

Crustacea Decapoda : *Munida japonica* Stimpson, 1858, and related species (Galatheidae)

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ABSTRACT

In order to clarify the systematic status of *Munida japonica* Stimpson, 1858, which has been mixed with several other species constituting a complex, a neotype of this species from Kagoshima, Japan, is selected and described. Examination of the type materials of *M. heteracantha* Ortmann, 1892, *M. semoni* Ortmann, 1894 (previously merged with *M. heteracantha*) and *M. honshuensis* Benedict, 1902 (previously considered synonymous with *M. japonica*), discloses that they are valid species. Comparison of these species with numerous specimens from the Philippines, Indonesia, Japan, and the western Indian Ocean yields 13 new relatives species to be described.

RÉSUMÉ

Crustacea Decapoda : *Munida japonica* Stimpson, 1858, et les espèces apparentées (Galatheidae)

Afin de clarifier la position systématique de *Munida japonica* Stimpson, 1858, qui a été confondue avec plusieurs autres espèces formant un complexe, un néotype de cette espèce, en provenance de Kagoshima au Japon, est désigné et décrit. L'examen des types de *M. heteracantha* Ortmann, 1892, de *M. semoni* Ortmann, 1894 (précédemment mise en synonymie avec *M. heteracantha*) et de *M. honshuensis* Benedict, 1902 (précédemment considérée comme synonyme de *M. japonica*), montre que toutes ces espèces sont valides. La comparaison de ces diverses espèces avec de nombreux spécimens récoltés aux Philippines, en Indonésie, au Japon et dans l'océan Indien occidental, conduit à la description de 13 espèces nouvelles, proches des précédentes.

INTRODUCTION

The genus *Munida* Leach is represented in the Indo-West Pacific region by about 50 species (BABA, 1988; 1990). Differences among the species are often so slight and some of the distinct characters are often so variable that confusion has appeared in determination of the species (see below). One of the most unwieldy species may be *M. japonica* Stimpson, 1858 (see BALSS, 1913; YANAGITA, 1943; MIYAKE & BABA, 1967; HAIG, 1973; BABA, 1988), which is believed to occur most commonly in Japanese waters, ranging from the eastern Indian Ocean including the Red Sea eastward to the Bonin Islands, via the Indo-Malayan region. This species was described first by STIMPSON (1858) from one male collected in Kagoshima Bay, Japan, in 36 m, subsequently by MIERS (1879) in Korea Strait, ORTMANN (1892) in Sagami Bay, Japan, BORRADAILE (1900) in New Britain, DOFLEIN (1902) in Sagami Bay, DE MAN (1902) in Halmahera, STIMPSON (1907) in Kagoshima Bay, BALSS (1913) in Japan and Taiwan (as *Munida japonica typica*), BALSS (1915) in the Red Sea, PARISI (1917) in Sagami Bay, LAURIE (1926) in Providence and Mauritius Islands, YOKOYA (1933) and YANAGITA (1943) in several localities of Japan, MELIN (1939) in the Bonin Islands, TIRMIZI (1966) in the Red Sea and Zanzibar, MIYAKE and BABA (1967) in the East China Sea, LEWINSOHN (1969) in the Red Sea, KIM (1973) in Korea, HAIG (1973, 1974) in Western Australia, MIYAKE (1982) and BABA (in BABA *et al.*, 1986) in Japan, TÜRKAY (1986) in the Red Sea, BABA (1988) in the Philippines and Indonesia, and BABA (1990) in Madagascar. In the meanwhile, *Munida honshuensis* described by BENEDICT (1902) off Honshu, Japan, was merged with *M. japonica* (see BALSS, 1913; BABA, 1988).

One of the closest relatives of *M. japonica* seemed to be *M. heteracantha* Ortmann which was described from one male and one female taken in Katsiyama (= ? Katsuyama) and Sagami Bay, respectively (ORTMANN, 1892). The species was subsequently reported by the following authors : DOFLEIN (1902) without locality, BALSS (1913) (as *Munida japonica* var. *heteracantha*) and YANAGITA (1943) (as *Munida japonica heteracantha*), in several localities of Japan, MELIN (1939) in the Bonin Islands (as *Munida japonica* var. *heteracantha*), BABA (1969) in the East China Sea, and BABA (1988) in the Philippines.

Munida sagamiensis Doflein, 1902, described from Sagami Bay, has been synonymized with *M. heteracantha* (see BALSS, 1913; BABA, 1988). Also merged with that species was *M. semoni* Ortmann, 1894, from Ambon, Indonesia (BABA, 1988).

Munida japonica and *M. heteracantha* belong to the group of species which have the lateral margin of the carapace with five spines behind the cervical groove, the eyes large, the epigastric region with row of 10-14 spines, the merus of the third maxilliped with two or more spines on the flexor margin, the third abdominal segment unarmed, the chelipeds relatively long and slender (more than twice the postorbital carapace length), and the male gonopods present on the first and second abdominal segments. Also referred to this group is *M. inornata* Henderson, 1885, previously known from off the Admiralty Islands. *Munida compressa* Baba, 1988, *M. militaris* Henderson, 1885 and *M. curvirostris* Henderson, 1885 (= *M. andamanica* Alcock, 1894) seem to be other relatives, but apparently differ from this group in the short and massive chelipeds (see BABA, 1988, 1990; BABA & MACPHERSON, 1991).

Munida japonica is usually distinguished from *M. heteracantha* by the presence of the distal spine on the extensor margin of the merus of the third maxilliped (BABA, 1988), whereas some authors believed this difference to be of subspecific importance (BALSS, 1913; YANAGITA, 1943). The previous species definition, supported recently by BABA (1988), may allow wide morphological variations, for instance, the second abdominal segments unarmed or armed with a few to about 10 spines, the supraocular spines ranging from very short to well developed, the walking legs from slender to stout, especially the dactylus, and the extensor margin of the merus of the third maxilliped bearing a prominent, moderate, or sometimes reduced spine distally, and sexual maturity attained from a small to good size (MIYAKE & BABA, 1967; HAIG, 1973; BABA, 1988). According to TÜRKAY (1986), however, there is a difference in colour pattern between specimens from Japan and the Red Sea. Very recently, BABA and MACPHERSON (1991) pointed out the possibility that several species have been mixed up under *M. japonica* (therein called the *M. japonica* complex), suggesting the necessity of a revision of the material reported by the previous authors under *M. japonica*.

Considering this controversy in this paper, we examine selected material from the collections of MUSORSTOM 1, 2, 3 and CORINDON cruises made in the Philippines and Indonesia respectively, and all or part of the material of *M. japonica* reported from the East China Sea (MIYAKE & BABA, 1967), the Red Sea (TÜRKAY, 1986), and

Madagascar (BABA, 1990). In addition, specimens from Japan were sorted out from the collection of the Muséum national d'Histoire naturelle, Paris. Michael TÜRKAY kindly selected material for us from the collection of the Senckenberg Museum, from Japan, the Red Sea and the Gulf of Aden. At our request, Kyoichiro UEDA of Kitakyushu Museum of Natural History, kindly arranged a loan of material from the collection under his care, which was recently transferred from Kyushu University Zoological Laboratory. Unfortunately, no specimen of *M. japonica* from the type-locality (Kagoshima, Japan) was found to exist in any institution. Then, at our request, great efforts were made by Hiroshi SUZUKI of Kagoshima University to collect specimens from the type-locality; however, the substrates of Kagoshima Bay have been changed since 1858, so it seemed impossible to obtain topotypic material. He sent us three lots of four specimens of "*M. japonica*" collected from three different locations off Makura-zaki near Kagoshima Bay.

We propose here the selection of a neotype, since the type of *M. japonica* was lost during the great fire of Chicago in 1871 (EVANS, 1967). The three lots made available by H. SUZUKI, however, prove to comprise three different, closely related species; one of them is chosen as the neotype of *M. japonica* (see below), one is referable to *M. honshuensis*, and the remaining one is described as *M. agave* sp. nov. (see below). We also examined the type materials of *M. heteracantha*, *M. semoni* and *M. honshuensis*. As will be discussed below, these three species proved to be valid species. Unfortunately, since most of the specimens of *M. japonica* reported by previous workers are unidentifiable from their descriptions and figures, their systematic status remain unresolved. The material from Madagascar reported by BABA (1990) as *M. japonica* is divided into two new species (*M. sphinx* and *M. limula*) and the "*Valdivia*" and "*Sonne*" material reported by TÜRKAY (1986) from the Red Sea is referred to *M. dispar* sp. nov.

The type material of another problematic species, *M. sagamiensis*, seems to have been lost (M. TÜRKAY, pers. comm.). According to the description made by DOFLEIN (1902), this species has the rostrum very short (less than one-third the remaining carapace length), the second abdominal segment with dorsal spines and the merus of the third maxilliped with only one spine on the flexor margin. These characters seem to support BALSS (1913) that *M. sagamiensis* be merged with *M. heteracantha*, but the systematic status of this species remains unresolved. The Philippine and Japanese material of *M. exigua* Baba, 1988, is now synonymized with *M. heteracantha*, and the Philippine material identified as *M. heteracantha* by BABA (1988) is referred to *M. oritea* sp. nov. (see below).

Several characters used to distinguish species of the genus *Munida* (e.g. spination of the abdominal segments, size of the distal spine on the extensor margin of the merus of the third maxilliped) vary (RICE & DE SAINT LAURENT, 1986) so they should be treated carefully. As shown in this paper, presence or absence of spines on the second abdominal segment proves to be relatively constant in most species. However, in several species, the two spines on each lateral part of the anterior ridge are variably present or absent. In those species having spines, the spines are consistently present, either all along the anterior ridge (e.g. *M. melite* sp. nov., *M. nesaea* sp. nov.), in the middle (e.g. *M. inornata* Henderson) or on the lateral part of the ridge (e.g. *M. pherusa* sp. nov.), only their number being subject to variation. Considering these problems, the presence of dorsal spines on the second abdominal segment is carefully taken into consideration and used only to separate close species.

We discuss here 18 species including 13 new species. The differences among them are often so slight that all the species other than the previously misunderstood species (*M. heteracantha*, *M. honshuensis*, *M. japonica* and *M. semoni*) are defined by only a diagnosis in order to avoid a repetitious description. Most of the characters for the species are apparent from the accompanying figures.

Species are arranged alphabetically. Measurements given in this paper refer to the postorbital carapace length. The rostrum is measured from its tip to the level of the sinus formed by the rostrum and supraocular spine. The materials studied are deposited in the collections of the following institutions :

KU : Kagoshima University, Kagoshima.

MNHN : Muséum national d'Histoire naturelle, Paris.

SAM : South African Museum, Cape Town.

SM : Musée Zoologique, Strasbourg.

SMF : Senckenberg Museum, Frankfurt a. M.

USNM : National Museum of Natural History (Smithsonian Institution), Washington, D.C.

ZLKU : Kitakyushu Museum of Natural History, Kitakyushu (material transferred from Zoological Laboratory, Kyushu University, Fukuoka; registration numbers unchanged).

LIST OF STATIONS

Most of the species of *Munida* here treated have been collected at the stations of MUSORSTOM 1, 2 and 3 and CORINDON 2 cruises listed below.

The gear used at each station is indicated by two capital letters. CP = Beam Trawl; CC = Otter Trawl; DR = Rectangular Dredge; DG = Geological Dredge.

MUSORSTOM 1. Philippines.

- Station CP 5. — 19.03.1976, 14°01.5'N, 120°23.5'E, 200-215 m : *M. heteracantha*, *M. philippinensis*.
 Station CP 9. — 19.03.1976, 14°01.8'N, 120°17.6'E, 150-194 m : *M. heteracantha*, *M. philippinensis*, *M. nesaea*.
 Station CP 10. — 19.03.1976, 13°59.8'N, 120°18.2'E, 187-205 m : *M. heteracantha*, *M. nesaea*.
 Station CC 11. — 20.03.1976, 13°59.8'N, 120°23.7'E, 217-230 m : *M. oritea*.
 Station DR 14. — 20.03.1976, 14°00.2'N, 120°17.2'E, 190 m : *M. philippinensis*.
 Station CP 18. — 21.03.1976, 13°56.3'N, 120°17.2'E, 150-159 m : *M. philippinensis*.
 Station CP 20. — 21.03.1976, 13°59.2'N, 120°20.3'E, 208-222 m : *M. heteracantha*, *M. oritea*.
 Station CP 21. — 21.03.1976, 14°01.0'N, 120°22.8'E, 174-223 m : *M. oritea*.
 Station CP 24. — 22.03.1976, 14°00.0'N, 120°18.2'E, 189-209 m : *M. heteracantha*, *M. nesaea*.
 Station CP 25. — 22.03.1976, 14°02.7'N, 120°20.3'E, 191-200 m : *M. heteracantha*, *M. nesaea*.
 Station CP 26. — 22.03.1976, 14°00.9'N, 120°16.8'E, 189 m : *M. oritea*.
 Station CP 27. — 22.03.1976, 13°59.8'N, 120°18.6'E, 188-192 m : *M. philippinensis*.
 Station CP 30. — 22.03.1976, 14°01.3'N, 120°13.5'E, 177-186 m : *M. heteracantha*.
 Station CP 31. — 22.03.1976, 14°00.0'N, 120°16.0'E, 187-195 m : *M. heteracantha*, *M. philippinensis*.
 Station CP 32. — 23.03.1976, 14°02.2'N, 120°17.7'E, 184-193 m : *M. heteracantha*.
 Station CP 34. — 23.03.1976, 14°01.0'N, 120°15.8'E, 188-191 m : *M. philippinensis*.
 Station CP 35. — 23.03.1976, 13°59.0'N, 120°18.5'E, 186-187 m : *M. philippinensis*.
 Station CP 36. — 23.03.1976, 14°01.2'N, 120°20.2'E, 187-210 m : *M. nesaea*, *M. philippinensis*.
 Station CP 40. — 24.03.1976, 13°57.4'N, 120°27.8'E, 265-287 m : *M. oritea*.
 Station CP 51. — 25.03.1976, 13°49.4'N, 120°04.2'E, 170-200 m : *M. melite*, *M. japonica*.
 Station CP 57. — 26.03.1976, 13°53.1'N, 120°13.2'E, 96-107 m : *M. pherusa*.
 Station CP 62. — 27.03.1976, 13°59.5'N, 120°15.6'E, 179-194 m : *M. heteracantha*, *M. philippinensis*.
 Station CP 63. — 27.03.1976, 14°00.8'N, 120°15.8'E, 191-195 m : *M. japonica*, *M. philippinensis*, *M. laevis*, *M. nesaea*.
 Station CC 64. — 27.03.1976, 14°00.5'N, 120°16.3'E, 194-195 m : *M. heteracantha*, *M. philippinensis*.
 Station CC 68. — 27.03.1976, 14°00.8'N, 120°17.4'E, 183-199 m : *M. heteracantha*.
 Station CP 71. — 28.03.1976, 14°09.3'N, 120°26.2'E, 174-204 m : *M. heteracantha*, *M. laevis*.

MUSORSTOM 2. Philippines.

- Station CP 1. — 20.11.1980, 14°00.3'N, 120°19.3'E, 188-198 m : *M. philippinensis*.
 Station CP 2. — 20.11.1980, 14°01.0'N, 120°17.1'E, 184-186 m : *M. philippinensis*.
 Station CP 6. — 20.11.1980, 13°56.5'N, 120°20.7'E, 136-152 m : *M. pherusa*.
 Station CP 10. — 21.11.1980, 14°00.1'N, 120°18.5'E, 188-195 m : *M. heteracantha*, *M. philippinensis*.
 Station CP 11. — 21.11.1980, 14°00.4'N, 120°19.7'E, 194-196 m : *M. philippinensis*.
 Station CP 13. — 21.11.1980, 14°00.5'N, 120°20.7'E, 193-200 m : *M. heteracantha*.
 Station CP 26. — 23.11.1980, 13°49.6'N, 120°51.0'E, 95-100 m : *M. oritea*.
 Station DG 32. — 24.11.1980, 13°40.5'N, 120°53.9'E, 192-220 m : *M. japonica*.
 Station DR 33. — 24.11.1980, 13°32.3'N, 121°07.5'E, 130-137 m : *M. agave*.
 Station CP 51. — 27.11.1980, 13°59.2'N, 120°16.4'E, 170-187 m : *M. philippinensis*, *M. agave*.
 Station CP 62. — 29.11.1980, 14°00.4'N, 120°17.0'E, 186-189 m : *M. philippinensis*.
 Station CP 63. — 29.11.1980, 14°07.3'N, 120°15.0'E, 215-230 m : *M. laevis*, *M. philippinensis*.

- Station CP 64. — 29.11.1980, 14°01.5'N, 120°18.9'E, 191-195 m : *M. nesaea*.
 Station CP 67. — 29.11.1980, 14°00.1'N, 120°18.5'E, 193-199 m : *M. nesaea*, *M. philippinensis*.
 Station CP 68. — 29.11.1980, 14°01.9'N, 120°18.8'E, 195-199 m : *M. heteracantha*, *M. philippinensis*.
 Station CP 71. — 30.11.1980, 14°00.1'N, 120°17.8'E, 189-197 m : *M. philippinensis*.
 Station CP 72. — 30.11.1980, 14°00.7'N, 120°19.4'E, 182-197 m : *M. philippinensis*.
 Station CP 75. — 01.12.1980, 13°50.5'N, 120°30.3'E, 300-330 m : *M. oritea*.
 Station CP 80. — 01.12.1980, 13°45.1'N, 120°37.7'E, 178-205 m : *M. philippinensis*, *M. nesaea*.
 Station CP 83. — 02.12.1980, 13°55.2'N, 120°30.5'E, 318-320 m : *M. oritea*.

MUSORSTOM 3. Philippines.

- Station CP 87. — 31.05.1985, 14°00.6'N, 120°19.6'E, 191-197 m : *M. heteracantha*, *M. philippinensis*.
 Station CP 92. — 31.05.1985, 14°03.0'N, 120°11.5'E, 224 m : *M. oritea*.
 Station CP 97. — 01.06.1985, 14°00.7'N, 120°18.8'E, 189-194 m : *M. heteracantha*.
 Station CP 98. — 01.06.1985, 14°00.2'N, 120°17.9'E, 194-195 m : *M. nesaea*.
 Station CP 99. — 01.06.1985, 14°01.0'N, 120°19.5'E, 196-204 m : *M. heteracantha*.
 Station CP 101. — 01.06.1985, 14°00.15'N, 120°19.25'E, 194-196 m : *M. heteracantha*, *M. philippinensis*.
 Station CP 103. — 01.06.1985, 14°00.4'N, 120°18.15'E, 193-200 m : *M. heteracantha*, *M. philippinensis*,
M. nesaea.
 Station CP 108. — 02.06.1985, 14°01.1'N, 120°17.9'E, 188-195 m : *M. philippinensis*.
 Station CP 116. — 03.06.1985, 12°32.2'N, 120°46.4'E, 804-812 m : *M. nesaea*.
 Station CP 120. — 03.06.1985, 12°05.6'N, 121°15.6'E, 219-220 m : *M. philippinensis*.
 Station CP 121. — 03.06.1985, 12°08.3'N, 121°17.3'E, 73-84 m : *M. pherusa*.
 Station DR 130. — 05.06.1985, 11°36.7'N, 121°43.5'E, 178-195 m : *M. laevis*, *M. philippinensis*.
 Station CP 133. — 05.06.1985, 11°57.8'N, 121°52.25'E, 334-390 m : *M. caesura*.
 Station CP 134. — 05.06.1985, 12°01.1'N, 121°57.3'E, 92-95 m : *M. agave*.
 Station CP 143. — 07.06.1985, 11°28.3'N, 124°11.6'E, 205-214 m : *M. oritea*.

CORINDON 2. Indonesia.

- Station 206. — 30.10.1980, 01°05.0'S, 117°45.2'E, 79-85 m : *M. pherusa*.
 Station 215. — 10.11.1980, 00°39.5'N, 117°52.3'E, 93 m : *M. sphinx*.
 Station 267. — 07.11.1980, 01°56.6'S, 119°16.7'E, 134-186 m : *M. heteracantha*.
 Station 271. — 07.11.1980, 01°57.8'S, 119°15.0'E, 215 m : *M. striola*.
 Station 273. — 07.11.1980, 01°56.0'S, 119°16.0'E, 180-220 m : *M. sphinx*.

