



FIGURE 32.—*Oplophorus* (a–e, *O. gracilirostris*, male [17.8 mm], Albatross sta 5120, west end of Verde Island Passage, Philippines; f–j, *O. novaezeelandiae*, male [14.5 mm], Discovery sta 250, South Atlantic northeast of Tristan da Cunha; k–o, *O. spinosus*, male [16.0 mm], Atlantis II sta RHB2037, off Western Sahara; p–t, *O. typus*, male [16.0 mm], Albatross sta 5630, southern end of Selat Patinti, Halmahera): a, extensor (ventral) surfaces of incisor and molar processes of right mandible; b, distal part of right 1st maxilliped; c, terminal segments of right 2nd maxilliped; d, endopod of right 1st pleopod; e, right appendices interna and masculina; f, extensor (ventral) surfaces of incisor and molar processes of right mandible; g, distal part of right 1st maxilliped; h, terminal segments of right 2nd maxilliped; i, endopod of right 1st pleopod; j, right appendices interna and masculina; k, extensor (ventral) surfaces of incisor and molar processes of right mandible; l, distal part of right 1st maxilliped; m, terminal segments of right 2nd maxilliped; n, endopod of right 1st pleopod; o, right appendices interna and masculina; p, extensor (ventral) surfaces of incisor and molar processes of right mandible; q, distal part of right 1st maxilliped; r, terminal segments of right 2nd maxilliped; s, endopod of right 1st pleopod; t, right appendices interna and masculina.

- pleuron of 1st abdominal somite armed with small tooth on ventral margin; antennal scale unarmed on only distal 1/6 of lateral margin *25. *O. gracilirostris*
- Rostrum rarely overreaching antennal scale; posterior extensions of upper lateral rostral carinae on carapace converging posteriorly in dorsal aspect; pleuron of 1st abdominal somite unarmed; antennal scale with distal 1/4 of lateral margin unarmed *26. *O. typus*
3. Antennal scale with distinct barb on mesial margin near apex, lateral margin dentate *O. spinosus* (Brullé, 1839:18)
 (Indian Ocean, southern Japan, off Hawaii, seamounts west of North America, and northeast of Easter Island, western and eastern subtropical North Atlantic, central South Atlantic, mesopelagic)
- Antennal scale unarmed on both mesial and lateral margins
 *O. novaezeelandiae* De Man, 1931:369
 (Off southwestern Australia, New Zealand, and central and eastern South Atlantic as far north as 12°37'S latitude off Angola; mesopelagic)

***25. *Oplophorus gracilirostris* A. Milne-Edwards, 1881**

FIGURE 32a-e

Oplophorus gracilirostris A. Milne-Edwards, 1881b:6 [type-locality: off Dominica, Lesser Antilles, 216 m].—Chace, 1947:44, figs. 4-7.

Oplophorus longirostris Bate, 1888:765, pl. 127: fig. 2 [type-locality: Fiji Islands; 19°07'50"S, 178°19'35"E, 1116 m; trawled].

Hoplophorus Smithii Wood-Mason, in Wood-Mason and Alcock, 1891:194 [type-locality: Bay of Bengal; 16°44'30"N, 88°19-32'E, 2631 m; trawled, and 15°14'N, 81°09'E, 2305 m; trawled].

DIAGNOSIS.—Rostrum distinctly overreaching antennal scale; carapace with sharp tooth near posterior end of ventral margin in adults, with posterior extensions of upper lateral rostral carinae subparallel in dorsal aspect; abdomen with pleuron of 1st somite armed with small tooth on ventral margin in adults; antennal scale dentate on proximal 5/6 of lateral margin, without barb

