J. L. BARNARD's figures drawn from Hawaiian materials.

Distribution: Caribbean Sea (Puerto Rico), West and South Africa, Mediterranean, Red Sea, Zanzibar, Seychelles, Ceylon, and Pacific (Gambier Archipelago and Hawaiian Is.).

Family LILJEBORGIIDAE

Key to the species of Liljeborgiidae

1. Gnothopod 2 larger than gnathopod 1 2
1. Gnathopod 2 smaller than gnathopod 1 3
   2. Peraeopod 5, article 2 weakly serrate behind ..... *Liljeborgia japonica*
   2. Peraeopod 5, article 2 deeply serrate behind ..... *Liljeborgia serrata*
3. Gnathopod 1, finger in male abruptly curved ..... *Idunella curvidactyla*
3. Gnathopod 1, finger in male evenly curved ..... *Idunella chilkensis*

Liljeborgia japonica, sp. nov.

(Figs. 11, 12)

Material examined: Areas IV (1), IX–b (1), X (16), XI–a (33), XI–b (1), XIII–a (2). Total: 54 specimens, 3.5–10.0 mm long ; 2–53 m in depth.

Description: Pleon segments 1 and 2 each produced to three adpressed dorsal teeth, the middle one largest. Pleon segments 4 and 5 each with a small thooth, that of pleon segment 5 very small and often evanescent. Pleon segment 6 with one pair of dorso-lateral spine. Lateral lobes of head somewhat narrowly produced, its apex subacute. Eyes and antennae like in *L. pallida* figured by SARS (1895, pl. 187). Coxae 1–3 each with a minute tooth at the lower hind corner ; coxa 4 with 2–4 minute teeth on the hind margin ; the anterior lower margin of coxae 2–4 and the lower hind corner of coxae 5–6 also each with a minute notch or tooth ; all the tooth or notch usually accompanied by a minute seta. Third pleonal epimeron with a small sinus above the lower hind corner tooth.

The inner plate of maxilla 1 with one or two setae, the second article of

maxillipedal palp relatively elongate, outherwise the oral parts nearly like in SARS' figures of *L. pallida*. Gnathopod 1: article 2 proximally wider; article 6 long and slender, more than twice as long as broad; the palm, along the most outside edge, with a row of spinules hooking at the tip; the median side bearing the edge lined with spine-like setae armed with 2 minute accessory teeth at the middle; article 7 with the inner edge entirely smooth.

Gnathopod 2: the palm roughly dentate near the hinge of the finger; the palm in male lined with many long setae throughout the margin; finger with

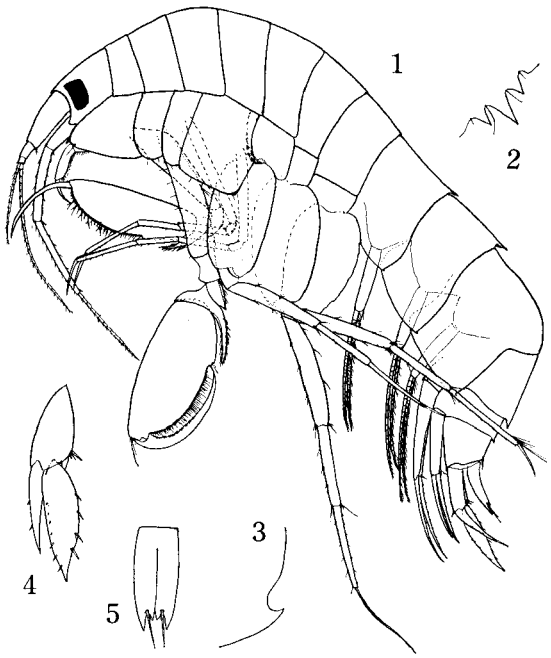


Fig. 11. *Liljeborgia japonica*, sp. nov. : 1, lateral view; 2, upper view of dorsal teeth on first pleon segment; 3, lower hind corner of third pleonal epimeron; 4, male third uropod; 5, telson.