SYSTEMATIC ACCOUNT

Key to *Munida japonica* and its relatives

1. Lateral parts of seventh thoracic sternite with numerous granules 2
 — Lateral parts of seventh thoracic sternite without granules 4
2. Distal spines of antennular basal segment subequal. Merus of third maxilliped unarmed on extensor margin *M. heteracantha*
 — Distomesial spine of antennular basal segment longer than distolateral spine. Merus of third maxilliped with distal spine on extensor margin 3
3. Distomesial spine of antennal basal segment distinctly overreaching third antennal segment *M. honshuensis*
 — Distomesial spine of antennal basal segment only slightly overreaching second antennal segment *M. limula*
4. Distal spines of antennular basal segment unequal in size 5
 — Distal spines of antennular basal segment subequal 6

5. Distomesial spine of antennular basal segment shorter than distolateral spine..... *M. dispar*
- Distomesial spine of antennular basal segment longer than distolateral spine..... *M. agave*
6. Merus of third maxilliped unarmed on extensor margin 7
- Merus of third maxilliped with distal spine on extensor margin 9
7. Distomesial spine of basal antennal segment only slightly overreaching second antennal segment; sternal plastron feebly strigose *M. semoni*
- Distomesial spine of antennal basal segment distinctly overreaching third antennal segment; sternal plastron very strigose..... 8
8. Dactylus of walking legs with spinules along ventral margin, unarmed on distal fourth of its length..... *M. oritea*
- Dactylus of walking legs unarmed on distal half of ventral margin *M. striola*
9. Fourth to seventh thoracic sternites with numerous striae (Fig. 16)..... 10
- Few striae in the fourth and fifth thoracic sternites (Fig. 9)..... 14
10. Second abdominal segment with 2 median dorsal spines..... *M. philippinensis*
- Second abdominal segment usually unarmed or with 4–9 dorsal spines..... 11
11. Distomesial spine of antennal basal segment not reaching end of third antennal segment 12
- Distomesial spine of antennal basal segment distinctly overreaching third antennal segment..... 13
12. Second abdominal segment unarmed. Third thoracic sternite as wide as anterior margin of following sternite *M. pherusa*
- Second abdominal segment with 6–8 dorsal spines. Third thoracic sternite wider than anterior margin of following sternite *M. nesaea*
13. Posterior stria on carapace interrupted by median scale on intestinal region. Merus of third maxilliped with short distal spine on extensor margin. Second abdominal segment unarmed *M. caesura*
- Posterior stria on carapace uninterrupted in intestinal region. Merus of third maxilliped with well-developed distal spine on extensor margin. Second abdominal segment usually with 6 spines *M. eudora*
14. Second abdominal segment with 2 median dorsal spines..... *M. inornata*
- Second abdominal segment usually unarmed or with 4–9 dorsal spines..... 15
15. Distomesial spine of basal antennal segment distinctly overreaching third antennal segment..... 16
- Distomesial spine of basal antennal segment not reaching third antennal segment 17
16. Second abdominal segment with 8 dorsal spines. Posteriormost stria of carapace interrupted on intestinal region..... *M. melite*
- Second abdominal segment with 2 dorsal spines on each side. Posteriormost stria of carapace uninterrupted..... *M. japonica*
17. Movable finger of cheliped with a few spines between basal and distal spines on mesial margin. Second abdominal segment with 5–9 dorsal spines..... *M. sphinx*
- Movable finger of chelipeds without spines between basal and distal spines on mesial margin. Second abdominal segment unarmed..... *M. laevis*

Munida agave sp. nov.

Figs 1-2

MATERIAL EXAMINED. — **Japan.** Off Makura-zaki, Kagoshima Pref., 31°11.6'N, 130°26.4'E, 89 m : 1 ♂ 8.6 mm; 1 ov. ♀ 7.8 mm (KU).

Philippines. MUSORSTOM 2 : stn 33, 130-137 m : 1 ♂ 4.9 mm; 4 ov. ♀ 5.3-8.9 mm; 2 ♀ 3.7, 4.9 mm; 2 juv. 3.4, 3.9 mm (MNHN-Ga 2291 and 3221). — Stn 51, 170-187 m : 1 ♂ 11.1 mm (MNHN-Ga 2290).

MUSORSTOM 3 : stn 134, 92-95 m : 11 ♂ 7.6-12.7 mm; 4 ov. ♀ 8.2-9.4 mm; 7 ♀ 5.6-9.7 mm (MNHN-Ga 2292 and USNM).

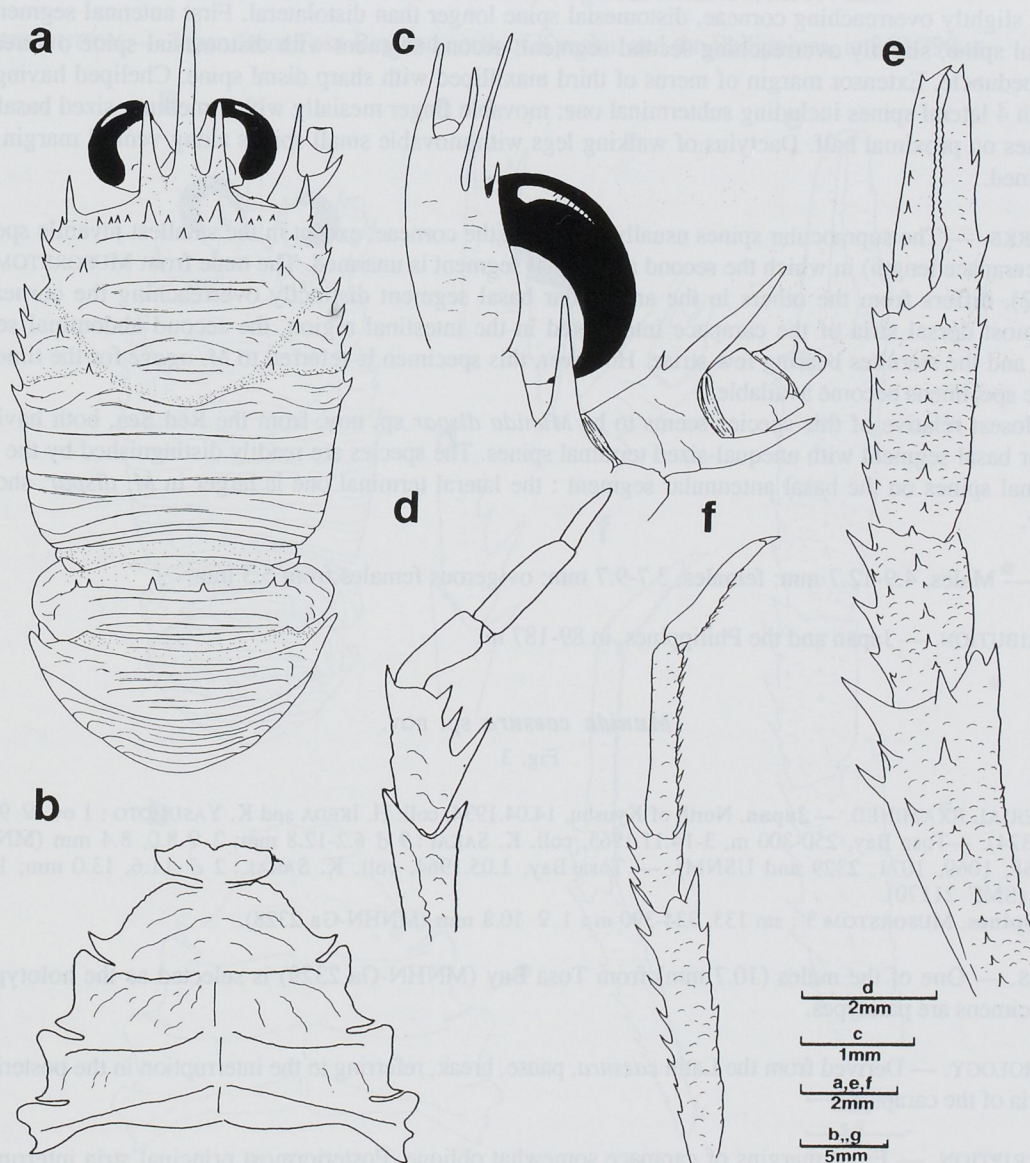


FIG. 1. — *Munida agave* sp. nov., holotype ov. ♀ 8.6 mm, from the Philippines, MUSORSTOM 2, Stn 33, 130-137 m (MNHN-Ga 3221) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, endopod of right third maxilliped, lateral view; e, right cheliped, dorsal view; f, right first walking leg, lateral view.

TYPES. — One of the ovigerous females (8.6 mm) from MUSORSTOM 2 : stn 33 (MNHN-Ga 3221) is selected as the holotype. The other specimens are paratypes.

ETYMOLOGY. — The name refers to one of the Nereids of the Greek mythology (*Agave*).

DESCRIPTION. — Front margins of carapace somewhat oblique. Posteriormost main stria not interrupted. Thoracic sternites with some arcuate striae; lateral parts of seventh sternite without granules. Second abdominal segment with row of 3 pairs of spines on anterior ridge, but rarely median 2 pairs absent; second to fourth segments with several uninterrupted striae. Eyes moderately large. Basal segment of antennule (terminal spines excluded) slightly overreaching corneae, distomesial spine longer than distolateral. First antennal segment with distomesial spine, slightly overreaching second segment; second segment with distomesial spine overreaching antennal peduncle. Extensor margin of merus of third maxilliped with sharp distal spine. Cheliped having fixed finger with 4 lateral spines including subterminal one; movable finger mesially with 1 medium-sized basal and 4 other spines on proximal half. Dactylus of walking legs with movable small spines along ventral margin, distal third unarmed.

REMARKS. — The supraocular spines usually overreach the corneae, except in the smallest juvenile specimen (3.4 mm carapace length) in which the second abdominal segment is unarmed. The male from MUSORSTOM 2, stn 51 (Fig. 2), differs from the others in the antennular basal segment distinctly overreaching the corneae, the posteriormost dorsal stria of the carapace interrupted in the intestinal region, the second abdominal segment unarmed, and the sternites bearing few striae. However, this specimen is referred to *M. agave* for the time being until more specimens become available.

The closest relative of this species seems to be *Munida dispar* sp. nov. from the Red Sea, both having the antennular basal segment with unequal-sized terminal spines. The species are readily distinguished by the size of the terminal spines on the basal antennular segment : the lateral terminal one is larger in *M. dispar*, shorter in *M. agave*.

SIZE. — Males, 4.9-12.7 mm; females, 3.7-9.7 mm; ovigerous females from 5.3 mm.

DISTRIBUTION. — Japan and the Philippines, in 89-187 m.

Munida caesura sp. nov.

Fig. 3

MATERIAL EXAMINED. — **Japan.** North of Kyushu, 14.04.1934, coll. H. IKEDA and K. YASUMOTO : 1 ov. ♀ 9.4 mm. (ZLKU 4324). — Tosa Bay, 250-300 m, 3-14.11.1963, coll. K. SAKAI : 9 ♂ 6.2-12.8 mm; 2 ♀ 8.0, 8.4 mm (MNHN-Ga 1066, 1068, 1069, 1071, 2329 and USNM). — Tosa Bay, 1.05.1964, coll. K. SAKAI : 2 ♂ 11.6, 13.0 mm; 1 ov. ♀ 11.2 mm (SMF 21170).

Philippines. MUSORSTOM 3 : stn 133, 334-390 m : 1 ♀ 10.8 mm (MNHN-Ga 2328).

TYPES. — One of the males (10.7 mm) from Tosa Bay (MNHN-Ga 2329) is selected as the holotype. The other specimens are paratypes.

ETYMOLOGY. — Derived from the Latin *caesura*, pause, break, referring to the interruption in the posteriormost dorsal stria of the carapace.

DESCRIPTION. — Front margins of carapace somewhat oblique. Posteriormost principal stria interrupted on intestinal region with one scale. Sternum with numerous arcuate striae; no granules on lateral parts of seventh sternite. Abdominal segments unarmed, second to fourth segments with several striae. Eyes large. Basal antennular segment (terminal spines excluded) not overreaching corneae; 2 terminal spines subequal in size. First antennal segment with strong distomesial spine overreaching third segment; second segment with long distomesial spine overreaching antennal peduncle. Extensor margin of merus of third maxilliped with small distal spine. Cheliped

having fixed finger with several spines along lateral border; movable finger with 4 mesial spines : 3 on proximal half of length and 1 subterminal. Dactylus of walking legs with movable small spines along ventral margin, but unarmed on distal fourth.

REMARKS. — In the specimen from the Philippines (MNHN-Ga 2328), the secondary striae are more numerous and the mesial spine of the basal antennal segment distinctly overreaches the third antennal segment.

Munida caesura is close to *M. eudora* sp. nov. from the Red Sea. Their relationships are discussed below under "Remarks" of the latter.

SIZE. — Males, 6.2-13.0 mm; females, 8.0-11.2 mm; ovigerous females from 9.4 mm.

DISTRIBUTION. — Japan from Tosa Bay and north of Kyushu, and the Philippines, in 250-390 m.

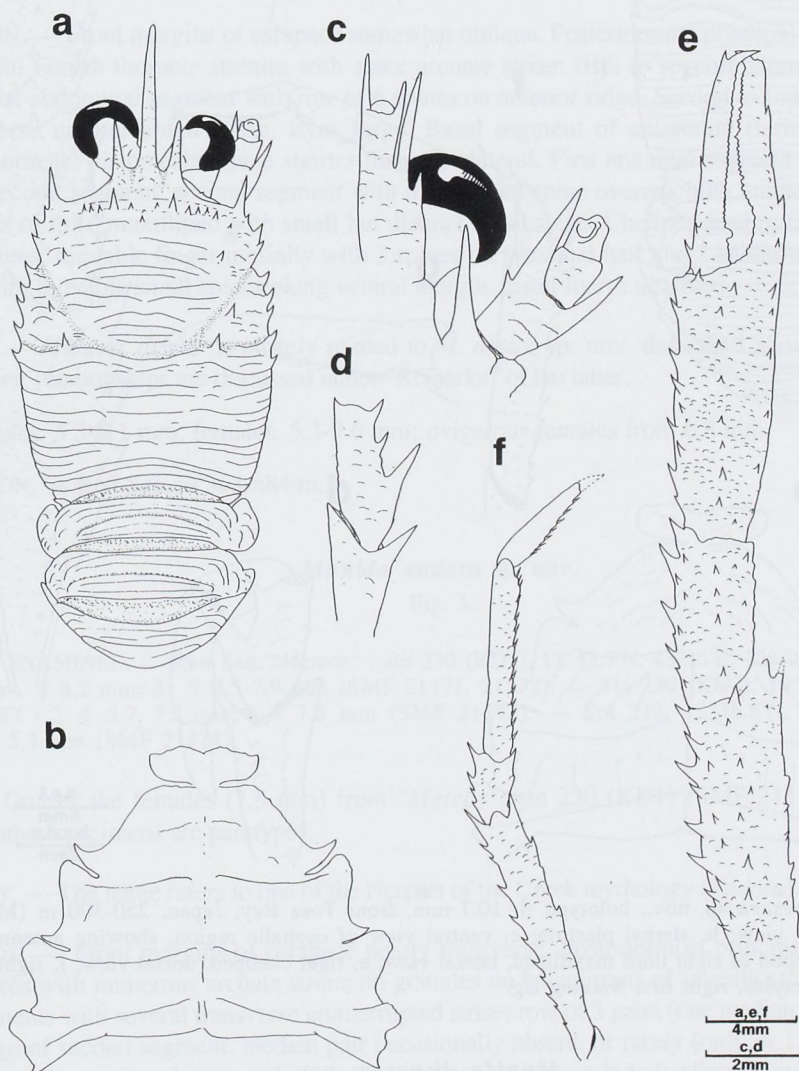


FIG. 2. — *Munida agave* sp. nov., paratype ♂ 11.1 mm, from the Philippines, MUSORSTOM 2, Stn 51, 170-187 m (MNHN-Ga 2290) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, merus and distal part of ischium of right third maxilliped, lateral view; e, right cheliped, dorsal view; f, right first walking leg, lateral view.

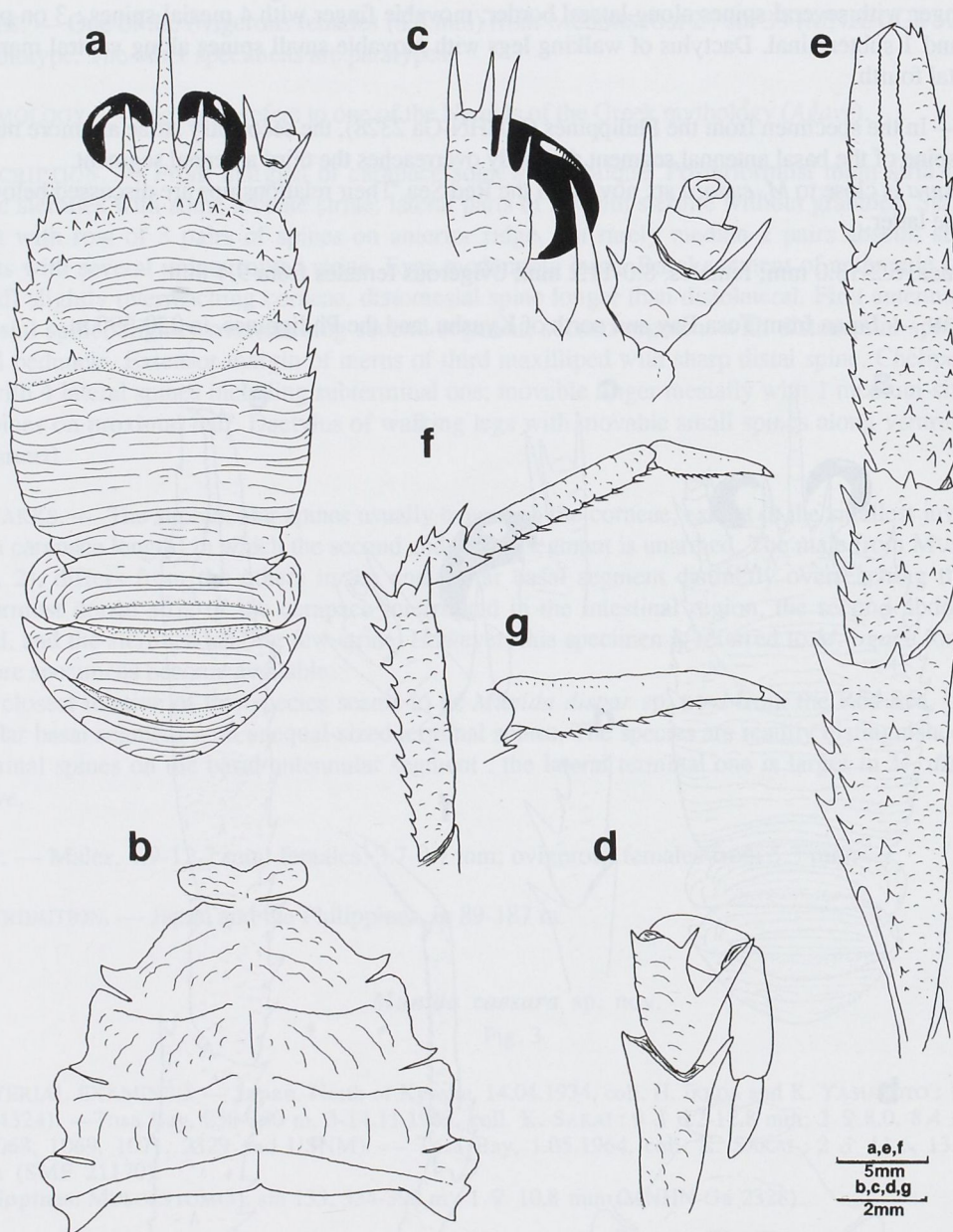


FIG. 3. — *Munida caesura* sp. nov., holotype ♂ 10.7 mm, from Tosa Bay, Japan, 250-300 m (MNHN-Ga 2329) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, endopod of right third maxilliped, lateral view; e, right cheliped, dorsal view; f, right first walking leg, lateral view; g, dactylus, right first walking leg.

Munida dispar sp. nov.