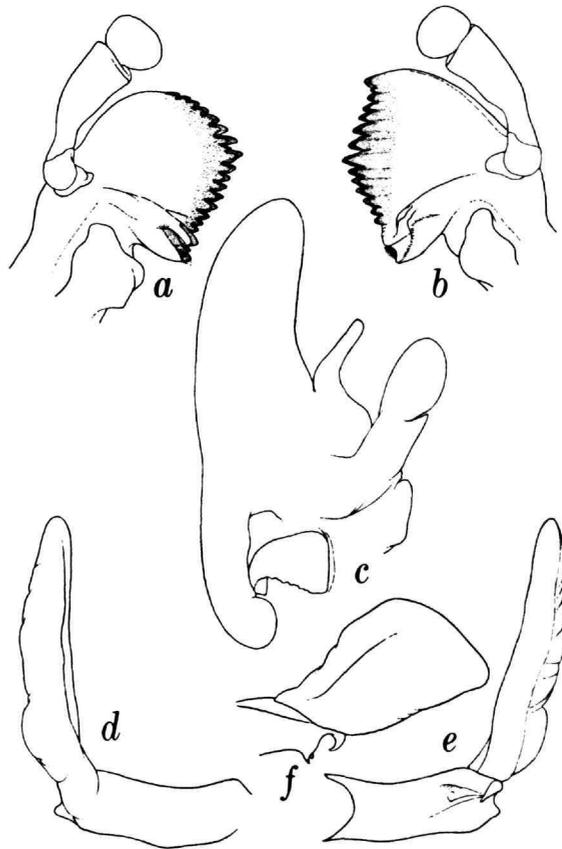


FIGURE 33.—*Oplophorus typus*, male [16.0 mm], *Albatross* sta 5630, southern end of Selat Patinti, Halmahera: a, left mandible (flexor or dorsal surface); b, right mandible; c, right 2nd maxilla; d, epipod (lateral aspect) from right 2nd pereopod; e, same (mesial aspect); f, same, mesial teeth (dorsal aspect).

near apex of mesial margin; maximum carapace length 21 mm.

MATERIAL.—PHILIPPINES. *Babuyan Channel, north of Luzon*: sta 5328; 18°29'45"N, 121°39'E; 274 m; blue mud; 12.2°C; 19 Nov 1908 (0923–0944); 12' Tanner beam trawl, mud bag: 1♂ [16.7]; sta 5329; 18°33'N, 121°37'30"E; 388 m; blue mud; 10.8°C; 19 Nov 1908 (1125–1135); 12' Tanner beam trawl, mud bag: 4♀ [14.0–16.0], 3 ovig [14.0–14.9]. *Western end of Verde Island Passage, east of Lubang Islands*: sta 5120; 13°45'30"N, 120°30'15"E; 719 m; green mud, sand; 6.5°C; 21 Jan 1908 (1441–1510); 3-meter open net towed horizontally at 640 meters: 1♂ [17.8] 2 juv [9.0, 10.0]. *Verde Island Passage*: sta 5270; 13°35'45"N, 120°58'30"E; 430 m; 8 Jun 1908 (1507–1527); 3-meter open net towed horizontally at 256 m: 1 juv [6.3]; sta 5296; 13°40'09"N, 120°57'45"E; [384 m]; [mud, sand]; 24 Jul 1908 (1247–1307); 12' Agassiz beam trawl, mud bag: 1♂ [17.0]. *Batangas Bay, southern Luzon*: sta 5267; 13°42'20"N, 120°58'25"E; 311 m; pebbles, shells; 8 Jun 1908 (1025–1045); 12' Agassiz beam trawl, mud bag: 2♂ [16.1, 16.3].

Northwest of Panay: sta 5259; 11°57'30"N, 121°42'15"E; 571 m; globigerina; 9.6°C; 3 Jun 1908 (1031–1051); 12' Agassiz beam trawl, mud bag: 1♂ [14.2]. *West of Jolo Island, Sulu Archipelago*: sta 5548; 6°00'20"N, 120°45'35"E; 424 m; sand, broken shells; 11.9°C; 17 Sep 1909 (0755–0820); 9' Tanner beam trawl, mud bag: 1♀ [12.5]; sta 5551; 5°54'48"N, 120°44'24"E; 353 m; fine sand; 11.8°C; 17 Sep 1909 (1407–1427); 9' Tanner beam trawl: 2♂ [10.2, 12.1] 1♀ [12.5] 3 juv [9.1–10.1]; sta 5566; 5°52'12"N, 120°31'00"E; 446 m; fine sand, shells; 11.4°C; 21 Sep 1909 (1407–1434); 9' Tanner beam trawl: 1 ovig ♀ [14.8].

INDONESIA. *West of Halmahera*: sta 5618; 0°37'00"N, 127°15'00"E; 763 m; gray mud; 27 Nov 1909 (1444–1504); 12' Agassiz beam trawl: 1 juv [9.0]. *Ceram Sea south of Pulau Obi*: sta 5634; 1°54'00"S, 127°36'00"E; 602 m; 3 Dec 1909 (0627–0702); 12' Agassiz beam trawl: 1 juv [8.3].

RANGE.—Off southeastern Africa, Indian Ocean, Indonesia, Philippines, southern Japan, Fiji Islands, Hawaii, Gulf of Mexico, Bahamas, Caribbean Sea; mesopelagic.

***26. *Oplophorus typus* H. Milne Edwards, 1837**

FIGURES 32*p–t*, 33

Oplophorus typus H. Milne Edwards, 1837:424, pl. 25bis: fig. 6 [type-locality: New Guinea].—Bate, 1888:762, pl. 127, fig. 1.—Chace, 1947:45, figs. 8–11.