5-8 flattened teeth on the proximal half. Peraeopods 1 and 2 very slender and delicate, finger more than one half the length of article 6. Peraeopod 5: article 2 distally narrow; article 5 subequal to or shorter than article 4, in male the article 5 rather longer; finger normally longer than article 6, but often broken off. Uropod 3: inner ramus longer than the outer, in male much wider than in female. Telson more than twice as long as broad, the apices bidentate, the outer point much longer than the inner, each of the notches with a strong spine. Color tinted with pale pink, particularly on peraeon segments 2-4 and pleon segments 1-3.

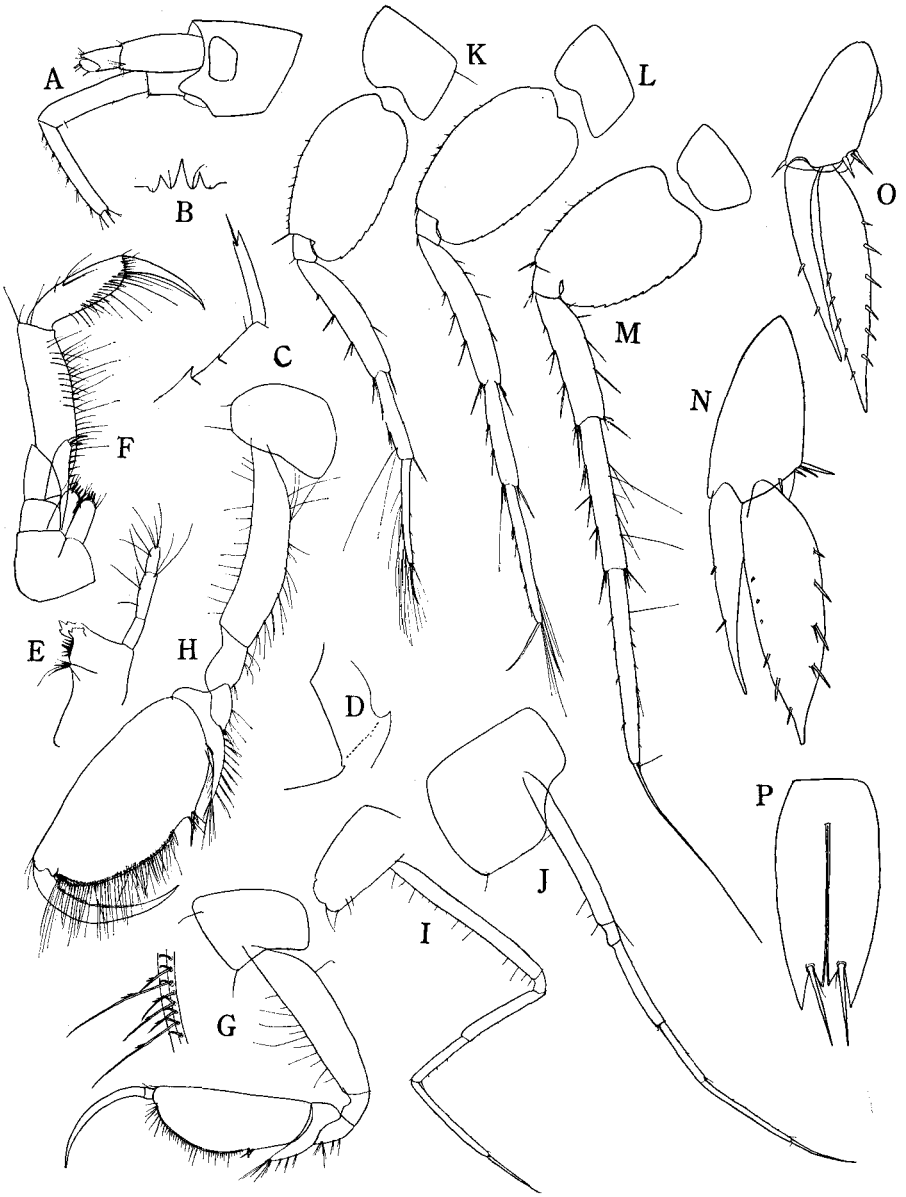


Fig. 12. *Liljeborgia japonica*, sp. nov. Male, 8 mm : A, head and peduncular articles of antennae ; B, dorsal teeth of pleon segment 1 from upper view ; C, lateral view of pleon segments 4–6 and telson ; D, third pleonal epimeron ; E, Mandible ; F, maxilliped ; G, gnathopod 1, with palmar armature magnified ; H, gnathopod 2 ; I, J, K, L, M, peraeopods 1, 2, 3, 4, 5 ; N, uropod 3 ; P, telson. Female, ovig., 7 mm : O, uropod 3. G–M : the same proportion of magnification.

Holotype: KN No. 3104, male, 8.8 mm. *Type locality*: St. 7 in Area XI-a, 47–51 m, sandy mud, June 13, 1959.

Remarks: The new species is in general appearance too much closely related to *L. brevicornis* which is figured by SARS for *L. pallida*, except for the dorsal dentation; each of pleon segments 1 and 2 in the latter has only a dorsal tooth. In discussing *L. aequabilis* which is also much closely allied to *L. brevicornis*, STEBBING says on the value for specific distinction attributed to the difference of dorsal dentation, "the question exercised a soporific influence on my mind" (1910, p. 588). This question has also much annoyed me for a long time in identifying the present Japanese form.