Fig. 4

Munida japonica - TÜRKAY, 1986 : 130. Not *M. japonica* Stimpson, 1858.

MATERIAL EXAMINED. — Red Sea. "Sonne" : stn 203, 20°52.5'N, 37°25.2'E, 490-588 m, 17.10.1977 : 2 ♂ 5.3, 6.0 mm; 3 ♀ 4.5-9.2 mm (SMF 21162, 21168).

"*Valdivia*" : stn 238, 21°22'N, 39°04'E, 363-383 m, 17.04.1979 : 1 ov. ♀ 9.6 mm; 1 ♀ 6.8 mm (SMF 21163). — Stn 245, 26°54.6'N, 35°27.2'E, 542-547 m, 10.03.1981 : 2 ♂ 6.6, 7.8 mm; 1 ov. ♀ 8.0 mm; 1 ♀ 7.4 mm (SMF 21164).

"*Meteor*" : stn 84, 22°52.7'N, 37°03.4'E, 880-884 m, 07.02.1987 : 1 ♀ 5.3 mm (SMF 21165). — Stn 96, 22°04.2'N, 37°10'E, 600 m, 09.02.1987 : 2 ♂ 5.5, 7.2 mm; 4 ov. ♀ 6.3-6.6 mm; 1 ♀ 7.1 mm (SMF 21166). — Stn 99, 22°08.4'N, 37°28.9'E, 827-863 m, 09.02.1987 : 1 ov. ♀ 6.8 mm; 2 ♀ 6.3, 6.6 mm (SMF 21167). — Stn 148, 19°43.3'N, 37°40.5'E, 517-583 m, 20.02.1987 : 1 ♂ 8.1 mm (SMF).

TYPES. — One of the females (9.2 mm) from "*Sonne*", stn 203 (SMF 21168), is selected as the holotype. The other specimens are paratypes.

ETYMOLOGY. — The Latin *dispar*, dissimilar, alludes to the different size of the distal spines of the basal antennular segment.

DESCRIPTION. — Front margins of carapace somewhat oblique. Posteriormost principal stria not interrupted on intestinal region. Fourth thoracic sternite with some arcuate striae; fifth to seventh sternites without striae and granules. Second abdominal segment with row of 6 spines on anterior ridge. Second to fourth segments each with several transverse uninterrupted striae. Eyes large. Basal segment of antennule (terminal spines excluded) overreaching corneae, distomesial spine shorter than distolateral. First antennal segment with distomesial spine overreaching second segment; second segment with distomesial spine overreaching antennal peduncle. Extensor border of merus of third maxilliped with small but distinct distal spine. Cheliped having fixed finger with row of dorsolateral spines; movable finger mesially with 3 spines on proximal half and 1 subterminal spine. Dactylus of walking legs with movable small spines along ventral margin, distal fourth unarmed.

REMARKS. — *Munida dispar* is closely related to *M. agave* sp. nov. described above from Japan and the Philippines. Their relationships are discussed under "Remarks" of the latter.

SIZE. — Males, 5.3-8.1 mm; females, 5.3-9.6 mm; ovigerous females from 6.8 mm.

DISTRIBUTION. — Red Sea, in 363-884 m.

Munida eudora sp. nov.

Fig. 5

MATERIAL EXAMINED. — **Red Sea.** "*Meteor*" : stn 230 (KD1), 12°43.7'N, 43°15'E, 228-235 m, 5.03.1987 : 29 ♂ 4.0-9.0 mm; 1 ov. ♀ 8.2 mm; 31 ♀ 4.5-7.9 mm (SMF 21171, 21172). — Stn 230 (KD2), 12°43.5'N, 43°14.8'E, 214-237 m, 5.03.1987 : 2 ♂ 5.7, 7.8 mm; 1 ♀ 7.8 mm (SMF 21173). — Stn 232, 12°36.8'N, 43°15.7'E, 276-296 m, 6.03.1987 : 1 ♀ 5.3 mm (SMF 21174).

TYPES. — One of the females (7.5 mm) from "*Meteor*", stn 230 (KD1) (SMF 21171), is selected as the holotype. The other specimens are paratypes.

ETYMOLOGY. — The name refers to one of the Nereids of the Greek mythology (*Eudora*).

DESCRIPTION. — Front margins of carapace nearly transverse. Posteriormost principal stria not interrupted. Thoracic sternites with numerous arcuate striae; no granules on lateral parts of seventh sternite. Second to fourth abdominal segments with several transverse uninterrupted striae; row of 3 pairs (one median and 2 lateral) of spines on anterior ridge of second segment, median pair occasionally absent, or rarely (only in 1 specimen) all of these obsolescent. Eyes large. Basal antennular segment (distal spines excluded) slightly overreaching corneae; 2 terminal spines subequal in size. First antennal segment with long distomesial spine slightly overreaching antennal peduncle; second segment with long distomesial spine overreaching antennal peduncle. Extensor margin of merus of third maxilliped with prominent distal spine accompanied by small spine at its base. Fixed finger of cheliped with row of dorsal spines near lateral border; movable finger with row of 5 spines along whole mesial border. Dactylus of walking legs with row of movable spines along ventral margin, but unarmed on distal fourth.

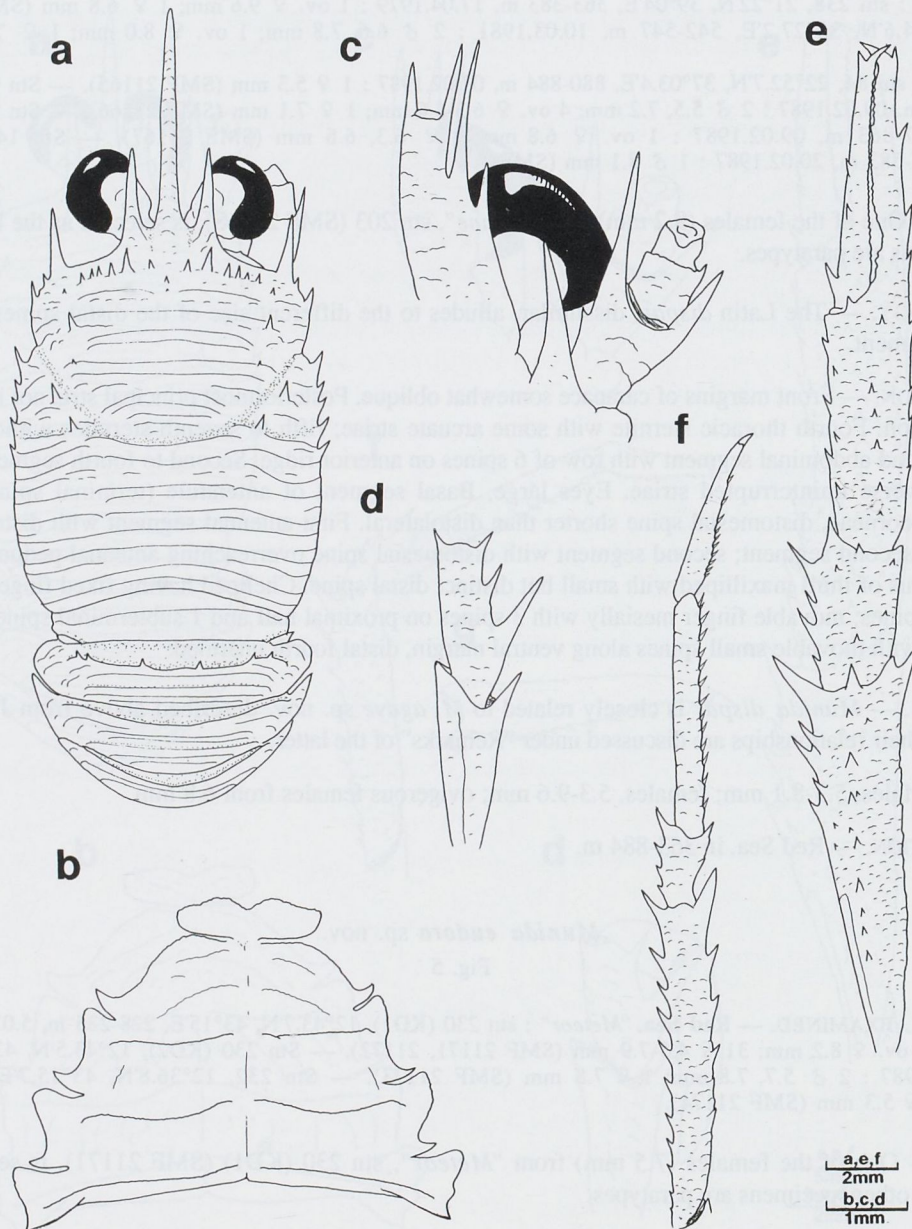


FIG. 4. — *Munida dispar* sp. nov., holotype ♀ 9.2 mm, from the Red Sea, "Valdivia", Stn 203, 490-588 m (SMF 21168): a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, merus and distal part of ischium of right third maxilliped, lateral view; e, right cheliped, dorsal view; f, right first walking leg, lateral view.

REMARKS. — *Munida eudora* is closely related to *M. caesura* sp. nov. described above from Japan and the Philippines in the antennular basal segment bearing equal sized terminal spines, the merus of the third maxilliped bearing a distal spine on the extensor margin, and the sternum bearing numerous striae, but they are distinguished by the following:

— The posteriormost stria of the carapace is interrupted in the intestinal region by a distinct scale in *M. caesura*, uninterrupted in *M. eudora*.

- The front margin is somewhat oblique in *M. caesura*, transverse in *M. eudora*.
- The second abdominal segment is unarmed in *M. caesura*, armed with four or more spines in *M. eudora*.
- The merus of the third maxilliped has the distal spine of flexor border relatively much shorter in *M. caesura* than in *M. eudora*.

SIZE. — Males, 4.0-9.0 mm; females, 4.5-8.2 mm; ovigerous female, 8.2 mm.

DISTRIBUTION. — South of the Red Sea, in 214-296 m.

Munida heteracantha Ortmann, 1892

Fig. 6

Munida heteracantha Ortmann, 1892 : 255, pl. 11, figs 12, 12i, 12k.

Munida exigua Baba, 1988 : 83 (key), 98, fig. 36.

Not *Munida heteracantha* - BABA, 1988 : 104, fig. 38 (= *Munida oritea* sp. nov.).

MATERIAL EXAMINED. — **Japan.** Sagami Bay : 1 ov. ♀ 7.3 mm, lectotype (herein selected) (SM). — Kami-Kawaguchi, Kochi Prefecture, 33°01.7'N, 133°02.3'E, 120 m, 29.10.1979, coll. ♂. **TURKEY** : 1 ♂ 9.5 mm (SMF 21160).

Philippines. MUSORSTOM 1 : stn 5, 200-215 m : 1 ♀ 6.0 mm, (MNHN-Ga 3231). — Stn 9, 180-194 m : 4 ♂ 5.0-7.3 mm (MNHN-Ga 2271). — Stn 10, 187-205 m : 1 ♀ 4.5 mm (MNHN-Ga 2272). — Stn 20, 208-222 m : 1 ov. ♀ 5.6 mm (MNHN-Ga 2273). — Stn 24, 189-209 m : 2 ♂ 6.1, 8.5 mm; 1 ♀ 8.0 mm (MNHN-Ga 2274). — Stn 25, 191-200 m : 4 ♂ 5.4-8.2 mm; 4 ♀ 4.3-5.2 mm (MNHN-Ga 2275). — Stn 30, 177-186 m : 2 ♂ 5.6, 7.7 mm; 1 ov. ♀ 6.3 mm; 1 ♀ 5.3 mm (MNHN-Ga 2276). — Stn 31, 187-195 m : 2 ♂ 5.3, 8.2 mm; 1 ov. ♀ 6.0 mm (MNHN-Ga 2277). — Stn 32, 184-193 m : 2 ♂ 4.5, 5.9 mm; 2 ov. ♀ 6.0, 7.3 mm (MNHN-Ga 2278). — Stn 62, 179-194 m : 1 ♂ 7.6 mm (MNHN-Ga 2279). — Stn 64, 194-195 m : 1 ♂ 6.3 mm (MNHN-Ga 2280). — Stn 68, 195-198 m : 1 ♂ 5.0 mm (MNHN-Ga 3232). — Stn 71, 174-204 m : 1 ♂ 6.1 mm (MNHN-Ga 2281).

MUSORSTOM 2 : stn 10, 188-195 m : 1 ♂ 6.2 mm (MNHN-Ga 2282). — Stn 13, 193-200 m : 1 ov. ♀ 8.0 mm (MNHN-Ga 2283).

MUSORSTOM 3 : stn 87, 191-197 m : 2 ♂ 6.9, 8.7 mm; 1 ov. ♀ 6.0 mm (MNHN-Ga 2284). — Stn 97, 189-194 m : 1 ♀ 6.4 mm (MNHN-Ga 2285). — Stn 99, 196-204 m : 3 ♂ 7.7-8.9 mm; 1 ov. ♀ 8.0 mm; 1 ♀ 7.0 mm (MNHN-Ga 2286). — Stn 101, 194-196 m : 2 ♂ 7.8, 8.9 mm; 1 ov. ♀ 6.7 mm (MNHN-Ga 2287). — Stn 103, 193-200 m : 2 ♂ 7.8, 8.5 mm (MNHN-Ga 2288).

Indonesia. CORINDON 2 : stn 267, 134-186 m : 1 ♂ 5.3 mm (MNHN-Ga 2289).

DESCRIPTION. — (Lectotype). Carapace, excluding rostrum, slightly longer than wide. Transverse ridges mostly interrupted. Secondary striae present. Gastric region with row of 11 epigastric spines, largest spines directly behind supraocular spines. Small parahepatic and postcervical spines on each side.

Front margins somewhat oblique. Lateral margins slightly convex, bearing 4 spines in front of, and 5 spines behind cervical groove. First spine well developed, situated on anterolateral angle, not overreaching level of sinus between rostrum and supraocular spine; second and fourth very small, third larger than second but much smaller than first. Spines behind cervical groove subequal in size.

Rostrum spiniform, half as long as remaining carapace, slightly sinuous in profile and horizontal. Supraocular spines very short, not reaching end of corneae, slightly convergent and directed upwards.

Fourth thoracic sternite with some arcuate striae; fifth and sixth sternites without striae; lateral parts of seventh sternite with distinct granules.

Second abdominal segment with row of 7 spines on anterior ridge. Second and third segments each with 3 transverse striae, 2 anterior striae uninterrupted, third stria less conspicuous and interrupted medially on third segment. Fourth segment with 2 uninterrupted striae, fifth with one such stria.

Eyes moderately large, maximum corneal diameter about one-third distance between bases of anterolateral spines.

Basal segment of antennule (distal spines excluded) about one-quarter carapace length, elongate, ending at level of corneae, with 2 subequal terminal and 2 lateral spines, proximal of latter short, located at midlength of segment, distal long, reaching end of terminal spines.

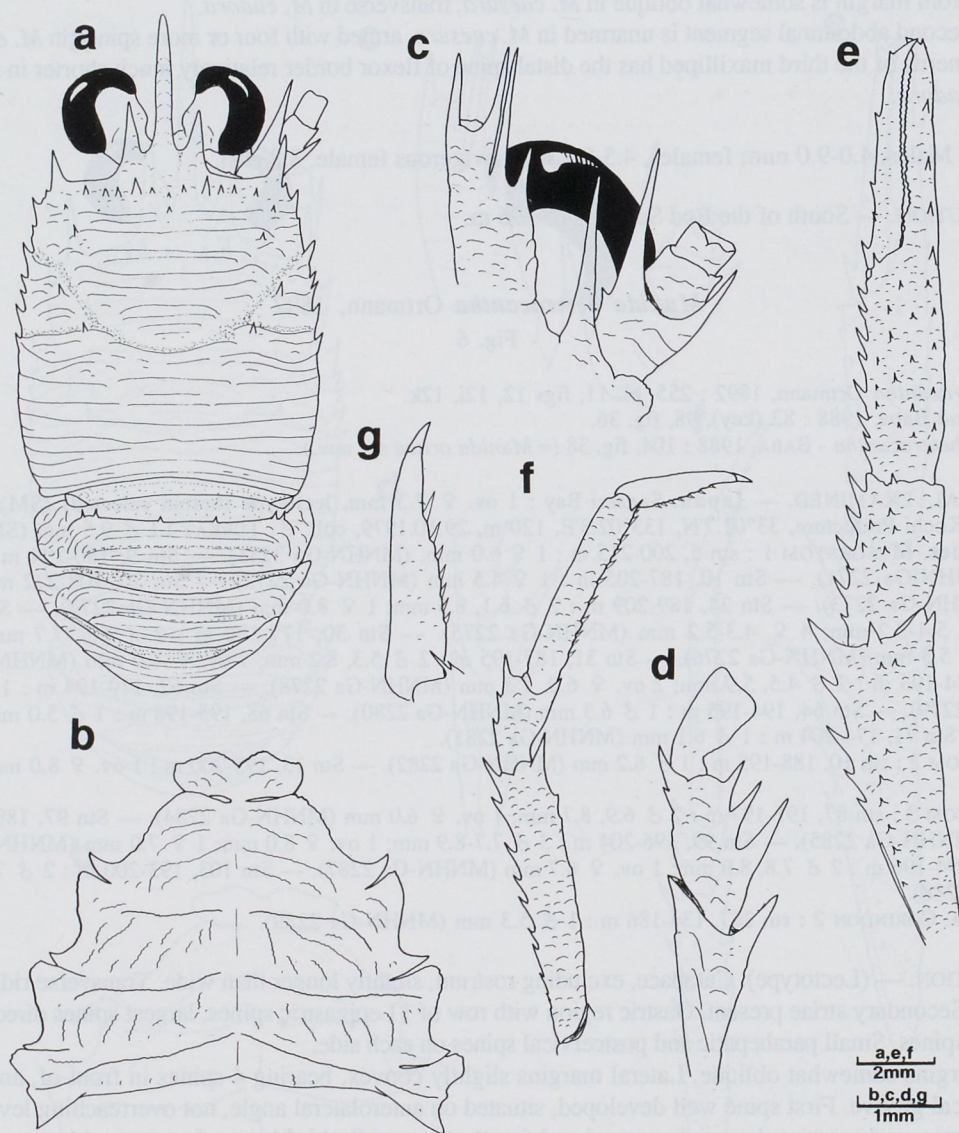


FIG. 5. — *Munida eudora* sp. nov., holotype ♀ 7.5 mm, from the Red Sea, "Meteor", Stn 230 (KD1), 228-235 m (SMF 21171) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, carpus, merus and distal part of ischium of right third maxilliped, lateral view; e, right cheliped, dorsal view; f, right first walking leg, lateral view; g, dactylus, right first walking leg.

First segment of antennal peduncle with distomesial spine only reaching end of second segment; second segment with 2 distal spines, mesial spine longer than lateral spine and almost reaching end of antennal peduncle; third segment unarmed.

Third maxilliped having merus with 2 well-developed spines on flexor margin, proximal longer than distal; extensor margin produced distally, without spine.

Left cheliped (right missing) squamate, with some iridescent setae more dense on mesial borders; about 3 times as long as carapace; merus with 4 rows of spines on mesial, dorsal and ventral borders and distal spine on lateral margin; carpus with row of spines on mesial side and several scattered spines on dorsal and ventral sides; palm with some mesial spines, and row of dorsolateral spines; fixed finger laterally with 3 spines on proximal half and 2 near tip; movable finger with 1 basal and 1 subterminal spine; fingers distally curving and crossing, ending in sharp point; cutting edges with small teeth of different sizes.