Oplophorus brevirostris Bate, 1888:766, pl. 127: fig. 3 [type-locality: Sibuyan Sea off Tablas Island, Philippines; 12°21'N, 122°15'E, 1280 m; trawled].

DIAGNOSIS.—Rostrum rarely overreaching antennal scale; carapace with sharp tooth near posterior end of ventral margin in adults, with posterior extensions of upper lateral rostral carinae converging posteriorly in dorsal aspect; abdomen with pleuron of 1st somite unarmed; antennal scale dentate on proximal 3/4 of lateral margin, without barb near apex of mesial margin; maximum carapace length 17 mm.

MATERIAL.—PHILIPPINES. *Western end of Verde Island Passage, north of Mindoro*: sta 5286; 13°38'15"N, 120°34'20"E; 823 m; gray sand, mud; 5.8°C; 20 Jul 1908 (1231–1309); 12' Agassiz beam trawl, mud bag: 1♂ [13.3]. *Verde Island Passage, north of Mindoro*: sta 5287; 13°37'40"N, 120°39'E; 694 m; gray sand; 6.3°C; 20 Jul 1908 (1458–1542); 3-meter open net towed horizontally at 567 m for 20 minutes, then raised vertically to surface in 24 minutes: 1♂ [15.4] 3♀ [10.2–11.1]. *Northeast of Mindoro*: sta 5123; 13°12'45"N, 121°38'45"E; 518 m; green mud; 2 Feb 1908 [1344–1404]; 12' Tanner beam trawl, mud bag: 1♂ [13.0]. *Tablas Strait, east of Mindoro*: sta 5227; 12°53'45"N, 121°52'30"E; 589 m; green mud; 5 May 1908 (1304–1330); 3-meter open net towed horizontally at 530 m: 1 ovig ♀ [11.7]. *Mindoro Strait, west of Mindoro*: sta 5333; 12°26'30"N, 120°37'45"E; 567 m; sand; 23.2°C [?]; 14 Dec 1908 (0740–0826); 12' Agassiz beam trawl, mud bag: 2♀ [11.0, 12.2], 1 ovig [12.2]. *Mompog Pass, east of Marinduque*: sta

5219; 13°21'N, 122°18'45"E; 969 m; green mud; 10.4°C; 23 Apr 1908 (1357–1437); 12' Agassiz beam trawl, mud bag: 1 ovig ♀ [12.9]. *Burias Pass, south of southeastern Luzon*: sta 5216; 12°52'N, 123°23'30"E; 393 m; green mud; 11.1°C; 22 Apr 1908 (0836–0856); 12' Agassiz beam trawl, mud bag: 4♂ [12.9–13.9]; sta 5387; 12°54'40"N, 123°20'30"E; 382 m; soft green mud; 11.3°C; 11 Mar 1909 (1342–1402); 12' Agassiz beam trawl, mud bag: 1♂ [14.7]. *Lagonoy Gulf, east of southern Luzon*: sta 5467; 13°35'27"N, 123°37'18"E; [878 m]; gray mud; 18 Jul 1909 (0752–0834); 12' Agassiz beam trawl, mud bag: 1♂ [16.2]. *Panay Gulf, south of Panay*: sta 5184; 10°18'30"N, 122°23'30"E; 1033 m; green mud; 9.9°C; 30 Mar 1908 (1355–1413); 12' Agassiz beam trawl, 3 mud bags: 1♂ [12.0]; sta 5421; 10°33'30"N, 122°26'E; 251 m; green mud; 14.7°C; 30 Mar 1909 (1738–1810); 12' Agassiz beam trawl, mud bag: 1♂ [13.7].

INDONESIA. *Celebes Sea off Sabah* (North Borneo): sta 5586; 4°06'50"N, 118°47'20"E; 635 m; gray mud; 6.7°C; 28 Sep 1909 (1144–1217); 9' Tanner beam trawl, mud bag: 1♂ [14.3]. *Makassar Strait west of Celebes*: sta 5667; 2°56'00"S, 118°47'30"E; 671 m; gray sand, mud; 5.4°C; 29 Dec 1909 (0955–1025); 12' Agassiz beam trawl: 1 ovig ♀ [12.2]. *Southwest of Makassar, Celebes*: sta 5662; 5°43'00"S; 119°18'00"E; 386 m; 9.3°C; 21 Dec 1909 (0612–0632); 12' Agassiz beam trawl: 2♂ [15.3, 15.9]. *West of Halmahera*: sta 5621; 0°15'00"N, 127°24'35"E; 545 m; gray and black sand; 28 Nov 1909 (0950–1010); 12' Agassiz beam trawl, mud bag: 1 ovig ♀ [12.1]. *Selat Patinti, Halmahera*: sta 5628; 0°28'30"S, 127°45'00"E; 2361 m; gray mud; 30 Nov 1909 (1122–1245); 12' Agassiz beam trawl: 1♂ [12.5]. *Southern end of Selat Patinti, southern Halmahera*: sta 5630; 0°56'30"S, 128°05'00"E; 1041 m; coral sand, mud; 2 Dec 1909 (0936–1000); 12' Agassiz beam trawl: 1♂ [16.0].