If this Japanese form was not designated as a new species, it would have been assigned to any of the known ones having a close resemblance to *L. brevicornis*: *L. aequabilis* STEBBING, *L. proxima* CHEVREUX, *L. octodentata* SCHELLENBERG, and *L. brevicornis* (BRUZELIUS). *L. octodentata* is found from the neighboring waters of Falkland Is., and it is geographically far distant from Japan. *L.* proxima identified by SCHELLENBERG (1938, p. 31, fig. 15) from Marshall Is. shows a afairly divergence from a typical form of *proxima* designated as a new one by CHEVREUX (1907, p. 475, figs. 4–5) from Gambier Alchipelago, South Pacific. K. H. BARNARD suggests in his paper of 1916 (p. 167) that his South African specimen referred to *L. proxima* may possibly be a synonym of *L. aequabilis*.

In my specimens, gnathopod 2 is never excavated on the palm unlike in *L. aequabilis* (STEBBING 1910, p. 558; K. H. BARNARD 1930, p. 364; HURLEY 1954, p. 786). CHILTON's material referred to *L. brevicornis* from South Australia (Bass Strait) (CHILTON 1921, p. 64) is undoubtedly the same species as *L. aequabilis* by STEBBING. PIRLOT's specimens of *aequabilis* from Sulu Sea, Philippines (PIRLOT 1936, p. 301) bear four setae on the inner plate of maxilla 1, and show a considerable difference from the typical form of *aequabilis*. It is strange that Australian *aequabilis* by STEBBING and CHILTON is somewhat different from New Zealand one by K. H. BARNARD and HURLEY. The dorsal teeth is absent in the former, whereas, in the latter K. H. BARNARD discerns three minute denticles only on pleon segments 1 and 2, and in HURLEY materials it is arranged as 3, 3, 0, 1, 1 in order of pleon segments 1–5. As far as the arrangement of dorsal teeth is concerned, the present new one is certainly allied to *L. aequabilis* described by HURLEY.

After a long period of consideration about a question which annoyed me much, 1 made up my mind to accept the importance of the specific value of dorsal dentation for avoiding a confusion in the identification of the species in this genus.