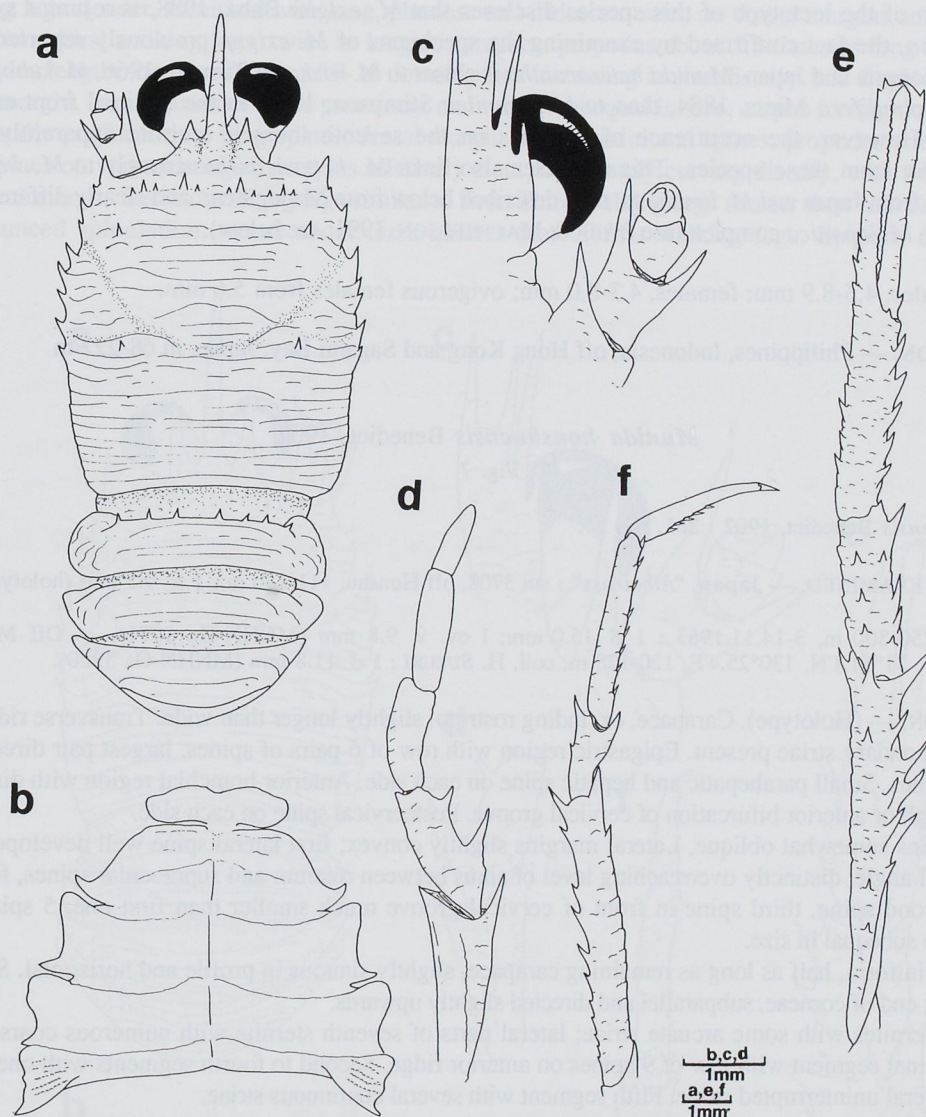


FIG. 6. — *Munida heteracantha* Ortmann, 1892, lectotype ov. ♀ 7.3 mm, from Japan (SM) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, endopod of right third maxilliped, lateral view; e, left cheliped, dorsal view; f, right first walking leg, lateral view.

Walking legs slender, furnished with long, plumose and iridescent setae on dorsal margins and short setae on lateral borders. First walking legs twice length of carapace; merus with row of 11 spines on dorsal border increasing in size distally, and 2 spines on distal third of ventral margin, both distal spines prominent. Carpus with long distal spines each on dorsal and ventral borders and additional small spine on dorsal margin; propodus with row of 8 movable spines on ventral margin; dactylus as long as propodus, with dorsal margin straight, slightly curving distally, ventral margin with 5 movable spinules on proximal half. Second walking legs similar to first. Third walking legs shorter than first and second, with less pronounced spinulation; merus about three-quarters that of first walking legs. Epipods absent from all pereopods.

REMARKS. — In several lots there are specimens with and without 2 small median spines on the third abdominal segment. This variability suggests that the spinulation on that segment should be considered carefully. The second abdominal segment bears 7-8 dorsal spines.

Examination of the lectotype of this species discloses that *M. exigua* Baba, 1988, is a junior synonym of *M. heteracantha*, the fact confirmed by examining the specimens of *M. exigua* previously reported from the Philippines, Indonesia and Japan. *Munida heteracantha* is closer to *M. roshanei* Tirmizi, 1966, *M. kuboi* Yanagita, 1943, and *M. spinulifera* Miers, 1884, than to *M. japonica* Stimpson, 1858, in the inclined front margin (see BABA, 1988). However, the occurrence of granules on the seventh thoracic sternite apparently separates *M. heteracantha* from these species. This character also links *M. heteracantha* strongly to *M. honshuensis* Benedict, 1902, from Japan and *M. limula* sp. nov. described below from Madagascar, and clearly differentiates this species from the *M. japonica* complex (see BABA & MACPHERSON, 1991; see below).

SIZE. — Males, 4.5–8.9 mm; females, 4.3–8.0 mm; ovigerous females from 5.6 mm.

DISTRIBUTION. — Philippines, Indonesia, off Hong Kong and Sagami Bay, Japan, in 68–222 m.

Munida honshuensis Benedict, 1902

Fig. 7

Munida honshuensis Benedict, 1902 : 261, fig. 11.

MATERIAL EXAMINED. — **Japan.** "Albatross" : stn 3708, off Honshu, 111–130 m : 1 ♀ 9.5 mm (holotype) (USNM 25472).

Tosa Bay, 250–300 m, 3–14.11.1963 : 1 ♂ 15.0 mm; 1 ov. ♀ 9.8 mm (MNHN-Ga 1071). — Off Makura-zaki, Kagoshima Pref., 31°11.1'N, 130°25.4'E, 120–128 m, coll. H. SUZUKI : 1 ♂ 11.8 mm (MNHN-Ga 3220).

DESCRIPTION. — (Holotype). Carapace, excluding rostrum, slightly longer than wide. Transverse ridges mostly interrupted. Secondary striae present. Epigastric region with row of 6 pairs of spines, largest pair directly behind supraocular spines. Small parahepatic and hepatic spine on each side. Anterior branchial region with distinct spine behind midlength of anterior bifurcation of cervical groove. Postcervical spine on each side.

Front margins somewhat oblique. Lateral margins slightly convex; first lateral spine well developed, situated on anterolateral angle, distinctly overreaching level of sinus between rostrum and supraocular spines, followed by very small second spine, third spine in front of cervical groove much smaller than first one, 5 spines behind cervical groove subequal in size.

Rostrum spiniform, half as long as remaining carapace, slightly sinuous in profile and horizontal. Supraocular spines reaching end of corneae, subparallel and directed slightly upwards.

Thoracic sternites with some arcuate striae; lateral parts of seventh sternite with numerous coarse granules. Second abdominal segment with row of 9 spines on anterior ridge. Second to fourth segments with one transverse furrow and several uninterrupted striae. Fifth segment with several continuous striae.

Eyes moderately large, maximum corneal diameter about one-third distance between bases of anterolateral spines.

Basal segment of antennule (distal spines excluded) about one-third carapace length, elongate, ending at level of corneae, with 2 terminal (mesial one longer than lateral) and 2 lateral spines (proximal one short, located at midlength of segment, distal long and reaching end of terminal spines).

First segment of antennal peduncle with strong distomesial spine slightly overreaching antennal peduncle; second segment with 2 long distal spines (mesial longer than lateral, overreaching antennal peduncle) and small median spine at midpoint of mesial margin; third segment unarmed.

Merus of third maxilliped with 2 well-developed spines on flexor margin, proximal longer than distal; extensor margin with small but distinct distal spine.

Chelipeds squamate, subequal, with iridescent setae more dense on mesial border. Right cheliped about 2.5 times as long as carapace; merus with rows of spines on mesial, dorsal and ventral borders and 1 distal spine on lateral margin; carpus with row of spines on mesial margin and several spines scattered on dorsal side; palm with 2 rows of mesial spines, 1 row of small dorsal spines, 1 row of dorsolateral spines continued onto fixed finger and reaching tip; movable finger with row of spines along whole mesial border; fingers distally curving and crossing, ending in sharp point; cutting edges with small teeth of different sizes.

Walking legs slender, furnished with long, plumose and iridescent setae on dorsal margins and short setae on lateral borders. First walking legs twice as long as carapace, propodus about 5.5 times as long as high and 1.5 times dactylus length; merus with row of 9-10 dorsal spines increasing in size distally, and 2 spines on distal half of ventral margin, distal spines of these prominent and nearly subequal in size; carpus having dorsal and ventral borders distally produced into long spines, dorsal margin with 3 additional spines; propodus with row of 11-12 movable spines on ventral margin; dactylus relatively stout, moderately curving distally, with 8 movable spines along ventral margin. Second walking legs similar to first. Third walking legs shorter than first and second, with less pronounced spinulation, merus about three-quarter that of first walking legs. Epipods absent from all pereopods.

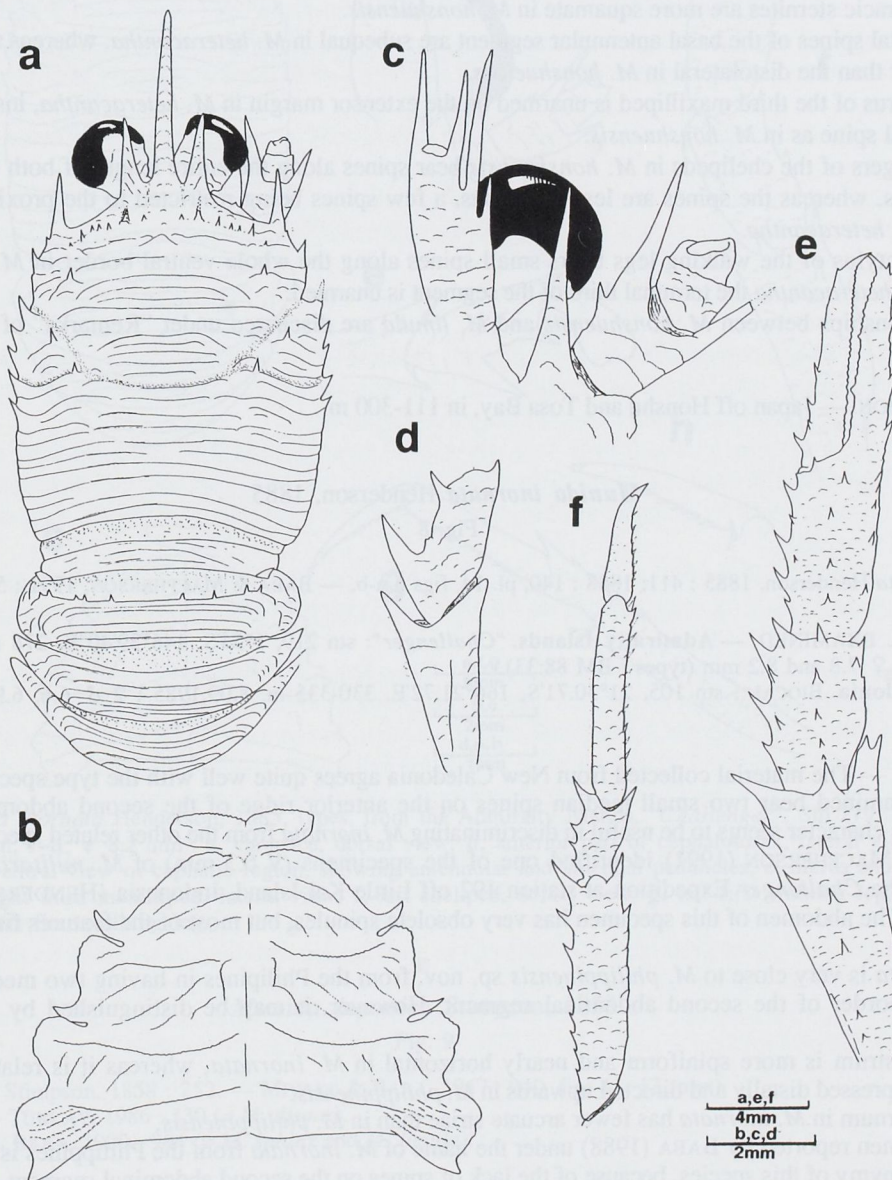


FIG. 7. — *Munida honshuensis* Benedict, 1902, holotype ♀ 9.5 mm, from Japan (USNM 25472) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, merus and distal part of ischium of left third maxilliped, lateral view; e, right cheliped, dorsal view; f, right first walking leg, lateral view.

REMARKS. — No significant differences were observed among the specimens studied.

The species has been considered to be synonymous with *M. japonica* (see BALSS, 1913; BABA, 1988), but examination of the holotype of this species (USNM 25472) revealed that *M. honshuensis* is a good species, differentiated from by the presence of granules on the lateral parts of the seventh thoracic sternite.

The closest species which share the characteristic granules on the thoracic plastron may be *M. heteracantha* Ortmann from Japan, the Philippines and Indonesia, and *M. limula* sp. nov. from Madagascar.

Munida honshuensis can be distinguished from *M. heteracantha* by :

— The supraocular spines never overreach the eyes in *M. heteracantha*, distinctly extend beyond them in *M. honshuensis*.

— The thoracic sternites are more squamate in *M. honshuensis*.

— The distal spines of the basal antennular segment are subequal in *M. heteracantha*, whereas the distomesial spine is longer than the distolateral in *M. honshuensis*.

— The merus of the third maxilliped is unarmed on the extensor margin in *M. heteracantha*, instead of having a distinct distal spine as in *M. honshuensis*.

— The fingers of the chelipeds in *M. honshuensis* bear spines along the entire length of both the mesial and lateral margins, whereas the spines are less numerous, a few spines being restricted to the proximal and distal portions, in *M. heteracantha*.

— The dactylus of the walking legs bears small spines along the whole ventral border in *M. honshuensis*, whereas in *M. heteracantha* the terminal third of the segment is unarmed.

The relationships between *M. honshuensis* and *M. limula* are discussed under "Remarks" of the latter (see below).

DISTRIBUTION. — Japan off Honshu and Tosa Bay, in 111-300 m.

Munida inornata Henderson, 1885

Fig. 8

Munida inornata Henderson, 1885 : 411; 1888 : 140, pl. 14, figs 6 a-b. — BABA & MACPHERSON, 1991 : 543, fig. 3.

MATERIAL EXAMINED. — **Admiralty Islands.** "Challenger": stn 219, 1°54'S, 146°39'40"E, 278 m, 10.03.1875 : 1 ♂ 8.0 mm; 2 ♀ 7.8 and 8.2 mm (types : BM 88:33).

New Caledonia. BIOCAL : stn 105, 21°30.71'S, 166°21.72'E, 330-335 m, 8.09.1985 : 2 ♂ 6.6, 6.9 mm (MNHN-Ga 3227).

REMARKS. — The material collected from New Caledonia agrees quite well with the type specimens. All the specimens examined bear two small median spines on the anterior ridge of the second abdominal segment. Therefore, this character seems to be useful in discriminating *M. inornata* from the other related species.

BABA and MACPHERSON (1991) identified one of the specimens (V 6.3 mm) of *M. militaris* Henderson, collected by the *Challenger* Expedition at station 192 off Little Kai Island, Indonesia (HENDERSON, 1885), as *M. inornata*. The abdomen of this specimen has very obsolete spinules, but most of the features fit the definition of *M. inornata*.

M. inornata is very close to *M. philippinensis* sp. nov. from the Philippines in having two median spines on the anterior border of the second abdominal segment. However, it may be distinguished by the following differences :

— The rostrum is more spiniform and nearly horizontal in *M. inornata*, whereas it is relatively shorter, distinctly compressed distally and directed upwards in *M. philippinensis*.

— The sternum in *M. inornata* has fewer arcuate striae than in *M. philippinensis*.

The specimen reported by BABA (1988) under the name of *M. inornata* from the Philippines is now removed from the synonymy of this species, because of the lack of spines on the second abdominal segment. It may belong to another species, but additional material would be desirable to confirm its identity.

SIZE. — Males, 6.6-6.9 mm; females, 7.8-8.2 mm.

DISTRIBUTION. — New Caledonia and Admiralty Islands, in 278-335 m.

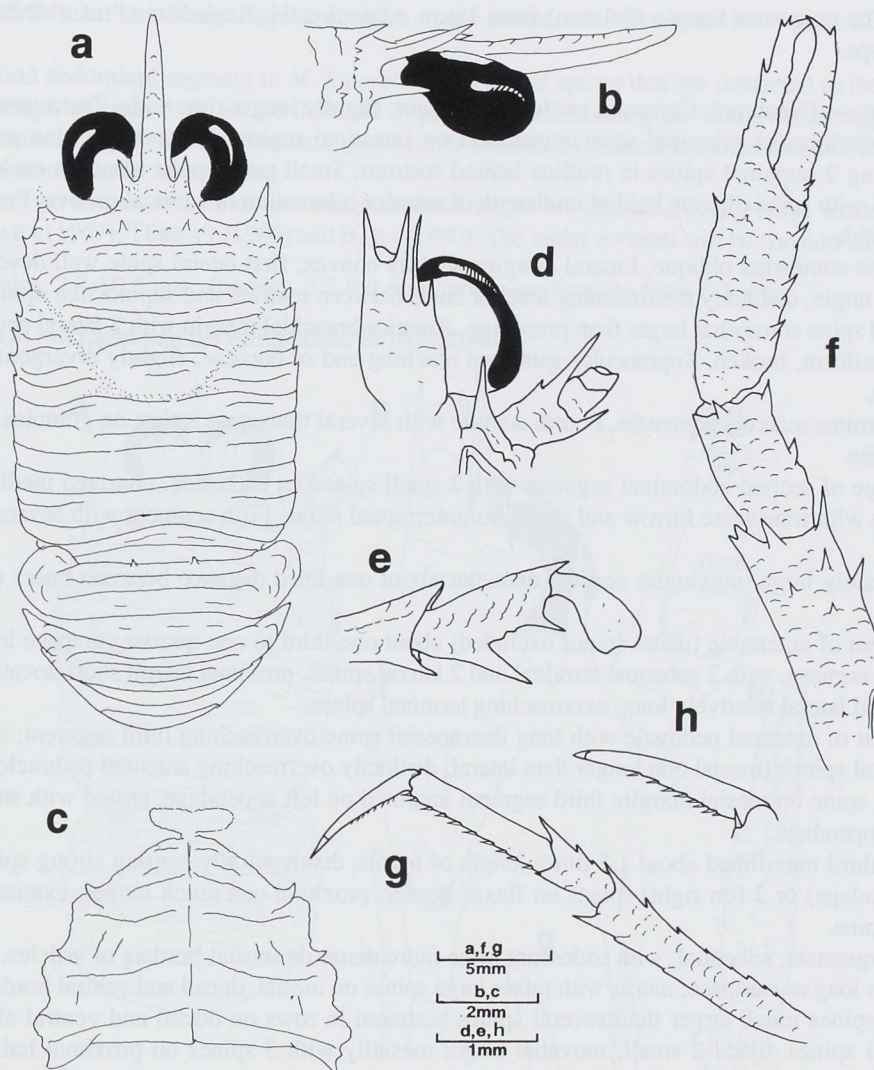


FIG. 8. — *Munida inornata* Henderson, 1885, types, from the Admiralty Islands, "Challenger", Stn 219, 278 m (BM) : a-e, M 8.0 mm; f-h, ♀ 8.2 mm : a, carapace, dorsal view; b, anterior part of cephalotorax, lateral view; c, sternal plastron; d, ventral view of cephalic region, showing antennular and antennal peduncles; e, merus and distal part of ischium of right third maxilliped, lateral view; f, left cheliped, dorsal view; g, left first walking leg, lateral view; h, dactylus, left first walking leg.

Munida japonica Stimpson, 1858

Fig. 9

Munida japonica Stimpson, 1858 : 252. — MIYAKE & BABA, 1967 : 240, figs 11, 12 (part).

Not *M. japonica* - TÜRKAY, 1986 : 130 (= *M. dispar*).

Not *M. japonica* - BABA, 1990 : 964 (= *M. sphinx* and *M. limula*).

MATERIAL EXAMINED. — **Japan.** 33°59.4'N, 128°48'E, 102 m, 19.06.1964 : 4 ♂ 7.7-10.5 mm; 1 ov. ♀ 7.4 mm; 1 ♀ 8.0 mm (ZLKU 10771).

Off Makura-zaki, Kagoshima Pref., 31°04.6'N, 130°35.1'E, 145 m : 1 ov. ♀ 7.4 mm (MNHN-Ga 2337).