RANGE.—*Oplophorus typus* seems, from present records, to be confined to the Indo-West Pacific from southeastern Africa, through the

Indian Ocean to the Philippines and Indonesia, where it appears to be especially common; it has not yet been reported from any seas east of New Guinea; mesopelagic.

**Systellaspis* Bate, 1888

FIGURES 34–36

Systellaspis Bate, 1888:757. [Type-species, by original designation: *Systellaspis lanceocaudata* Bate, 1888:758; gender: feminine.]

Hoplopassiphaea Yokoya and Shibata, 1965:4. [Type-species, by monotypy: *Hoplopassiphaea philippinensis* Yokoya and Shibata, 1965:4; gender: feminine.]

DIAGNOSIS.—Integument firm; rostrum with more teeth in dorsal series than in ventral; carapace not denticulate dorsally, without hepatic spine, hepatic furrow not abruptly delimited posteriorly; abdomen with 6th somite longer than 5th; telson terminating posteriorly in sharply pointed, laterally spinose endpiece flanked by pair of long lateral spines; eye with cornea at least as wide as eyestalk; antennal scale without lateral teeth proximal to distolateral spine; mandibles not very dissimilar, molar process consisting of rather deep channel flanked by thin walls opposing similar structure on other member of pair, incisor process toothed along entire opposable margin; 2nd maxilla with short papilla and submarginal lamina on proximal endite; 1st maxilliped with slender central lobe subdivided by 2 transverse sutures, distal segment small; 3rd maxilliped and 1st pereopod with exopods neither unusually broad nor rigid; pereopods with neither ischium nor merus broadly compressed, 4th pair with epipod well-developed, except for vertical component; appendix masculina present on 2nd pleopod of male; eggs large and few (less than 50).

RANGE.—Most tropical and temperate seas; mesopelagic and benthic in 291–3292 m.

REMARKS.—There is little doubt that *Hoplopassiphaea* Yokoya and Shibata, 1965, is a junior synonym of *Systellaspis*. The unique holotype of *H. philippinensis* may have a regenerating fourth pereopod, at least on the illustrated left side. The