SCHELLENBERG says in his paper of 1931 (p. 129, as to *L. octodentata*), "Die abweichende Bezähnung des I und II Metasomsegmentes kommt im Habitus

nicht zum Ausdruck. Die dorsale Bezähnung ist schon bei dem 2.5 mm langen Exemplar deutlich ausgebildet." In the materials at my hand, the dorsal dentation on pleon segments can be distinctly discerned even in small specimen of 3.5 in length. According to the pleonal tooth formulas given by J. L. BARNARD (1962, p. 86, table 1) to 26 species hitherto been reported of the genus, the species bearing the arrangement of the dorsal teeth number as 3, 3, 0, 1, 1 in order of pleon segments 1 to 5, are limited to the following seven ones:

L. kinahani (BATE) 1862
L. aequabilis STEBBING 1888
L. mixta SCHELLENBERG 1925
L. octodentata SCHELLENBERG 1931
L. macrodon SCHELLENBERG 1931
L. longicornis (SCHELLENBERG) 1931
L. akaroika HURLEY 1954

The present new one is distinguished from any of the above species by the following characters: The male gnathopod 2 is densely lined along its palm by long setae; the inner edge of finger of gnathopod 1 is entirely smooth in all of the specimens ranging from 3.5 to 10.0 mm in length; and peraeopod 5 has much long finger. It should be noted that the new species agrees with *L. barhami* HURLEY (1954, p. 798, figs. 184–201) in having no teeth on the finger of gathopod 1, and agrees with *L. macronyx* (SARS) (SARS 1895, pl. 188, fig. 2; STEBBING 1906, p. 231) in having a long and slender finger of peraeopods 1 and 2, and also with *L. proxima* CHEVREUX (l.c.) in having a very long finger in peraeopod 5.

Liljeborgia serrata, sp. nov.

(Fig. 13)

Material examined: Areas IV (19), VI (5), XI-a (10), XI-b (2). Total: 36 specimens, 4.2–13.0 mm, from depths of 5–53 m.

Description: Pleon segments 1 and 2 each with three adpressed dorsal teeth, the middle one the largest. Pleon segments 4 and 5 dorsally elivating and carinate, each produced to an acute tooth on the posterior end. Pleon segment 6 with one pair of dorso-lateral spines, and the hinder end produced backwards to the rounding lateral lobes. Pleon segment 3 dorsally unarmed, the epimeron with a tooth at the posterior lower corner, sinuated above, the hind margin slightly convex. Coxae like in the preceding species, except that coxa 7 is lined with many minute notches on the hind margin. Lateral lobes of head more broadly produced than in the preceding species, its apex rounding. The shape of eyes and antennae like in the preceding one. The first article of mandibular palp rather longer than the second; the outer lobes of lower lip with a minute spine at apex: the inner plate of maxilla 1 with one or two long setae; otherwise, the oral parts like in *L. pallida* figured by SARS.

Gnathopod 1, article 6 not so slender as that of the preceding species, article 7 with 5 flattened teeth. Gnathopod 2 with the palm of article 6 finely dentate, lined with many blunt small denticles partly or through the length; finger with 9 teeth along the proximal two thirds; gnathopods 1–2 otherwise like those of the preceding one. Peraeopods 1–2 also like in the preceding one. Peraeopods 3 and 4: article 2 oblong oval, the hind margin nearly straight and distinctly serrated, the lower edge of the hind lobe truncated; article 4 the largest of the last four articles; finger normal. Peraeopod 5: article 2 more expanded, rounding oval, the hind margin deeply serrate, the lower edge truncated; article 4 subequal in length to article 5 in female, in male article 5 rather longer than article 4; finger stiliform, about five sixths as