Philippines. MUSORSTOM 1 : stn 51, 170-200 m : 1 ♂ 8.9 mm (MNHN-Ga 2322). — Stn 63, 191-195 m : 1 ov. ♀ 6.1 mm (MNHN-Ga 2323).

MUSORSTOM 2 : stn 32, 192-220 m : 1 ♀ 5.7 mm (USNM).

TYPES. — The ovigerous female (7.4 mm) from Japan, Makura-zaki, Kagoshima Pref. (MNHN-Ga 2337) is selected as neotype.

DESCRIPTION. — (Neotype). Carapace, excluding rostrum, slightly longer than wide. Transverse ridges mostly interrupted. Posteriormost principal stria interrupted on intestinal region. Secondary striae present. Row of 14 spines flanking 2 unpaired spines in midline behind rostrum. Small parahepatic spine on each side. Anterior branchial region with spine directly behind midlength of anterior bifurcation of cervical groove. Postcervical spine present on each side.

Front margins somewhat oblique. Lateral margins slightly convex; first lateral spine well developed, situated on anterolateral angle, distinctly overreaching level of sinus between rostrum and supraocular spine, second spine very small, third spine somewhat larger than preceding. Anterior branchial margin with 5 lateral spines.

Rostrum spiniform, broken. Supraocular spine not reaching end of corneae, slightly divergent anteriorly and directed upwards.

Thoracic sternites scarcely squamate. Fourth sternite with several transverse striae; no granules on lateral parts of seventh sternite.

Anterior ridge of second abdominal segment with 2 small spines on each side, unarmed medially. Second to fourth segments with transverse furrow and several uninterrupted striae. Fifth segment with several uninterrupted striae.

Eyes moderately large, maximum corneal diameter about one-third distance between bases of anterolateral spines.

Basal segment of antennule (distal spines excluded) about one-third to one-quarter carapace length, elongate, reaching end of corneae, with 2 subequal terminal and 2 lateral spines, proximal lateral short, located at midlength of segment, distal lateral relatively long, overreaching terminal spines.

First segment of antennal peduncle with long distomesial spine overreaching third segment; second segment with 2 long distal spines (mesial one longer than lateral, distinctly overreaching antennal peduncle) and small but distinct median spine on mesial margin; third segment unarmed on left appendage, armed with small distolateral spine on right appendage.

Ischium of third maxilliped about 1.5 times length of merus, distoventrally bearing strong spine; merus with 3 (on left appendage) or 2 (on right) spines on flexor border, proximal one much longer; extensor margin with distinct distal spine.

Chelipeds squamate, subequal, with iridescent setae more dense on mesial borders of articles. Right cheliped about 3 times as long as carapace; merus with rather large spines on mesial, dorsal and ventral borders; carpus with mesial row of spines much larger than several spines scattered in rows on dorsal and ventral sides; palm with 2 spaced lateral spines, distal 2 small; movable finger mesially with 3 spines on proximal half of length and 1 subterminal spine; fingers distally curving and crossing, ending in sharp point; cutting edges nearly straight on movable finger, somewhat sinuous on fixed finger.

Walking legs slender, furnished with long, plumose and iridescent setae on dorsal margins and short setae on lateral borders. First walking legs about twice carapace length; propodus 4.5 times as long as high and 1.5 times dactylus length; merus with row of 9 dorsal spines increasing in size distally, 2 spines on distal half of ventral margin; distal spines of these prominent and subequal in size; carpus with long distal spine on dorsal and ventral borders and 3 additional spines on dorsal margin; propodus with row of 11 movable ventral spines; dactylus slender, slightly curving distally, with 6 movable small spines along ventral margin, unarmed on nearly distal third of length. Second walking legs similar to first. Third walking legs shorter than first and second, with less pronounced spinulation; merus about one-third that of first walking leg. Epipods absent from all pereopods.

REMARKS. — The rostrum in the intact specimens is nearly straight, directed upwards, its length varying from one-half to two-thirds the postorbital carapace length.

Munida japonica strongly resembles *M. melite* sp. nov. from the Philippines where they have been collected together, in having the basal antennular segment with subequal terminal spines, the sternum with fewer striae, and the merus of the third maxilliped with a distinct distal spine on the extensor margin. They may be distinguished by the following differences :

— The posteriormost stria in the intestinal region of the carapace is interrupted in *M. japonica*, uninterrupted in *M. melite*.

— The second abdominal segment in *M. japonica* bears dorsal spines that are restricted to the lateral portions of the anterior ridge, whereas in *M. melite* there are 8 spines distributed along the whole dorsal ridge.

— The antennular basal segment, excluding spines, in *M. melite* distinctly overreaches the cornea, instead of reaching end of cornea, as in *M. japonica*.

In this paper, we do not revised all the material identified as *M. japonica* by previous workers, only that of MIYAKE and BABA (1967), TÜRKAY (1986) and BABA (1990). The wider revision will be considered later.

SIZE. — Males, 7.7-10.5 mm; females, 5.7-8.0 mm; ovigerous females from 6.1 mm.

DISTRIBUTION. — Japan and the Philippines, in 102-220 m.

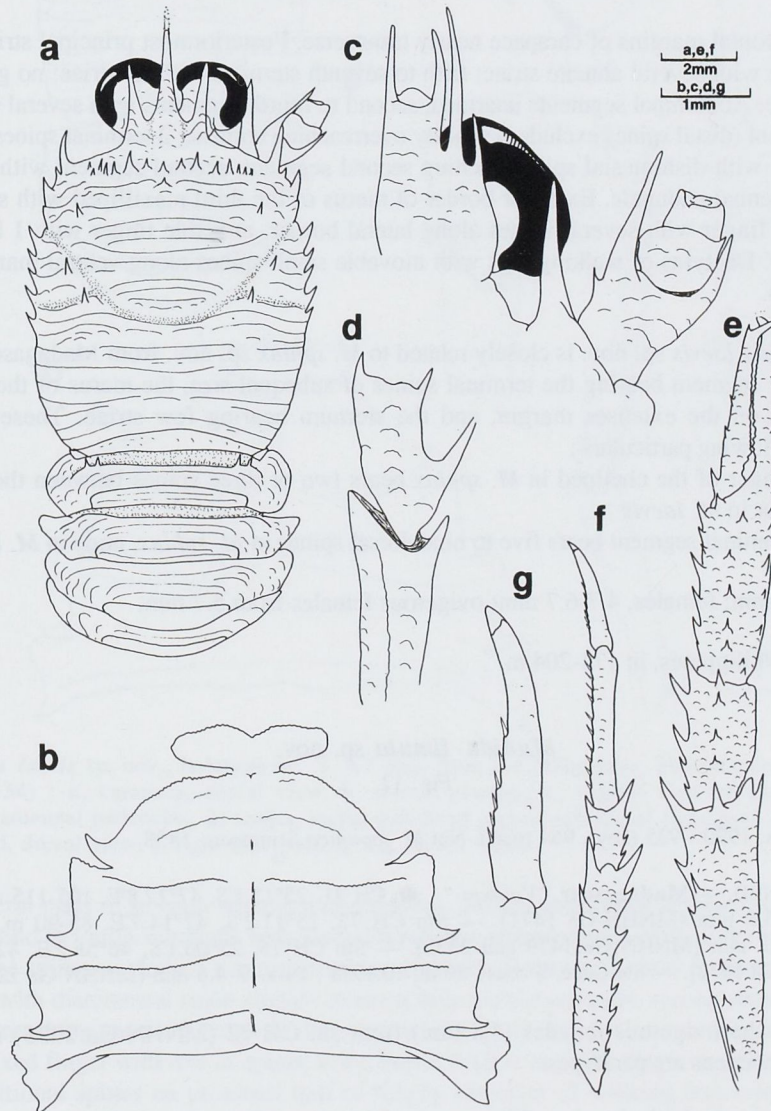


FIG. 9. — *Munida japonica* Stimpson, 1858, neotype ov. ♀ 7.4 mm, from Kagoshima, Japan (MNHN-Ga 2337) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, merus and distal part of ischium of right third maxilliped, lateral view; e, right cheliped, dorsal view; f, left first walking leg, lateral view; g, dactylus, left first walking leg.

Munida laevis sp. nov.

Fig. 10

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 1 : stn 63, 191-195 m : 1 ov. ♀ 5.7 mm; 2 ♀ 4.7, 5.7 mm (MNHN-Ga 2333). — Stn 71, 174-204 m : 1 ov. ♀ 6.7 mm (MNHN-Ga 2334).
MUSORSTOM 3 : stn 130, 178-195 m : 1 ♂ 5.8 mm (MNHN-Ga 2336).

TYPES. — The ovigerous female from MUSORSTOM 1, stn 71 (MNHN-Ga 2334), is selected as the holotype. The other specimens are paratypes.

ETYMOLOGY. — The Latin *laevis*, smooth, polished, refers to the smooth thoracic sternites.

DESCRIPTION. — Frontal margins of carapace nearly transverse. Posteriormost principal stria not interrupted. Fourth thoracic sternite with several arcuate striae; fifth to seventh sternites without striae; no granules on lateral parts of seventh sternite. Abdominal segments unarmed, second to fourth segments with several striae. Eyes large. Basal antennular segment (distal spines excluded) slightly overreaching corneae; 2 terminal spines subequal in size. First antennal segment with distomesial spine reaching second segment; second segment with long distomesial spine overreaching antennal peduncle. Extensor border of merus of the third maxilliped with small distal spine. Cheliped having fixed finger with several spines along lateral border, movable finger with 1 basal and 1 distal spine on mesial border. Dactylus of walking legs with movable small spines along ventral margin, but unarmed on distal third of length.

REMARKS. — *Munida laevis* sp. nov. is closely related to *M. sphinx* sp. nov. from Madagascar and Indonesia in the basal antennular segment bearing the terminal spines of subequal size, the merus of the third maxilliped bearing a distal spine on the extensor margin, and the sternum bearing few striae. These two species are differentiated by the following particulars :

— The movable finger of the cheliped in *M. sphinx* bears two or three spines between the basal and distal spines, which are absent in *M. laevis*.

— The second abdominal segment bears five to nine dorsal spines in *M. sphinx*, none in *M. laevis*.

SIZE. — Male, 5.8 mm; females, 4.7-6.7 mm; ovigerous females from 5.7 mm.

DISTRIBUTION. — Philippines, in 174-204 m.

Munida limula sp. nov.

Fig. 11

Munida japonica - BABA, 1990 : 925 (key), 964 (part). Not *M. japonica* Stimpson, 1858.

MATERIAL EXAMINED. — **Madagascar.** "Vauban" : stn CH 71, 25°13.1'S, 47°17.8'E, 105-115 m, 3.03.1973 : 4 ♂ 4.6-7.0 mm; 1 ov. ♀ 5.3 mm (MNHN-Ga 1471). — Stn CH 72, 25°11.2'S, 47°14.7'E, 85-90 m, 3.03.1973 : 1 ♂ 3.6 mm; 2 ov. ♀ 4.8, 5.5 mm (MNHN-Ga 1479 and 2335). — Stn CH 75, 25°06.1'S, 46°56.2'E, 42 m, 4.03.1973 : 1 ov. ♀ 3.8 mm (MNHN-Ga 1472). — Ste Luce, S coast, 50 m, 10.1958 : 1 ov. ♀ 4.6 mm (MNHN-Ga 2259).

TYPES. — One of the ovigerous females (4.8 mm) from stn CH 72 (MNHN-Ga 2335) is selected as the holotype. The other specimens are paratypes.

ETYMOLOGY. — From the Latin *limulus*, oblique, referring to the oblique front margins.

DESCRIPTION. — Front margins of carapace moderately oblique. Posteriormost principal stria interrupted on intestinal region. Secondary striae present. Branchial margin with usually 5, rarely 6 spines. Parahepatic spines 1-3 in number. Fourth and fifth thoracic sternites with several short arcuate striae; sixth and seventh sternites

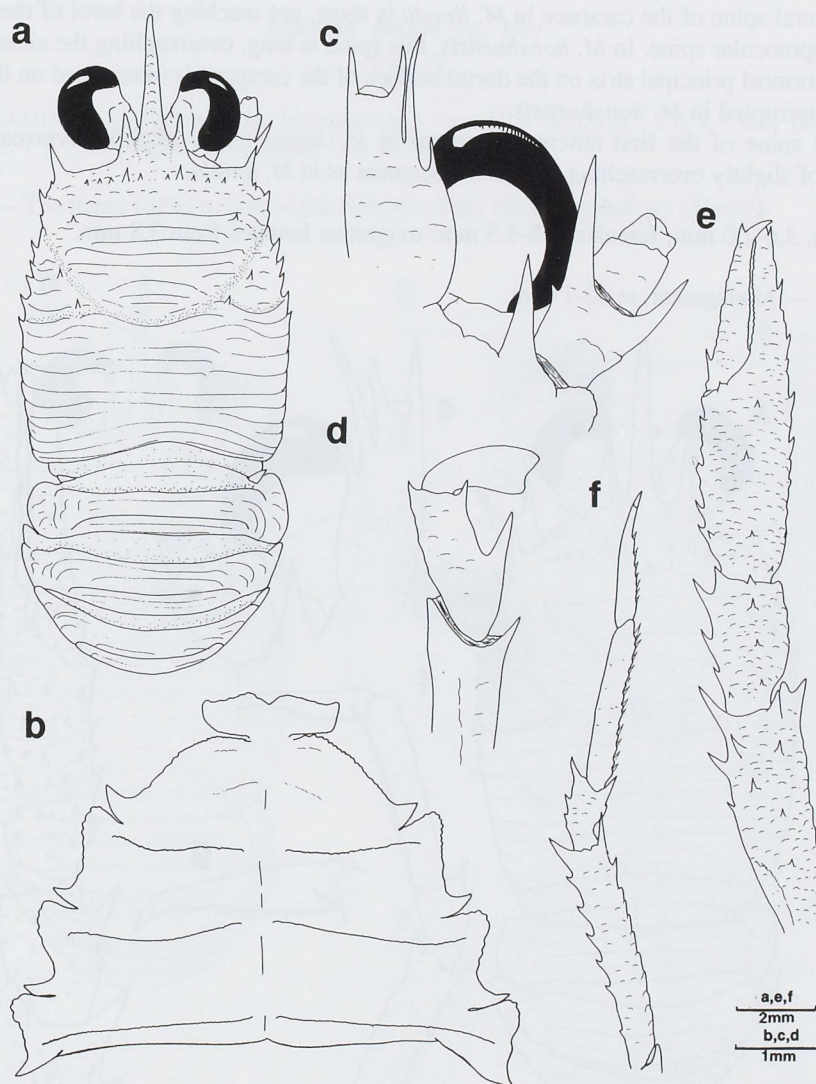


FIG. 10. — *Munida laevis* sp. nov., holotype ov. ♀ 6.7 mm, from the Philippines, MUSORSTOM 1, Stn 71, 174-204 m (MNHN-Ga 2334) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, carpus, merus and distal part of ischium of right third maxilliped, lateral view; e, right cheliped, dorsal view; f, right first walking leg, lateral view.

without striae; lateral parts of seventh sternite with granules. Second abdominal segment with row of 8 spines on anterior ridge. Second to fourth segments with several transverse uninterrupted striae. Eyes large. Basal segment of antennule (terminal spines excluded) not overreaching corneae, distomesial spine longer than distolateral. First antennal segment with distomesial spine slightly overreaching second segment; second segment with distomesial spine slightly overreaching antennal peduncle. Extensor border of merus of third maxilliped with one distal spine. Cheliped having fixed finger with row of spines along lateral border; movable finger mesially with basal and distal spines, and 4 additional spines on proximal half of length. Dactylus of walking legs with 7 movable spinules along nearly whole ventral margin.

REMARKS. — The presence of granules on the lateral parts of the seventh sternite and the antennular basal segment bearing a distomesial spine longer than the distolateral link the new species to *M. honshuensis* Benedict from Japan, but they differ in the following respects :

— The front margins are more oblique in the new species.

— The first lateral spine of the carapace in *M. limula* is short, not reaching the level of the sinus between the rostrum and the supraocular spine. In *M. honshuensis*, this spine is long, overreaching the sinus.

— The posteriormost principal stria on the dorsal surface of the carapace is interrupted on the intestinal region in *M. limula*, uninterrupted in *M. honshuensis*.

— The mesial spine of the first antennal segment in *M. honshuensis* slightly overreaches the antennal peduncle, instead of slightly overreaching the second segment as in *M. limula*.

SIZE. — Males, 3.6-7.0 mm; females, 3.8-5.5 mm; ovigerous females from 3.8 mm.

DISTRIBUTION. — Madagascar, in 42-115 m.

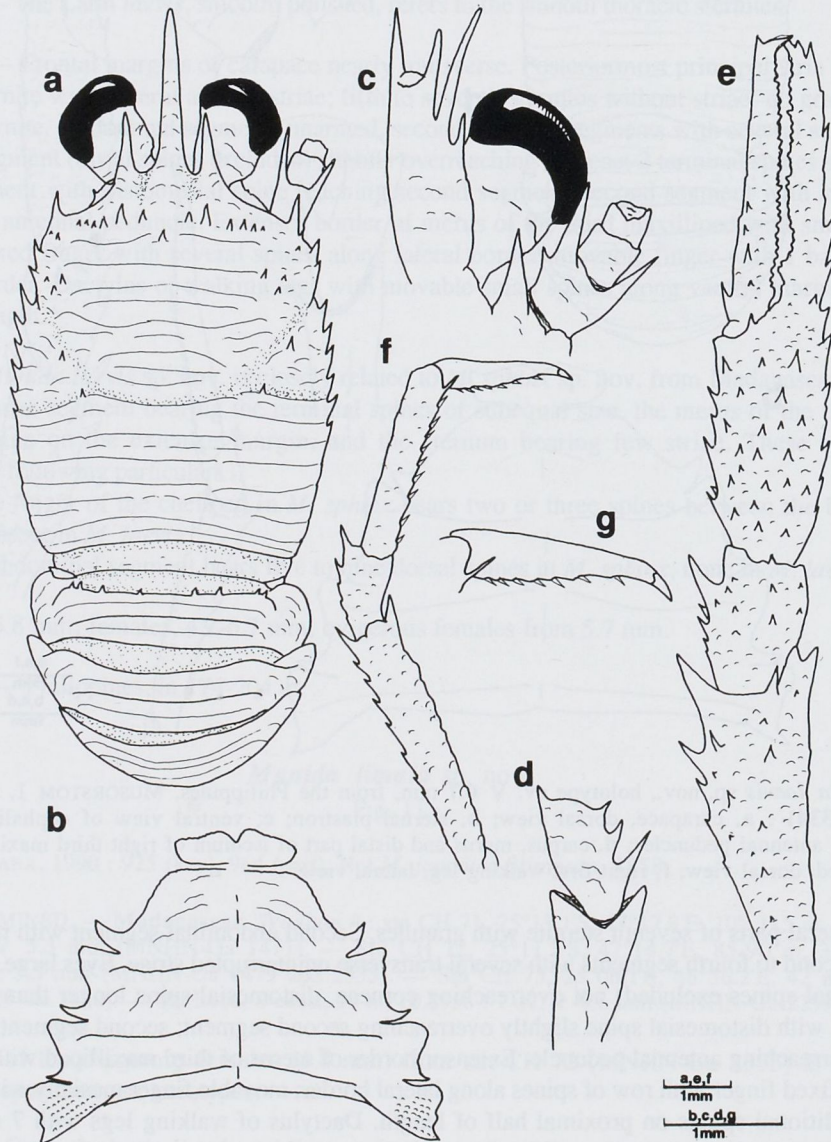


FIG. 11. — *Munida limula* sp. nov., holotype ov. ♀ 4.8 mm, from Madagascar, "Vauban", Stn CH 72, 85-90 m (MNHN-Ga 2335): a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, merus and distal part of ischium of right third maxilliped, lateral view; e, right cheliped, dorsal view; f, right first walking leg, lateral view; g, dactylus, right first walking leg.

Munida melite sp. nov.

Fig. 12

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 1 : stn 51, 170-200 m : 1 ♂ 8.9 mm (holotype, MNHN-Ga 2320); 1 ♂ 15.8 mm; 1 ♀ 7.9 mm (paratypes, MNHN-Ga 2321).

ETYMOLOGY. — The name refers to one of the Nereids of the Greek mythology (*Melite*).