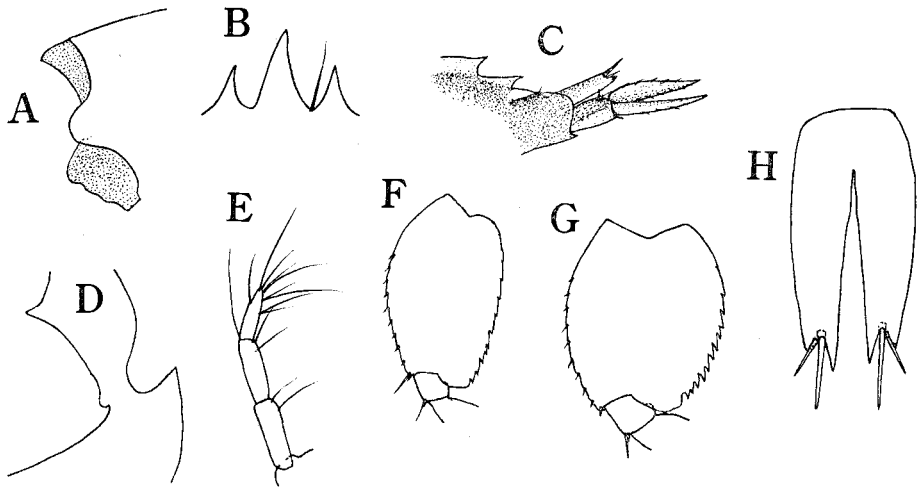


Fig. 13. *Liljeborgia serrata*, sp. nov. Female, ovig., holotype, 13 mm : A, lateral lobe of head. Female, ovig., 10 mm : B, upper view of dorsal teeth on pleon segment 1 ; C, lateral view of pleon segments 4–6, telson, and uropod 3 ; D, third pleonal epimeron, with the corner magnified ; E, mandibular palp ; F, G, article 2 of peareopods 3 and 5 ; H, telson.

long as article 6 (often broken off). Uropod 3, inner ramus subequal in length to and wider than the outer. Telson, the apices with the inner point longer than the outer contrary to those of the preceding species, each notch with two or three spines. Color redish, particularly with transverse bands of deep red.

Holotype: KN No. 3006, female, oving., 13.0 mm. *Type locality*: St. 8 in Area IV, 20–25 m, sandy mud, June 15, 1956.

Remarks: The new species appears to show no prominent sexual differences, and is fairly related to *L. macrodon* SCHELLENBERG (1931, p. 133, fig. 71), which is found from the neighbouring waters of Magellan Strait, South America, but is here distinguished from the latter by the following differences;

The oral parts in *macrodon* are said to be similar to *L. pallida*, except for upper lip, but in my specimens the first article of mandibular palp is usually broader and longer than the second, and the outer lobes of lower lip has a minute spine at each apex, just as seen in that of *Paradexamine barnardi* herein described. The posterior end of pleon segment 6 in *macrodon* is acutiform. The apices of telson in *macrodon* is contrary to those of the present new species, i.e. the outer point longer than the inner. As far as gnathopod 2 described and figured by SCHELLENBERG is concerned, the shape of article 2 in *macrodon* appears to show a sexual difference although there is a disparity in the size of the specimens, moreover, the armature of the palm and palmar angle are somewhat different in minor details; in the new one the palm finely dentate, and the palmar angle has a short spine at the concavity and has long and short two spines at the median side a little backwards; the shape of article 6 of gnathopods 1 and 2 also seems to somewhat differ from the new species.

Peraeopods 3 and 4, the posterior edge of article 2 in the new one is not so deeply serrate as that of peraeopon 5. The new species also somewhat differs from *macrodon* both in the proportional lengths between article 4 and article 5 of peraeopod 5, and in the length of finger of peraeopod 5. Both species are, however, essentially very near to each other, and I am not quite certain whether the present new species is entirely distinctive from *L. macrodon* or not. But no specimens of *L. macrodon* have been found from any other localities than Magellan sea-area, and so I would like to designate the Japanese specimens as a distinct species from the SCHELLENBERG's species recorded in the locality far distant from Japan.