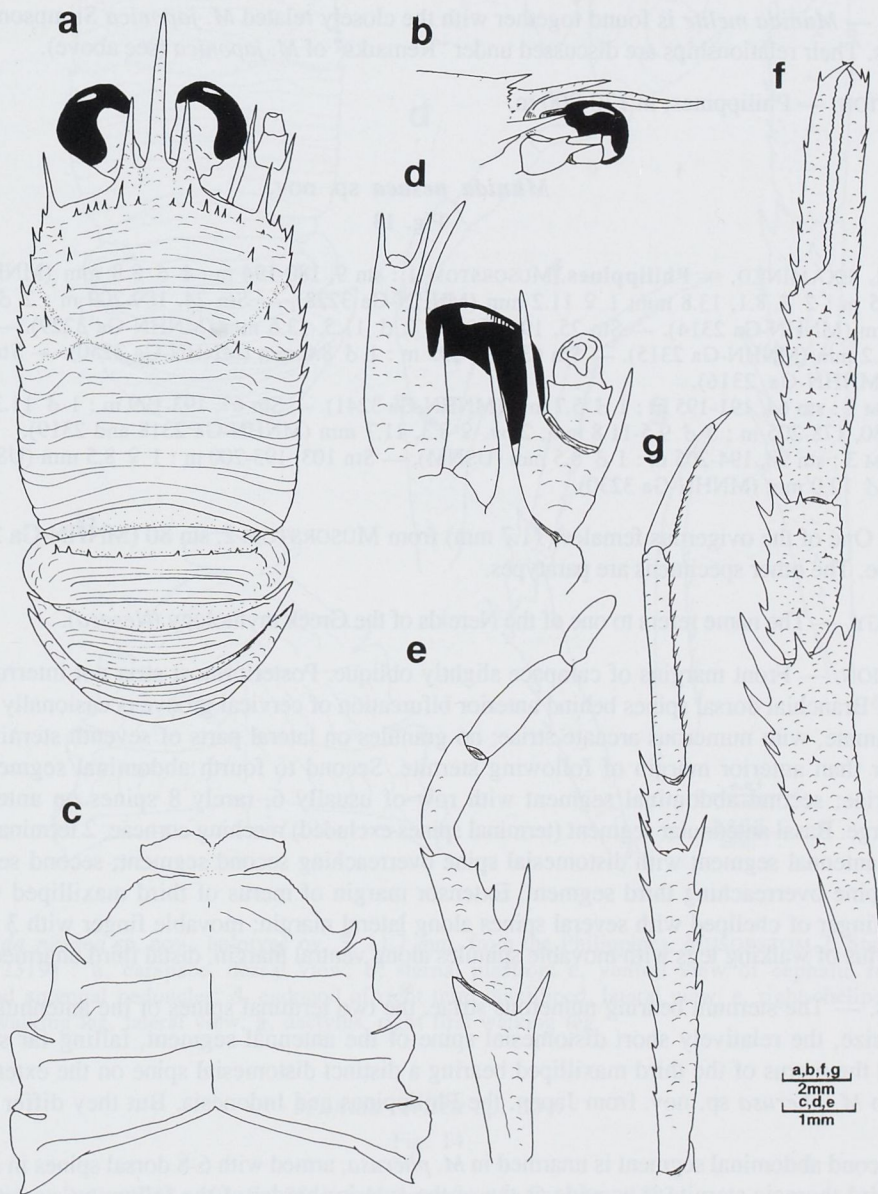


FIG. 12. — *Munida melite* sp. nov., holotype ♂ 8.9 mm, from the Philippines, MUSORSTOM 1, Stn 51, 170-200 m (MNHN-Ga 2320) : a, carapace, dorsal view; b, anterior part of carapace, lateral view; c, sternal plastron; d, ventral view of cephalic region, showing antennular and antennal peduncles; e, endopod of right third maxilliped, lateral view; f, right cheliped, dorsal view; g, right first walking leg, lateral view.

DESCRIPTION. — Front margins of carapace somewhat oblique. Posteriormost principal stria not interrupted. Secondary striae present. Fourth thoracic sternite with several short arcuate striae; fifth to seventh sternites with several longitudinal oblique striae; lateral parts of seventh sternite without granules. Second abdominal segment with row of 8 spines on anterior ridge. Eyes large. Basal antennular segment (distal spines excluded) overreaching corneae; 2 terminal spines subequal in size. First antennal segment with strong distomesial spine overreaching third segment; second segment with long distomesial spine overreaching antennal peduncle. Fixed finger of cheliped with row of spines along lateral margin; movable finger with row of spines along whole mesial border. Dactylus of walking legs with movable small spines along proximal two-thirds of ventral margin.

REMARKS. — *Munida melite* is found together with the closely related *M. japonica* Stimpson from Japan and the Philippines. Their relationships are discussed under "Remarks" of *M. japonica* (see above).

DISTRIBUTION. — Philippines, in 170-200 m.

Munida nesaea sp. nov.

Fig. 13

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 1: stn 9, 180-194 m: 1 ♂ 8.8 mm (MNHN-Ga 3251). — Stn 10, 178-205 m: 2 ♂ 8.1, 13.8 mm; 1 ♀ 11.2 mm (MNHN-Ga 3228). — Stn 24, 189-209 m: 2 ♂ 8.3, 12.0 mm; 3 ♀ 10.1-12.4 mm (MNHN-Ga 2314). — Stn 25, 191-200 m: 2 ♂ 11.5, 13.6 mm (MNHN-Ga 3229). — Stn 36, 187-210 m: 1 ov. ♀ 11.2 mm (MNHN-Ga 2315). — Stn 63, 191-195 m: 1 ♂ 8.6 mm (MNHN-Ga 3250). — Stn 64, 194-195 m: 1 ♂ 6.2 mm (MNHN-Ga 2316).

MUSORSTOM 2: stn 64, 191-195 m: 1 ♂ 5.7 mm (MNHN-Ga 3241). — Stn 67, 193-199 m: 1 ♂ 11.3 mm (MNHN-Ga 2317). — Stn 80, 178-205 m: 5 ♂ 9.5-11.8 mm; 2 ov. ♀ 8.3, 11.7 mm (MNHN-Ga 2318 and 2319).

MUSORSTOM 3: stn 98, 194-205 m: 1 ♂ 8.5 mm (USNM). — Stn 103, 193-200 m: 1 ♀ 8.5 mm (USNM). — Stn 116, 804-812 m: 1 ♂ 12.0 mm (MNHN-Ga 3230).

TYPES. — One of the ovigerous females (11.7 mm) from MUSORSTOM 2, stn 80 (MNHN-Ga 2319) is selected as the holotype. The other specimens are paratypes.

ETYMOLOGY. — The name refers to one of the Nereids of the Greek mythology (*Nesaea*).

DESCRIPTION. — Front margins of carapace slightly oblique. Posteriormost stria not interrupted. Secondary striae present. Branchial dorsal spines behind anterior bifurcation of cervical groove occasionally absent. Thoracic sternites squamate, with numerous arcuate striae; no granules on lateral parts of seventh sternite; third thoracic sternite wider than anterior margin of following sternite. Second to fourth abdominal segments with several transverse striae; second abdominal segment with row of usually 6, rarely 8 spines on anterior ridge. Eyes moderately large. Basal antennular segment (terminal spines excluded) reaching corneae, 2 terminal spines subequal in size. First antennal segment with distomesial spine overreaching second segment; second segment with long distomesial spine overreaching third segment. Extensor margin of merus of third maxilliped with small distal spine. Fixed finger of cheliped with several spines along lateral margin; movable finger with 3 spines on mesial border. Dactylus of walking legs with movable spinules along ventral margin, distal third unarmed.

REMARKS. — The sternum bearing numerous striae, the two terminal spines of the antennular basal segment subequal in size, the relatively short distomesial spine of the antennal segment, falling far short of the third segment, and the merus of the third maxilliped bearing a distinct distomesial spine on the extensor margin, link the species to *M. pherusa* sp. nov. from Japan, the Philippines and Indonesia. But they differ in the following particulars:

— The second abdominal segment is unarmed in *M. pherusa*, armed with 6-8 dorsal spines in *M. nesaea*.

— The third thoracic sternite is as wide as the of the anterior border of the following sternite in *M. pherusa*, wider in *M. nesaea*.

SIZE. — Males, 5.7-12.5 mm; females, 8.3-12.4 mm; ovigerous females from 8.3 mm.

DISTRIBUTION. — Philippines, in 178-812 m.

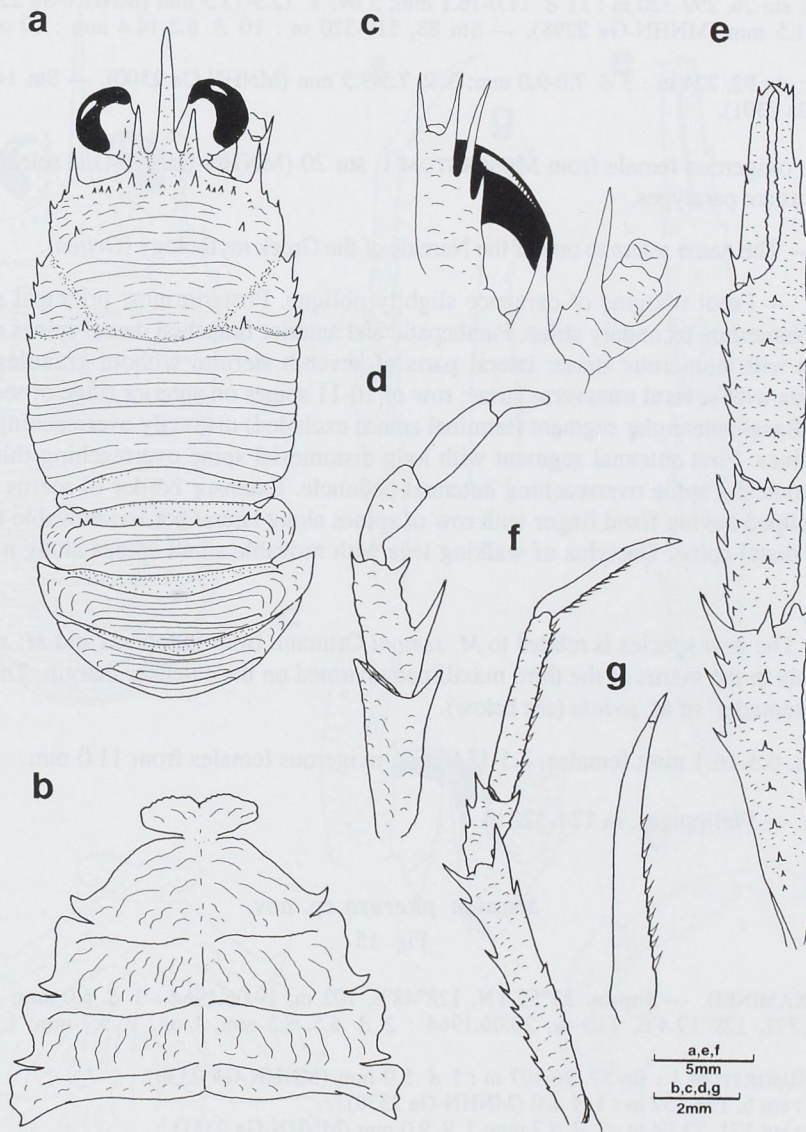


FIG. 13. — *Munida nesaea* sp. nov., holotype ov. ♀ 11.7 mm, from the Philippines, MUSORSTOM 2, Stn 80, 178-205 m (MNHN-Ga 2319) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, endopod of right third maxilliped, lateral view; e, right cheliped, dorsal view; f, right first walking leg, lateral view; g, dactylus, right first walking leg.

Munida oritea sp. nov.

Fig. 14

Munida heteracantha - BABA, 1988 : 104, fig. 38. Not *M. heteracantha* Ortmann, 1892.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 1 : stn 11, 217-230 m : 1 ov. ♀ 15.9 mm (MNHN-Ga 2293). — Stn 20, 208-222 m : 1 ov. ♀ 14.3 mm (MNHN-Ga 2294). — Stn 21, 174-223 m : 2 ♀ 12.0, 14.7 mm (MNHN-Ga 2295). — Stn 26, 189 m : 2 ov. ♀ 12.6, 13.3 mm (MNHN-Ga 2296). — Stn 40, 265-287 m : 7 ♂ 8.2-15.1 mm; 1 ov. ♀ 11.4 mm; 4 ♀ 7.7-9.0 mm (USNM).

MUSORSTOM 2 : stn 26, 299-320 m : 11 ♂ 11.0-16.1 mm; 5 ov. ♀ 12.5-13.5 mm (MNHN-Ga 2297). — Stn 75, 300-320 m : 1 ov. ♀ 11.5 mm (MNHN-Ga 2298). — Stn 83, 318-320 m : 10 ♂ 6.3-14.4 mm : 10 ov. ♀ 11.0-14.6 mm (MNHN-Ga 2299).

MUSORSTOM 3 : stn 92, 224 m : 3 ♂ 7.0-9.0 mm; 3 ♀ 7.5-9.5 mm (MNHN-Ga 2300). — Stn 143, 205-214 m : 1 ♂ 14.5 mm (MNHN-Ga 2301).

TYPES. — The ovigerous female from MUSORSTOM 1, stn 20 (MNHN-Ga 2294) is selected as the holotype. The other specimens are paratypes.

ETYMOLOGY. — The name refers to one of the Nereids of the Greek mythology (*Oritea*).

DESCRIPTION. — Front margins of carapace slightly oblique. Posteriormost principal stria interrupted on intestinal region. Numerous secondary striae. Parahepatic and anterior branchial dorsal spines occasionally absent. Thoracic sternites with numerous striae; lateral parts of seventh sternite without granules. Second to fourth abdominal segments with several transverse striae; row of 10-11 spines on anterior ridge of second segment. Eyes moderately large. Basal antennular segment (terminal spines excluded) distinctly overreaching corneae, bearing 2 subequal distal spines. First antennal segment with long distomesial spine overreaching third segment; second segment with distomesial spine overreaching antennal peduncle. Extensor border of merus of third maxilliped lacking spine. Cheliped having fixed finger with row of spines along lateral border; movable finger mesially with 1 proximal and 1 distal spine. Dactylus of walking legs with movable small spines along nearly whole ventral margin.

REMARKS. — The new species is related to *M. semoni* Ortmann from Indonesia and *M. striola* sp. nov. from Japan and Indonesia in the merus of the third maxilliped unarmed on the extensor margin. Their relationships are discussed under "Remarks" of *M. striola* (see below).

SIZE. — Males, 6.3-16.1 mm; females, 7.5-15.9 mm; ovigerous females from 11.0 mm.

DISTRIBUTION. — Philippines, in 174-320 m.

Munida pherusa sp. nov.

Fig. 15

MATERIAL EXAMINED. — **Japan.** 33°59.4'N, 128°48'E, 102 m, 19.06.1964 : 1 ♂ 6.0 mm; 1 ♀ 7.2 mm (ZLKU 10771). — 34°00.7'N, 129°19.4'E, 110 m, 20.06.1964 : 2 ♂ 6.5, 8.5 mm; 1 ov. ♀ 5.7 mm; 1 ♀ (broken) (ZLKU 10637).

Philippines. MUSORSTOM 1 : stn 57, 96-107 m : 1 ♂ 5.0 mm (MNHN-Ga 2330).

MUSORSTOM 2 : stn 6, 136-152 m : 1 ♂ 6.0 (MNHN-Ga 2338).

MUSORSTOM 3 : stn 121, 73-84 m : 1 ♂ 8.7 mm; 1 ♀ 9.0 mm (MNHN-Ga 2331).

Indonesia. CORINDON 2 : stn 206, 85 m : 1 ♂ 7.0 mm (MNHN-Ga 2332).

TYPES. — The male from MUSORSTOM 2, stn 6 (MNHN-Ga 2338), is selected as the holotype. The other specimens are paratypes.

ETYMOLOGY. — The name refers to one of the Nereids of the Greek mythology (*Pherusa*).

DESCRIPTION. — Front margins of carapace slightly oblique. Posteriormost principal stria not interrupted. Secondary striae present. Thoracic sternites with numerous short arcuate and transverse oblique striae; lateral parts of seventh sternite lacking granules; third thoracic sternite as wide as anterior margin of following sternite. Abdominal segments unarmed; second to fourth segments with several striae. Eyes large. Basal antennular segment (distal spines excluded) ending at level of corneae; 2 terminal spines subequal in size. First antennal segment with distomesial spine overreaching second segment but falling short of end of third segment; second segment with long distomesial spine slightly overreaching antennal peduncle. Extensor border of merus of third maxilliped with distinct distal spine. Fixed finger of cheliped with row of spines along lateral margin, movable finger with basal

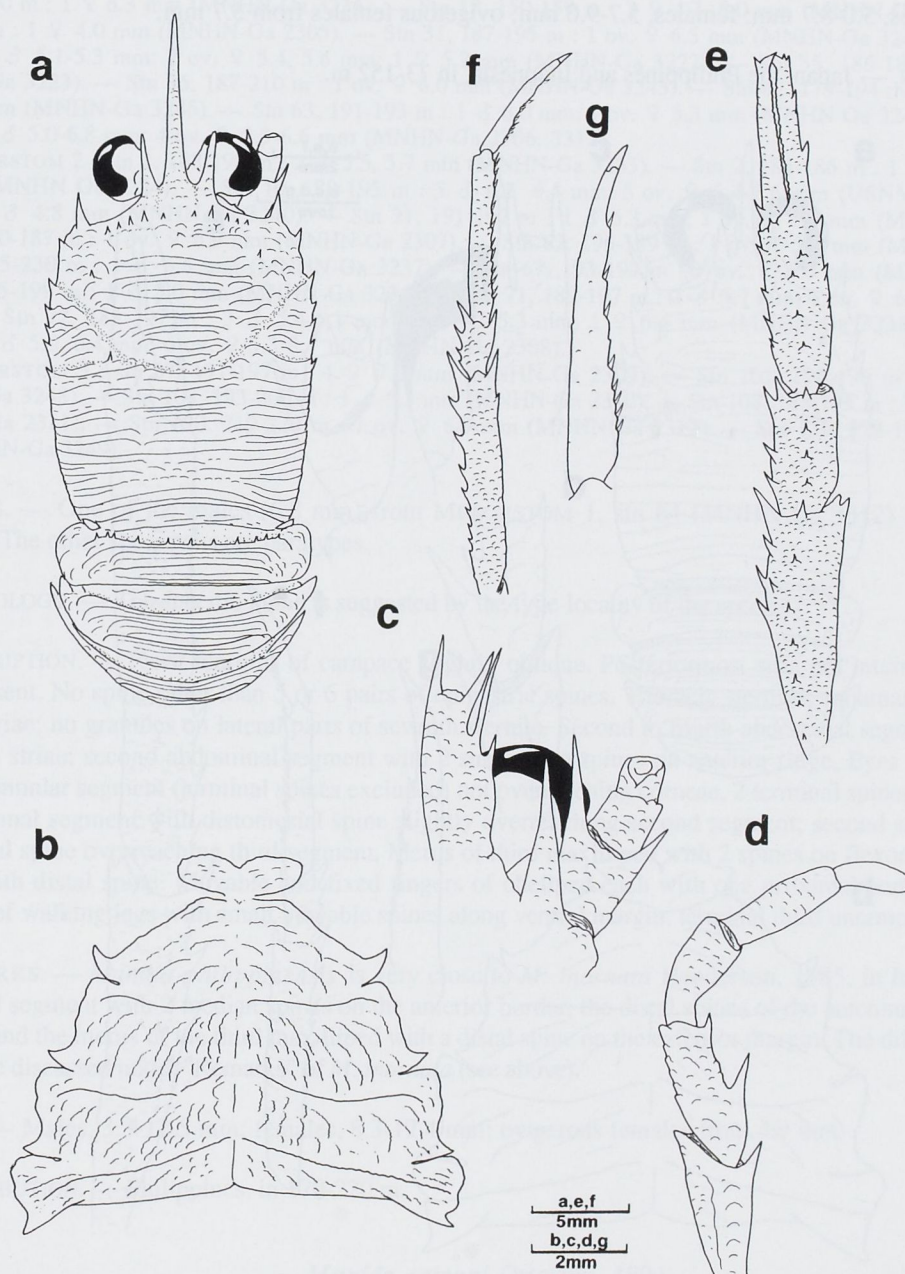


FIG. 14. — *Munida oritea* sp. nov., holotype ov. ♀ 14.3 mm, from the Philippines, MUSORSTOM 1, Stn 20, 208-222 m (MNHN-Ga 2294) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, endopod of right third maxilliped, lateral view; e, right cheliped, dorsal view; f, right first walking leg, lateral view; g, dactylus, right first walking leg.

and subterminal spines on mesial margin and another 2 small ones on proximal half slightly dorsal to mesial margin. Dactylus of walking legs with 6 movable small spines along ventral margin, terminal third unarmed.

REMARKS. — The new species is close to *M. nesaea* sp. nov. from the Philippines in having the sternum with numerous striae and the merus of the third maxilliped bearing a distinct distal spine on the extensor margin. The relationships between the two are discussed under the Remarks of *M. nesaea* (see above).

SIZE. — Males, 5.0-8.7 mm; females, 5.7-9.0 mm; ovigerous females from 5.7 mm.

DISTRIBUTION. — Japan, the Philippines and Indonesia, in 73-152 m.

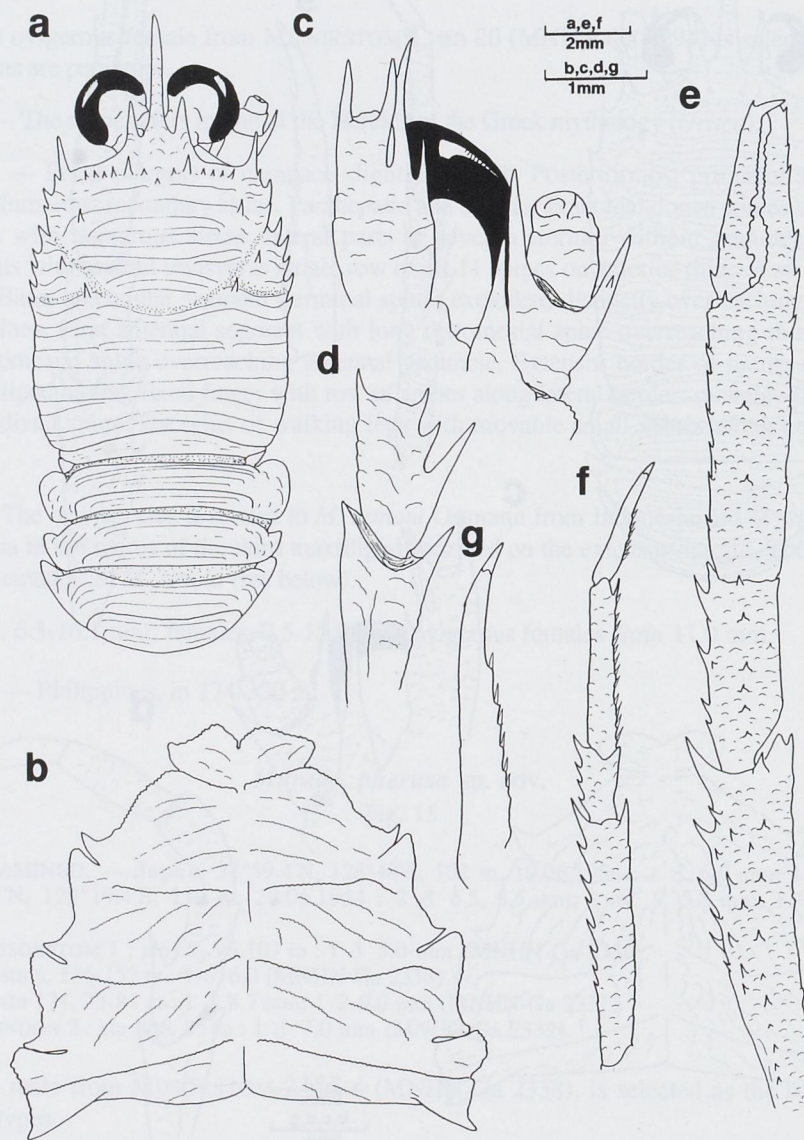


FIG. 15. — *Munida pherusa* sp. nov., holotype ♂ 6.0 mm, from the Philippines, MUSORSTOM 2, Stn 6, 136-152 m (MNHN-Ga 2338) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, merus and distal part of ischium of right third maxilliped, lateral view; e, right cheliped, dorsal view; f, right first walking leg, lateral view; g, dactylus, right first walking leg.

Munida philippinensis sp. nov.

Fig. 16

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 1 : stn 5, 186-187 m : 1 ♀ 5.3 mm (MNHN-Ga 2303). — Stn 9, 180-194 m : 1 ♂ 4.9 mm; 1 ov. ♀ 6.8 mm (MNHN-Ga 2304). — Stn 10, 187-205 m : 1 ♀ 4.9 mm (MNHN-Ga 3246). —

Stn 14, 190 m : 1 ♀ 6.3 mm (MNHN-Ga 3236). — Stn 18, 150-159 m : 2 ♀ 4.7, 6.0 mm (MNHN-Ga 3245). — Stn 27, 188-192 m : 1 ♀ 4.0 mm (MNHN-Ga 2305). — Stn 31, 187-195 m : 1 ov. ♀ 6.5 mm (MNHN-Ga 3247). — Stn 34, 188-191 m : 3 ♂ 5.1-5.3 mm; 2 ov. ♀ 5.4, 5.6 mm; 1 ♀ 5.2 mm (MNHN-Ga 3222). — Stn 35, 186-187 m : 1 ♀ 5.2 mm (MNHN-Ga 3223). — Stn 36, 187-210 m : 1 ov. ♀ 6.0 mm (MNHN-Ga 3243). — Stn 62, 179-194 m : 1 ♂ 4.8 mm; 2 ♀ 5.0, 5.3 mm (MNHN-Ga 3245). — Stn 63, 191-193 m : 1 ♂ 6.0 mm; 1 ov. ♀ 5.3 mm (MNHN-Ga 3243). — Stn 64, 194-195 m : 4 ♂ 5.0-6.8 mm; 4 ov. ♀ 5.3-6.6 mm (MNHN-Ga 2306, 3312).

MUSORSTOM 2 : stn 1, 188-198 m : 2 ♂ 5.5, 5.7 mm (MNHN-Ga 3233). — Stn 2, 184-186 m : 1 ♂ 3.3 mm; 1 ov. ♀ 6.1 mm (MNHN-Ga 3224). — Stn 10, 188-195 m : 3 ♂ 6.2-6.4 mm; 3 ov. ♀ 6.4-7.6 mm (USNM). — Stn 11, 194-196 m : 1 ♂ 4.8 mm (MNHN-Ga 3240). — Stn 21, 191-192 m : 1 ♂ 5.3 mm; 1 ov. ♀ 6.7 mm (MNHN-Ga 3225). — Stn 51, 170-187 m : 1 ov. ♀ 6.9 mm (MNHN-Ga 2307). — Stn 62, 196-189 m : 1 ov. ♀ 5.3 mm (MNHN-Ga 3226). — Stn 63, 215-230 m : 1 ♂ 6.6 mm (MNHN-Ga 3237). — Stn 67, 193-199 m : 1 ov. ♀ 6.0 mm (MNHN-Ga 3239). — Stn 68, 195-199 m : 1 ♂ 5.0 mm (MNHN-Ga 3234). — Stn 71, 189-197 m : 1 ♂ 5.7 mm; 1 ov. ♀ 6.2 mm (MNHN-Ga 3235). — Stn 72, 182-197 m : 3 ♂ 5.4-6.1 mm; 1 ov. ♀ 5.3 mm; 1 ♀ 6.4 mm (MNHN-Ga 3238). — Stn 80, 178-205 m : 2 ♂ 5.9, 6.4 mm; 6 ov. ♀ 5.3-8.1 mm (MNHN-Ga 2308).

MUSORSTOM 3 : stn 87, 191-197 m : 1 ♀ 7.2 mm (MNHN-Ga 2309). — Stn 101, 194-196 m : 1 ov. ♀ 6.8 mm (MNHN-Ga 3248). — Stn 103, 193-200 m : 1 ♂ 5.3 mm (MNHN-Ga 2310). — Stn 108, 188-195 m : 3 ov. ♀ 5.6-7.4 mm (MNHN-Ga 2311). — Stn 120, 219-220 m : 1 ov. ♀ 6.9 mm (MNHN-Ga 2312). — Stn 130, 178-195 m : 1 ov. ♀ 4.9 mm (MNHN-Ga 3249).

TYPES. — One of the males (6.8 mm) from MUSORSTOM 1, stn 64 (MNHN-Ga 3312) is selected as the holotype. The other specimens are paratypes.

ETYMOLOGY. — The specific name is suggested by the type-locality of the species.

DESCRIPTION. — Front margins of carapace slightly oblique. Posteriormost stria not interrupted. Secondary striae present. No spine other than 5 or 6 pairs of epigastric spines. Thoracic sternites squamate, with numerous arcuate striae; no granules on lateral parts of seventh sternite. Second to fourth abdominal segments with several transverse striae; second abdominal segment with 2 submedian spines on anterior ridge. Eyes moderately large. Basal antennular segment (terminal spines excluded) not overreaching corneae, 2 terminal spines subequal in size. First antennal segment with distomesial spine slightly overreaching second segment; second segment with long distomesial spine overreaching third segment. Merus of third maxilliped with 2 spines on flexor margin; extensor margin with distal spine. Movable and fixed fingers of cheliped each with one proximal and one distal spine. Dactylus of walking legs with small movable spines along ventral margin, terminal third unarmed.

REMARKS. — *Munida philippinensis* is very close to *M. inornata* Henderson, 1885, in having the second abdominal segment with 2 median spines on the anterior border, the distal spines of the antennular basal segment subequal and the merus of the third maxilliped with a distal spine on the extensor margin. The differences between the two are discussed under "Remarks" of *M. inornata* (see above).

SIZE. — Males, 3.3-12.5 mm; females, 8.3-12.4 mm; ovigerous females from 4.9 mm.

DISTRIBUTION. — Philippines, in 170-220 m.

Munida semoni Ortmann, 1894

Fig. 17

Munida semoni Ortmann, 1894 : 24, pl. 1, figs 4, 4i.

Not *Munida semoni* - BARNARD, 1950 : 491, fig. 92c (= *Munida* sp., see below).

MATERIAL EXAMINED. — **Indonesia**. Ambon : 1 ♂ 5.5 mm, lectotype (SM).

DESCRIPTION. — (Lectotype). Carapace, excluding rostrum, slightly longer than wide. Transverse ridges mostly interrupted. Secondary striae present. Epigastric region with row of 6 pairs of spines flanking 2 unpaired spines behind rostrum, largest pair directly behind supraocular spines. Parahepatic and hepatic spines distinct

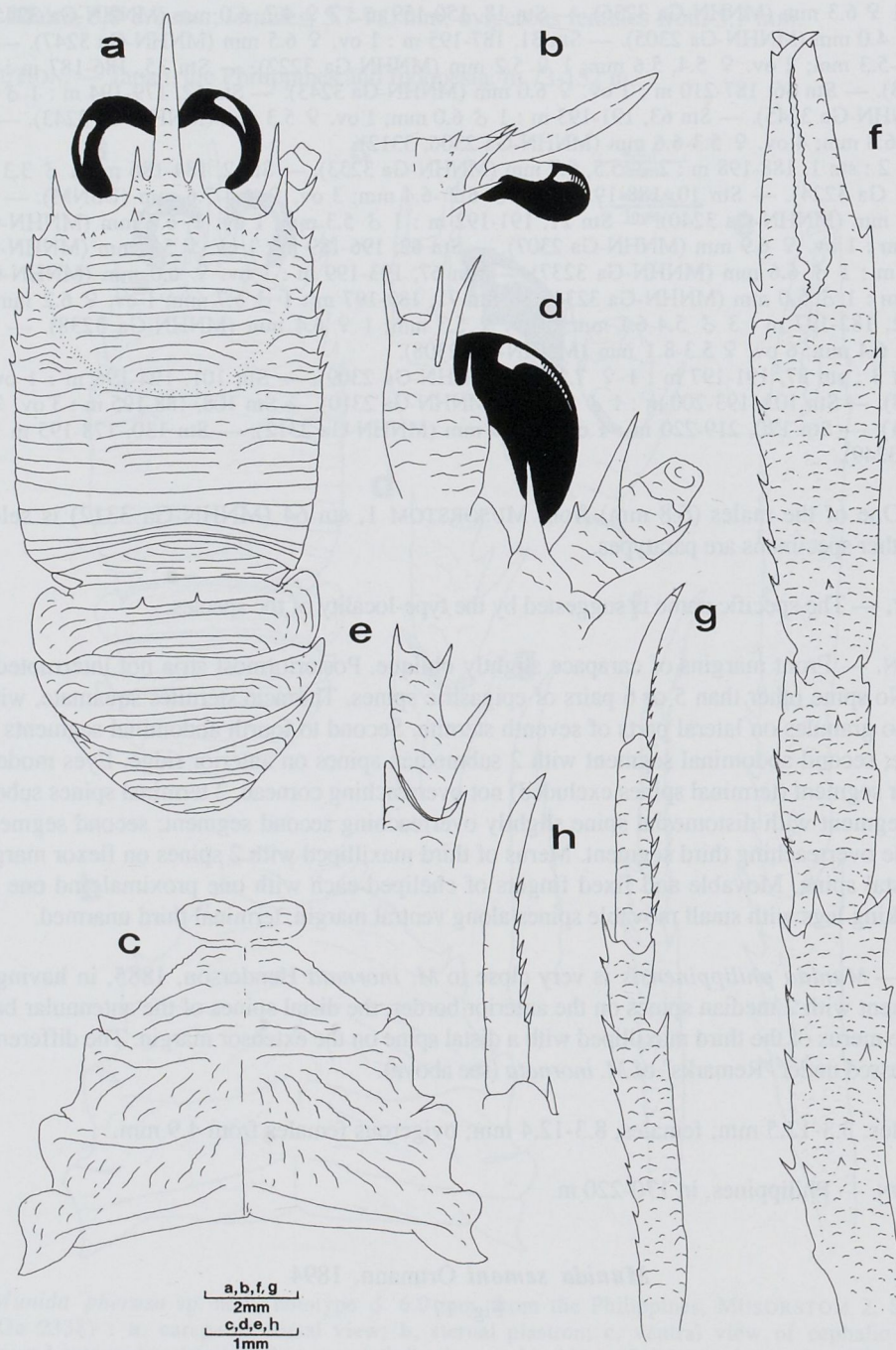


FIG. 16. — *Munida philippinensis* sp. nov., holotype ♂ 6.8 mm, from the Philippines, MUSORSTOM 1, Stn 64, 194–195 m (MNHN Ga-3312) : a, carapace, dorsal view; b, anterior part of cephalothorax, lateral view; c, sternal plastron; d, ventral view of cephalic region, showing antennular and antennal peduncles; e, merus and distal part of ischium of right third maxilliped, lateral view; f, right cheliped, dorsal view; g, right first walking leg, lateral view; h, dactylus, right first walking leg.

on each side. Anterior branchial region with spine behind midlength of anterior bifurcation of cervical groove. Postcervical spine on each side.

Front margins transverse. Lateral margins slightly convex (right side more convex due to bopyrid parasite); first lateral spine well developed, situated on anterolateral angle, reaching level of sinus between rostrum and supraocular spine, followed by 2 (right) or 3 (left) small spines in front of cervical groove. Anterior branchial margin with 5 spines of subequal size.

Rostrum spiniform, one-half as long as remaining carapace, slightly sinuous in profile and horizontal. Supraocular spines long, nearly reaching end of cornea, subparallel and directed slightly upwards.

Fourth thoracic sternite with several short arcuate striae; fifth to seventh sternites without striae and granules.

Second abdominal segment with row of 6 spines on anterior ridge and 3 uninterrupted striae; third and fourth segments with 3 transverse striae: anterior first and second uninterrupted, third less pronounced and interrupted medially; fifth segment with 2 uninterrupted striae.

Eyes large, maximum corneal diameter more than one-third distance between bases of anterolateral spines.

Basal segment of antennule (distal spines excluded) about one-quarter carapace length, elongate, ending in level of corneae, with 2 subequal terminal and 2 lateral spines, proximal lateral short, located at midlength of segment, distolateral long, overreaching terminal spines. First segment of antennal peduncle with strong distomesial spine slightly overreaching second segment; second segment with 2 long distal spines, mesial one longer than lateral, overreaching antennal peduncle; third segment unarmed.

Ischium of third maxilliped about 1.5 times length of merus, with distoventral spine; merus with 3 well-developed spines on flexor border, proximal spine strongest, extensor margin lacking distinct spine.

Chelipeds and several walking legs missing. Right second walking leg slender, twice as long as carapace, bearing long, plumose and iridescent setae on dorsal margins and short setae on lateral borders; dactylus broken, slightly shorter than propodus; merus with row of 7 dorsal spines increasing in size distally, and long ventral spine distally; carpus with distal spine on dorsal and ventral borders, and 2 other spines on dorsal margin; propodus with row of 10 movable spines on ventral margin; dactylus relatively slender, slightly curving distally, with 6 movable small spines along proximal half of ventral margin, distal third unarmed. Epipods absent from all pereopods.

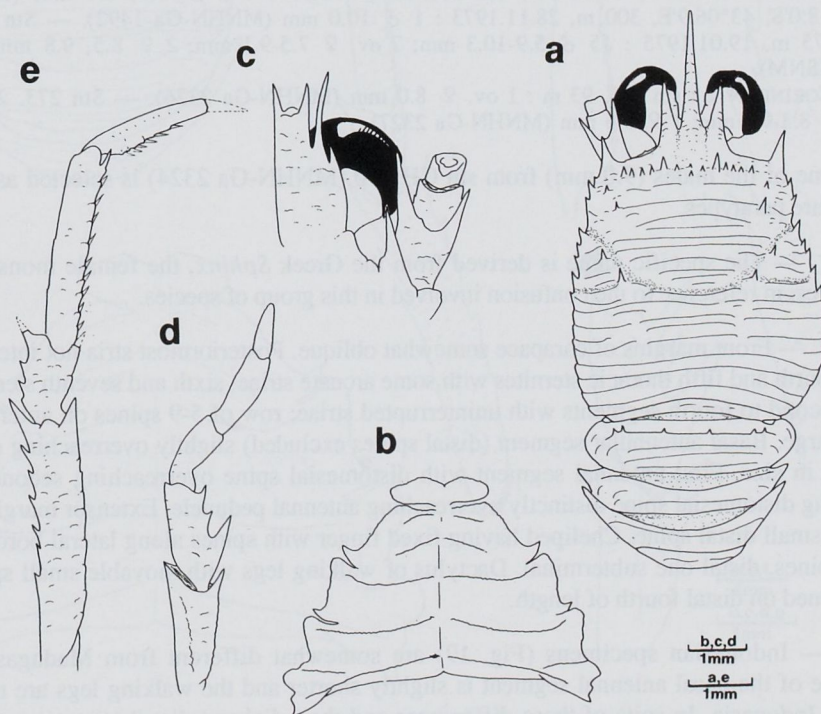


FIG. 17. — *Munida semoni* Ortmann, 1894, lectotype ♂ 5.5 mm, from Indonesia (SM): a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, endopod of right third maxilliped, lateral view; e, right first walking leg, lateral view.

REMARKS. — This species was considered by BABA (1988) identical to *Munida heteracantha* Ortmann. In the type material examined of *M. semoni*, however, the granules on the seventh thoracic sternite, characteristic of *M. heteracantha* (see above), are absent.

Munida semoni is close to *M. oritea* sp. nov. from the Philippines and *M. striola* sp. nov. from Japan and Indonesia. Their relationships are discussed under "Remarks" of *M. striola* (see below).

Examination of the specimens identified by BARNARD (1950) as *M. semoni* (1 ♂ 6.3 mm; 2 ov. ♀ 6.5 and 7.8 mm; 1 ♀ broken, collected off Scottburgh and Umhlangakulu River, Natal, South Africa, 170 m, SAM A900), discloses that they are apparently a different species. They show the second abdominal segment unarmed (except for one specimen that bears two spines on each side of the anterior ridge), the thoracic sternites moderately squamate, the distomesial spine of the basal antennal segment overreaching the third segment, and the merus of the third maxilliped bearing a distinct spine on the extensor distal margin. Unfortunately, these specimens are not intact, lacking pereopods, so their systematic status remains unresolved and awaits future discovery of more specimens.