Idunella chilkensis CHILTON

Idunella chilkensis CHILTON 1921a, p. 525, fig. 1.

Material examined: Areas XI–a (3), XI–b (1); 5.6–5.9 mm in length; from depths of 10–53 m.

Remarks: In the specimens at my hand, antenna 1 in female a little shorter than antenna 2, while in male antenna 2 much longer then antenna 1, about twice in length; peduncular article 1 of antenna 1 in both sexes stouter and a little longer than article 2; primary flagellum of antenna 1 in both sexes shorter than the peduncle. On the contrary, CHILTON's specimens have the first antenna in male longer than the second, and have the peduncular article 2 of antenna 1 in female longer than article 1. Telson in my specimens more longer, about 2.5 times as long as broad. Otherwise, the present ones appear to agree quite well with his ones, particularly with the characteristic feature of male gnathopod 1, and therefore I could not consider these

specimens to be entirely distinctive from *I. Chilkensis*. However, it is strange that CHILTON's specimens is contrary to the present ones in regarding to the relative lengths between the first and second antennae in male.

Distribution: Chilka Lake, India.

Idunella curvidactyla, sp. nov.

(Fig. 14)

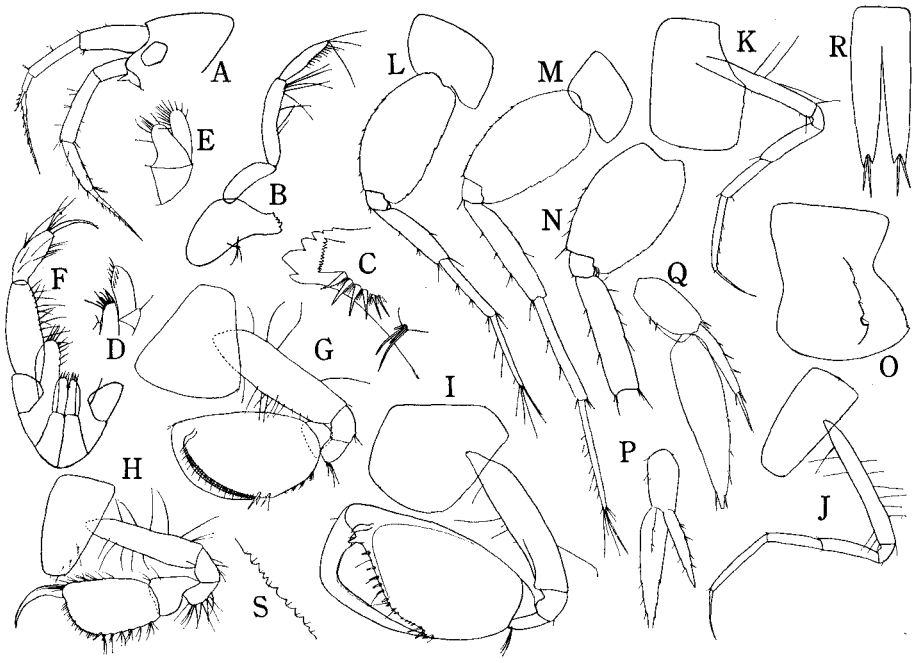


Fig. 14. *Idunella curvidactyla*, sp. nov. Female, 5 mm : A, head and antennae ; B, mandible ; C, distal half of right mandible magnified ; D, E, maxillae 1, 2 ; F, maxilliped ; G, H, gnathopods 1, 2 ; J, K, L, M, N, peraeopods 1, 2, 3, 4, 5 ; O, pleon segment 3 ; P, uropod 3 ; R, telson ; S, dorsal denticles of pleon segment 2 from upper view. Male, 6 mm : I, gnathopod 1 ; Q, uropod 3.