DISTRIBUTION. — Only known from the type locality, Ambon, Indonesia, depth unrecorded.

Munida sphinx sp. nov.

Figs 18-19

Munida japonica - BABA, 1990 : 925 (key), 964 (part). Not *M. japonica* Stimpson, 1858.

MATERIAL EXAMINED. — **Madagascar.** "Vauban": stn CH 44, 15°25.7'S, 46°01.0'E, 200-210 m, 7.11.1972 : 1 ♂ 5.4 mm (MNHN-Ga 1480). — Stn CH 47, 15°20.0'S, 46°11.8'E, 245-250 m, 7.11.1972 : 1 ♂ 10.2 mm (MNHN-Ga 1478). — Stn CH 52, 15°21.0'S, 46°12.5'E, 150 m, 8.11.1972 : 24 ♂ 3.1-8.9 mm; 16 ov. ♀ 7.2-9.7 mm; 11 ♀ 3.9-7.8 mm (MNHN-Ga 1473). — Stn CH 53, 15°21.7'S, 46°12.6'E, 90-130 m, 8.11.1972 : 2 ♂ 8.8, 10.3 mm (MNHN-Ga 1483). — Stn CH 86, 18°55.0'S, 43°56.5'E, 195-205 m, 24.11.1973 : 2 ♂ 8.6, 8.7 mm (MNHN-Ga 840). — Stn CH 101, 22°18.0'S, 43°06.9'E, 300 m, 28.11.1973 : 1 ♂ 10.0 mm (MNHN-Ga 1492). — Stn CH 130, 15°20.0'S, 46°11.5'E, 170-175 m, 19.01.1975 : 15 ♂ 5.9-10.3 mm; 7 ov. ♀ 7.5-9.1 mm; 2 ♀ 8.5, 9.8 mm (MNHN-Ga 1490, 2324, 2325 and USNM).

Indonesia. CORINDON 2 : stn 215, 93 m : 1 ov. ♀ 8.0 mm (MNHN-Ga 2326). — Stn 273, 220 m : 13 ♂ 10.2-12.4 mm; 3 ov. ♀ 8.3-9.8 mm; 1 ♀ 8.6 mm (MNHN-Ga 2327).

TYPES. — One of the males (9.0 mm) from stn CH 130 (MNHN-Ga 2324) is selected as the holotype. The other specimens are paratypes.

ETYMOLOGY. — The specific name is derived from the Greek *Sphinx*, the female monster of Thebes who pronounced riddles, in reference to the confusion involved in this group of species.

DESCRIPTION. — Front margins of carapace somewhat oblique. Posteriormost stria not interrupted. Secondary striae present. Fourth and fifth thoracic sternites with some arcuate striae; sixth and seventh sternites without striae and granules. Second to fourth segments with uninterrupted striae; row of 5-9 spines on anterior ridge of second segment. Eyes large. Basal antennular segment (distal spines excluded) slightly overreaching corneae; 2 terminal spines subequal in size. First antennal segment with distomesial spine overreaching second segment; second segment with long distomesial spine distinctly overreaching antennal peduncle. Extensor margin of merus of third maxilliped with small distal spine. Cheliped having fixed finger with spines along lateral border; movable finger with 4 mesial spines, distal one subterminal. Dactylus of walking legs with movable small spines along ventral margin but unarmed on distal fourth of length.

REMARKS. — Indonesian specimens (Fig. 19) are somewhat different from Madagascar material : the distomesial spine of the basal antennal segment is slightly shorter and the walking legs are more slender in the specimens from Indonesia. In spite of these differences and their disjunct distribution, we consider that all the specimens be referred to the same species.

This species is closely related to *M. laevis* sp. nov. from the Philippines. Their relationships are discussed below under the "Remarks" of the latter (see above).

SIZE. — Males, 3.1-12.4 mm; females, 3.9-9.8 mm; ovigerous females from 7.2 mm.

DISTRIBUTION. — Madagascar and Indonesia, in 90-300 m.

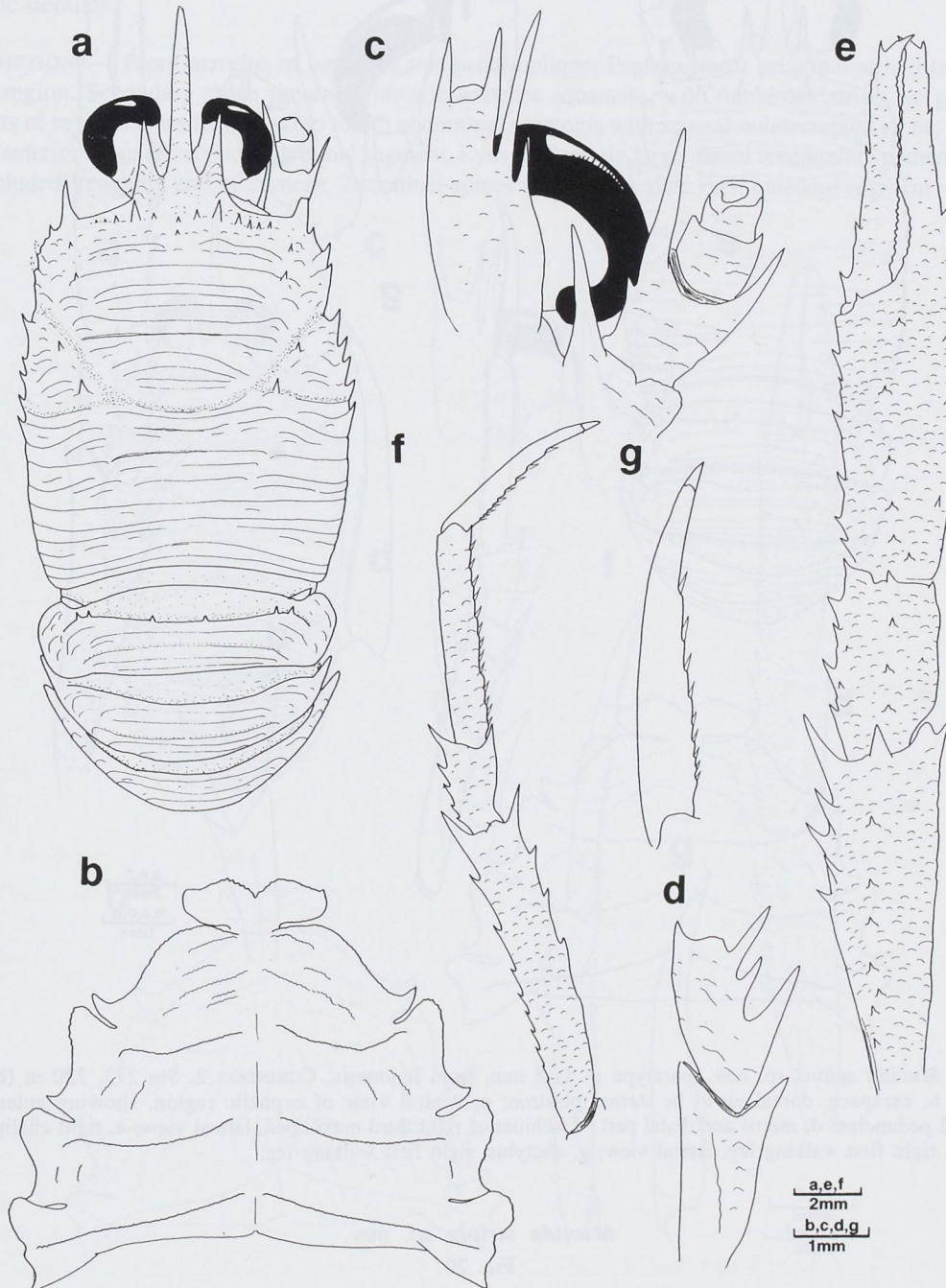


FIG. 18. — *Munida sphinx* sp. nov., holotype ♂ 9.0 mm, from Madagascar, "Vauban", Stn CH 130, 170-175 m (MNHN-Ga 2324) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, merus and distal part of ischium of right third maxilliped, lateral view; e, right cheliped, dorsal view; f, right first walking leg, lateral view; g, dactylus, right first walking leg.

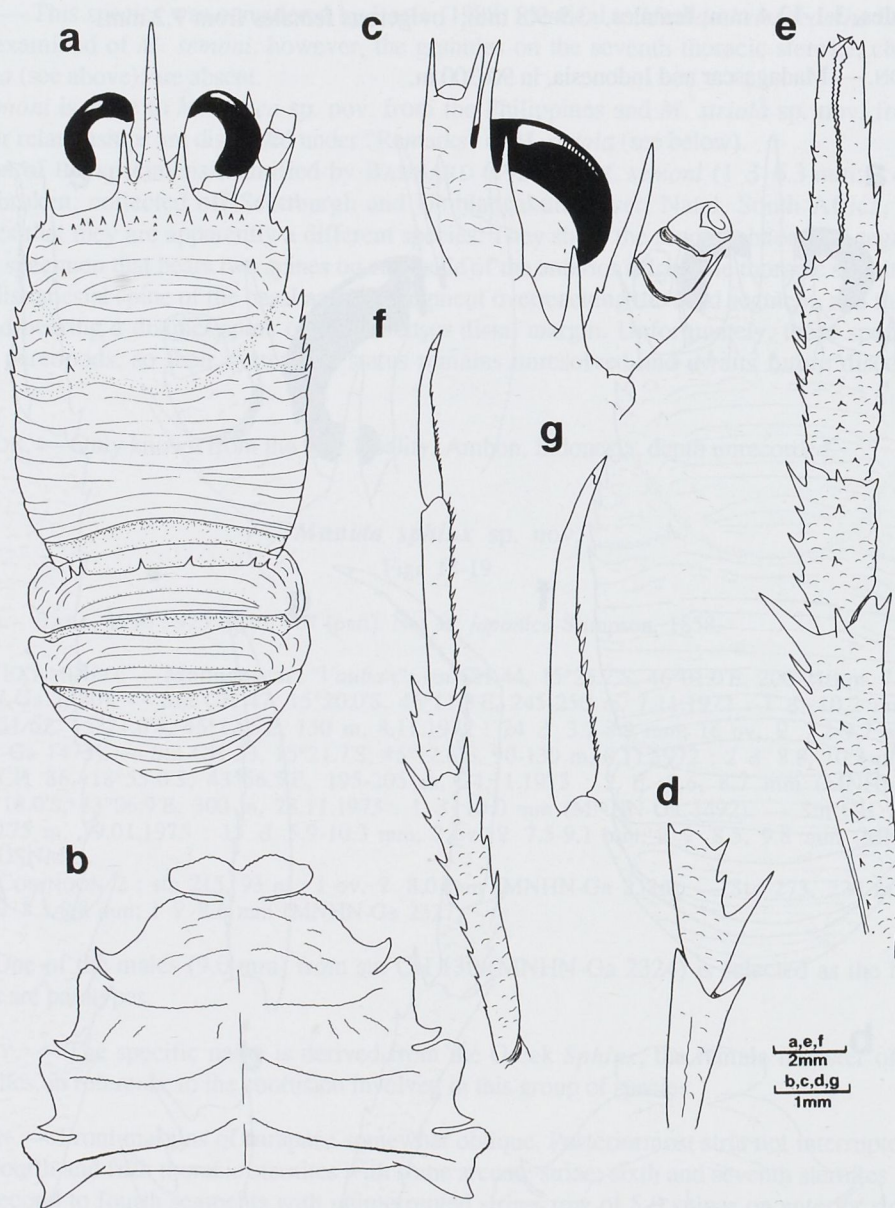


FIG. 19. — *Munida sphinx* sp. nov., paratype ♂ 11.8 mm, from Indonesia, CORINDON 2, Stn 273, 220 m (MNHN-Ga 2327) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, merus and distal part of ischium of right third maxilliped, lateral view; e, right cheliped, dorsal view; f, right first walking leg, lateral view; g, dactylus, right first walking leg.

Munida striola sp. nov.

Fig. 20

MATERIAL EXAMINED. — **Japan.** Tosa Bay, 10.01.1961, coll. K. SAKAI : 2 ♂ 13.3, 13.8 mm; 2 ov. ♀ 12.0, 13.0 mm (ZLKU 11018). — Tosa Bay, 250-300 m, 3-14.11.1963, coll. K. SAKAI : 3M 6.0-12.3 mm; 3 ov. ♀ 7.2-9.2 mm; 1 ♀ 10.5 mm (MNHN-Ga 1019 and SMF 21169). — Tosa Bay, 02.1966, coll. K. SAKAI : 1 ♀ 9.6 mm (MNHN-Ga 1065, 1067). — Tosa Bay, 04.1968, coll. K. SAKAI : 1 ♂ 13.8 mm; 2 ov. ♀ 12.5, 12.6 mm; 1 ♀ 8.3 mm (MNHN-Ga 2213). — North of Kyushu, 14.04.1934, coll. H. IKEDA and K. YASUMOTO : 1 ♂ 10.8 mm; 1 ov. ♀ 9.8 mm (ZLKU 4324).
Indonesia. CORINDON 2 : stn 271, 215 m : 2 ♂ 14.4, 17.9 mm; 2 ♀ 9.4, 10.8 mm (MNHN-Ga 2302).

TYPES. — The male (13.8 mm) from Tosa Bay, Japan (ZLKU 11018) is selected as the holotype. The other specimens are paratypes.

ETYMOLOGY. — The specific name is derived from the Latin *striola*, dim, referring to the numerous striae on the thoracic sternites.

DESCRIPTION. — Front margins of carapace somewhat oblique. Posteriormost principal stria interrupted on intestinal region. Secondary striae present. Thoracic sternites squamate, with numerous striae; no granules on lateral parts of seventh sternite. Second to fourth abdominal segments with several uninterrupted striae; row of 8-9 spines on anterior ridge of second abdominal segment. Eyes moderately large. Basal antennular segment (terminal spines excluded) reaching end of corneae, 2 terminal spines subequal in size. First antennal segment with strong

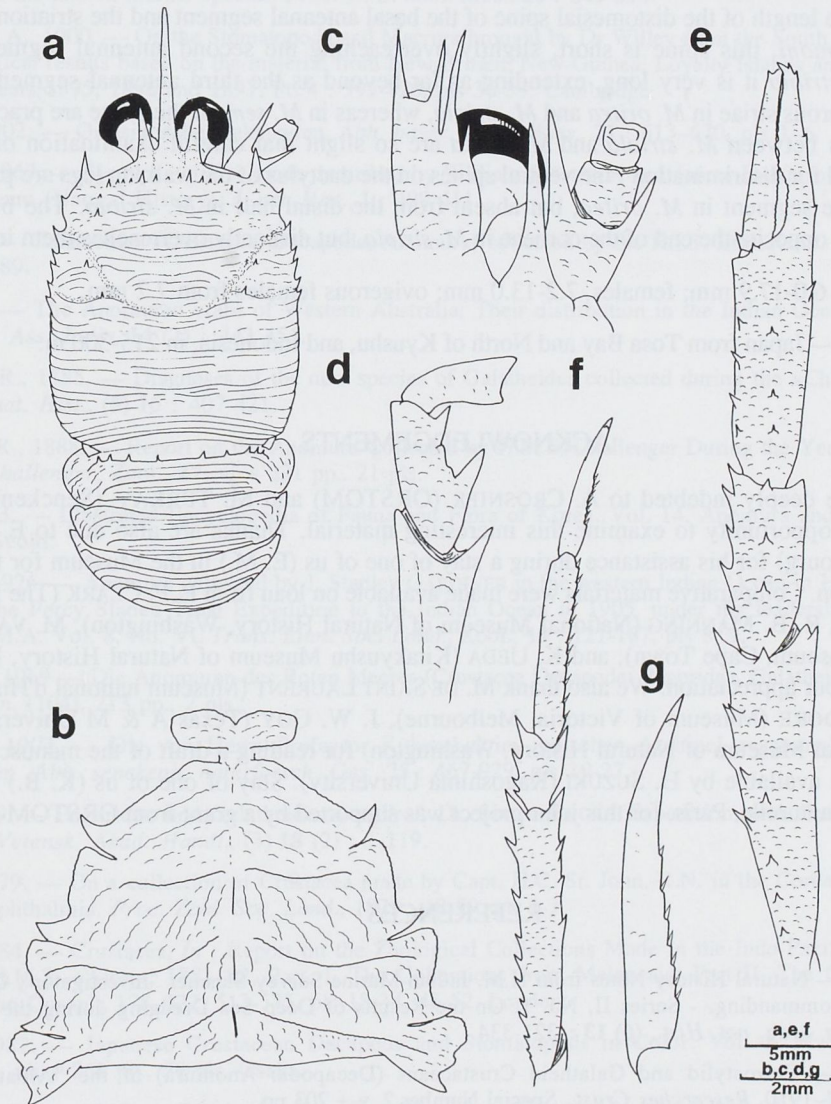


FIG. 20. — *Munida striola* sp. nov., holotype ♂ 13.8 mm, from Tosa Bay, Japan (ZLKU) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, merus and distal part of ischium of right third maxilliped, lateral view; e, right cheliped, dorsal view; f, right first walking leg, lateral view; g, dactylus, right first walking leg.

distomesial spine distinctly overreaching third segment; second segment with long distomesial spine overreaching antennal peduncle. Flexor margin of merus of third maxilliped unarmed. Cheliped having fixed finger with row of a few spines along lateral margin, movable finger with basal and subterminal spine on mesial border. Dactylus of walking legs with movable spinules along proximal 1/2-2/3 of ventral margin, distal part unarmed.

REMARKS. — Indonesian specimens seem to be somewhat different from Japan material. In the Indonesian material the supraocular spines always overreach the corneae and the dactylus of the walking legs is slightly more slender than in the Japanese specimens. Discovery of more material would be desirable in helping to determine whether these small differences can be considered as specific.

The absence of spines from the extensor margin of the merus of the third maxilliped links the species to *Munida oritea* sp. nov. from the Philippines and *M. semoni* Ortmann from Indonesia, but they are easily distinguished by the length of the distomesial spine of the basal antennal segment and the striation of the thoracic sternites. In *M. semoni*, this spine is short, slightly overreaching the second antennal segment, whereas in *M. oritea* and *M. striola* it is very long, extending as far beyond as the third antennal segment. The thoracic sternites have numerous striae in *M. oritea* and *M. striola*, whereas in *M. semoni* the striae are practically absent.

The differences between *M. striola* and *M. oritea* are so slight that careful examination of the following characters is needed for discrimination: the ventral spines on the dactylus of the walking legs are present along the whole length of the segment in *M. oritea*, but absent from the distal half in *M. striola*. The basal antennular segment terminates opposite the end of the corneae in *M. striola*, but distinctly overreaches them in *M. oritea*.

SIZE. — Males, 6.0-17.9 mm; females, 7.2-13.0 mm; ovigerous females from 7.2 mm.

DISTRIBUTION. — Japan from Tosa Bay and North of Kyushu, and Indonesia, in 215-300 m.

ACKNOWLEDGEMENTS

The authors are deeply indebted to A. CROSNIER (ORSTOM) and M. TÜRKAY (Senckenberg Museum, Frankfurt) for the opportunity to examine this interesting material. Thanks are also due to E. LANG (Musée Zoologique, Strasbourg) for his assistance during a stay of one of us (E. M.) in the Museum for the study of the ORTMANN collection. Comparative materials were made available on loan from P. F. CLARK (The Natural History Museum, London), R. B. MANNING (National Museum of Natural History, Washington), M. VAN DER MERWE (South African Museum, Cape Town), and K. UEDA (Kitakyushu Museum of Natural History, Kitakyushu), to whom we express our appreciation. We also thank M. DE SAINT LAURENT (Muséum national d'Histoire naturelle, Paris), G. C. B. POORE (Museum of Victoria, Melbourne), J. W. GOY (Texas A & M University) and A. B. WILLIAMS (National Museum of Natural History, Washington) for reading a draft of the manuscript. Part of the material was made available by H. SUZUKI (Kagoshima University). Stay of one of us (K. B.) in the Muséum national d'Histoire naturelle, Paris, for this joint project was supported by a grant from ORSTOM in 1991.

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