Material examined: Areas I (5), X (1), XI-a (14); up to 6.3 mm in length, from depths of 15–56 m

Description: Pleon segments 2–4 more or less minutely serrate on the posterodorsal edge respectively. Each of coxae 1–3 with a small tooth at the lower posterior corner. The third pleonal epimeron armed with a small tooth at the lower posterior corner, forming a small sinus above ; the slightly convex posterior edge minutely serrate along the half below. Eyes oval,

narrowing below (my drawing in the figure is poor). Antenna 1 subequal in length to antenna 2, peduncular article 1 slightly longer than article 2, article 3 very short, accessory flagellum 2-jointed. Antenna 2 with peduncular article 5 shorter than article 4. The above characters of antennae nearly similar in both sexes. Mandibular palp fully elongate, geniculated between articles 1 and 2; article 1 relatively long, nearly as long as article 3. Inner plater of maxilla 1 with two setae. Gnathopod 1 in male more powerful than in female, and much larger than gnathopod 2; in female nearly like in the preceding species, but in male the palm sharply turned at the middle, lined with a row of short spines, and bearing an acute tooth near the finger hinge, finger strongly developed, abruptly and right-angularly curved. Gnathopod 2 typical, similar in both sexes. Peraeopods 3-5 successively larger, their article 2 rather slender than the type, the posterior edge minutely serrate. Uropod 3 with inner ramus longer than the outer, particularly in male powerful, much longer and broader, the outer bearing the slender second article (or spine?). Telson slender, more than twice as long as broad, the outer point of the bidentate apices longer than the inner, each notch armed with two long spines.

Holotype: KN No. 2978, male, 6.3 mm, from St. 3 of Area XI-a, 40-45 m, June 12, 1959.

Remarks: Three species of this genus have hitherto been in the world, i.e. *I. aequicornis* (SARS), *I. chilkensis* CHILTON, and *I. longirostris* (CHEVREUX). The new species is obviously distinguished from the above-mentioned ones by the characteristic male gnathopod 1.

Family OEDICEROTIDAE

Key to the species of Oedicerotidae

1. Gnathopod 2 chelate ..... *Pontocrates altamarinus*
1. Gnathopod 2 subchelate 2
   2. Gnathopod 2, article 5 produced into a long slender posterior lobe ..... *Monoculodes limnophilus japonicus*
   2. Gnathopod 2, article 5 not produced into such a lobe at all ..... *Bathymedon longimanus*

Pontocrates altamarinus (BATE & WESTWOOD)

Pontocrates altamarinus, SARS 1895, p. 695, suppl. pl. VII, fig. 2; STEBBING 1906. p. 240; SCHELLENBERG 1942, p. 178, fig. 147; NAGATA 1960, p. 170. pl. 14, figs. 37-45.
Pontocrates arenarius, CHEVREUX & FAGE 1925, p. 166, fig. 167.

Material examined: Areas I (2), III (5), IV (108), VI (88), VII (132), IX-b (47), IX-c (10), IX-d (17), X (48), XI-a (991), XI-b (163), XIII-b (22). Total: 1633 specimens, up to 11.0 mm in length; from depths of low-water marks in spring tide to 56 m.

Distribution: European coasts (S. and N. coasts of Norway, Skagerrak, Kattegat, Dogger Bank, Netherlands, British Is., Atlantic coasts of France).

Bathymedon longimanus (BOECK)

Bathymedon longimanus, SARS 1805, p. 333, pl. 117 ; STEBBING 1906, p. 257 ; SHOEMAKER 1930, p. 273, figs. 24–25 ; GURIANOVA 1951, p. 552, fig. 336.

Material examined: Areas XI-a (330), XI-c (16); up to 6.0 mm. in length; from depths of 30–56 m.

Remarks: Comparing the specimens with SARS' figures, I can find only the following minor differences: Coxa 1 with the lower margin more rounded as seen in SHOEMAKERS's figure; antenna 1, the first peduncular article slightly longer than article 2; gnathopod 2, articles 5 and 6 somewhat more slender; telson rather similar to the shape of SHOEMAKER's one, the apex truncated, with two short spines and two long setae; peraeopod 3 with the article 2 proximally more expanded; article 7 of peraeopod 5 sometimes about as long as article 6.

Distributions: Franz Josef Land, Barents Sea, Norwegian coasts, Iceland, W. of Greenland, Gulf of St. Lawrence, North Sea, and Japan Sea.

Monoculodes limnophilus japonicus, subsp. nov.

(Fig. 15)

Material examined: Area V, 23 specimens, up to 5.4 mm in length; 2.9–3.7 m in depth.

Description: The specimens are divergent from the type described by TATTERSALL (1922, p. 440, pl. 18, figs. 10–20) in the following respects: The second pleonal epimeron with the posterior lower corner not rounded, a little produced backwards; the margin of the three pairs of the epimera lined with setae; the lower margin of the last two pairs of epimera not evenly rounded. Coxa 2 of equal breadth; coxa 4 with the lower hind corner more strongly produced backwards. The penultimate article of the peduncule of antenna 2 nearly equal to the ultimate in length. Artcle 2 of gnathopods 1–2 and peraeopod 2 not so slender and longer. Article 7 of peraeopods 1–2 extremely small, just as seen in those of *M. carinatus*, almost less than a half the length of that figured by TATTERSALL throughout all of my specimens, while those of peraeopods 3–4 well developed, about two thirds as long as article 6, bearing a nail-like cap at the distal end. Article 2 of peraeopod 5 nearly quadrate. Uropods 1–2, the rami almost equal, the inner only slightly longer than the outer, and on the contrary, those of uropod 3 with the outer only slightly longer than the inner. Telson slightly tapering towards the

distal end which bears two long setae on the edge. These specimens, otherwise, hold fairly well for TATTERSALL's description and figures.

Holotype: KN No. 2430, female, 5.4 mm from the mouth of the River Ôta, Oct. 20, 1956.

Remarks: The new subspecies could not be considered to be quitely distinctive species from Tattersall's one because of the entire agreement of the structure of the first and second gnathopods, although his species was taken

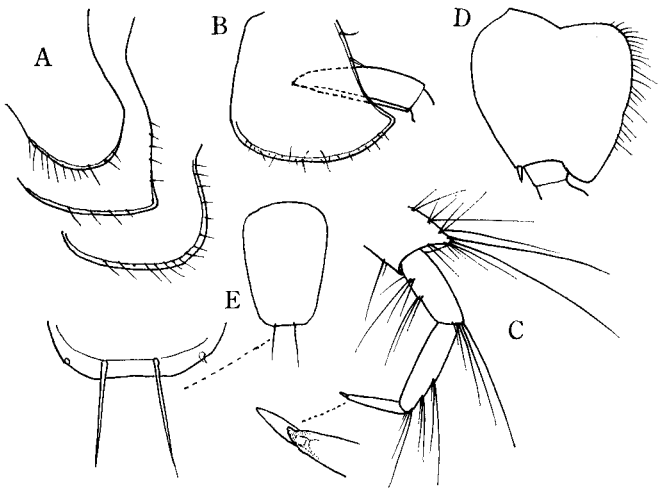


Fig. 15. *Monoculodes limnophilus japonicus*, subsp. nov. Female, holotype, 5.4 mm : A, plegnal epimera ; B, coxa 4 ; C, distal end of peraeopod 4, with the apex of finger magnified ; D, article 2 of peraeopod 5 ; E, telson, with the apical edge magnified.

from the fresh waters of China, whereas this was procured from the brackish waters of the river. The new one has a certain coincidence both with *M. synophthalmus* BULYCHEVA (1952, p. 209, Fig. 11) and with *M. uncinatus* BULYCHEVA (1952, p. 211, fig. 12), each from the Russian side of Japan Sea, but the former shows a different structure of gnathopod 2, the latter differs in gnathopod 1 from the present subspecies respectively.

(*To be continued*)