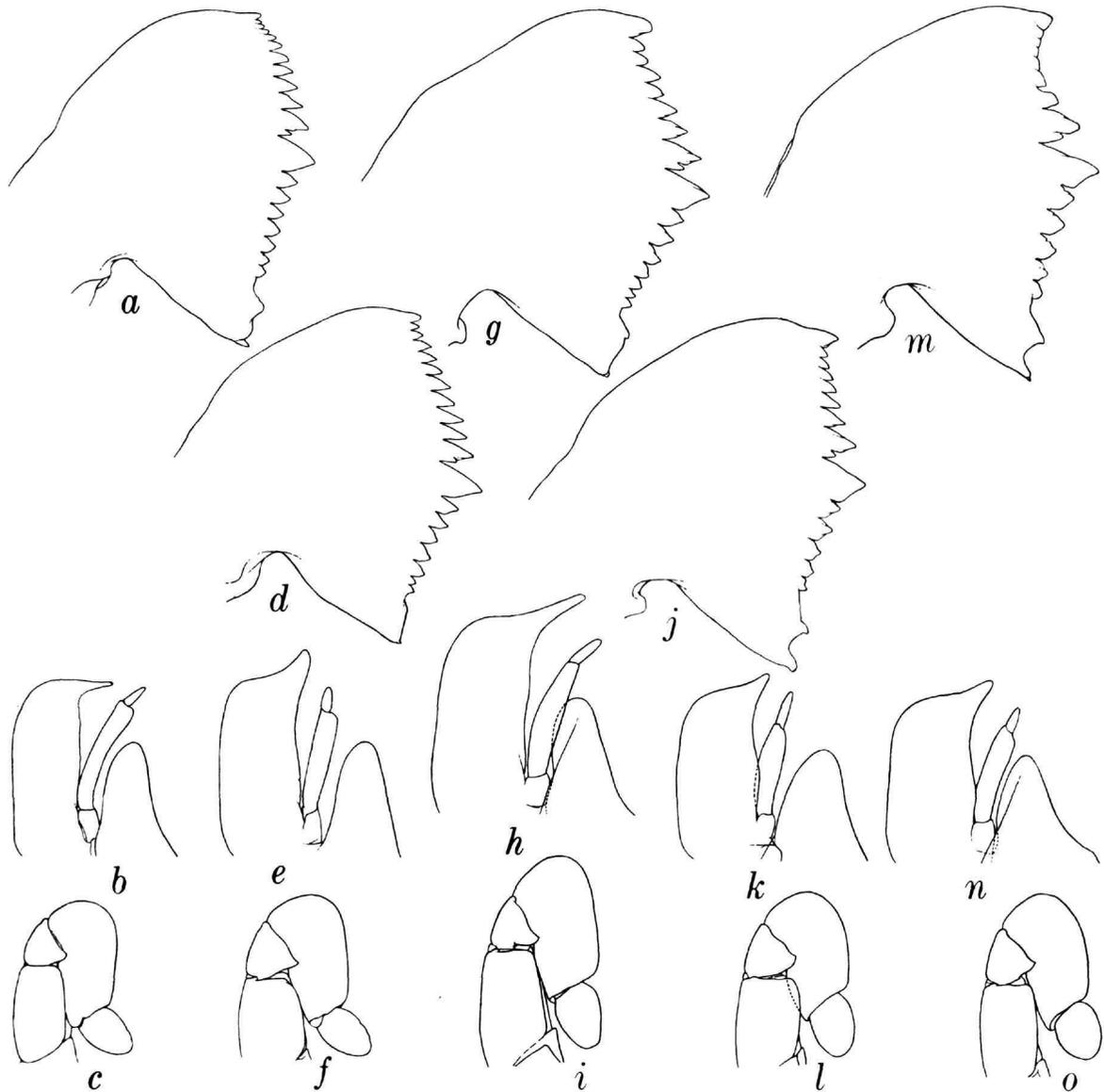


FIGURE 34.—*Systellaspis* (a–c, *S. braueri*, male [25.0 mm], *Columbus Iselin* sta 10, Bahamas; d–f, *S. cristata*, male [15.8 mm], *Albatross* sta 4655, off Peru; g–i, *S. debilis*, male [14.2 mm], *Albatross* sta 5447, Lagonoy Gulf, Philippines; j–l, *S. lanceocaudata*, female [13.1 mm], *Albatross* sta 5065, Suruga Wan, Japan; m–o, *S. pellucida*, male [13.5 mm], *Albatross* sta 5111, Balayan Bay, Philippines): a, extensor (ventral) surfaces of incisor and molar processes of right mandible; b, distal part of right 1st maxilliped; c, terminal segments of right 2nd maxilliped; d, extensor (ventral) surface of right mandible; e, distal part of right 1st maxilliped; f, terminal segments of right 2nd maxilliped; g, extensor (ventral) surfaces of incisor and molar processes of right mandible; h, distal part of right 1st maxilliped; i, terminal segments of right 2nd maxilliped; j, extensor (ventral) surfaces of incisor and molar processes of right mandible; k, distal part of right 1st maxilliped; l, terminal segments of right 2nd maxilliped; m, extensor (ventral) surfaces of incisor and molar processes of right mandible; n, distal part of right 1st maxilliped; o, terminal segments of right 2nd maxilliped.

type-locality—a 6-foot Isaacs-Kidd midwater trawl sample from 100 meters, over a total depth of more than 7000 meters at the extreme northern end of the Philippine Trench—suggests that the species may be referable to *Systellaspis debilis*, although figure 5 accompanying the description by Yokoya and Shibata, not surprisingly, fails to show the sharp spine characteristically situated on the posterior margin of the pleuron of the fifth abdominal somite of that species. Ken-Ichi

Hayashi has informed me that he learned from Keishi Shibata at Nagasaki University in 1969 (Yu Yokoya died in 1967) that the type-specimens of the species described in the 1965 paper were missing and that he (Shibata) was no longer involved with the taxonomy of marine animals.

All five currently recognized species of *Systellaspis* are known from the Philippine-Indonesian region, and four of them are represented in the *Albatross* collections.

Key to the Species of *Systellaspis*

1. Carapace with sinuous lateral ridge extending posteriorly from orbital region nearly to posterior margin; telson armed laterally with 2 or more rows of small spines totalling at least 20 on each side 2
 Carapace without lateral ridge extending posteriorly from orbital region nearly to posterior margin; telson armed dorsolaterally with single row of no more than 10 small spines on each side 3
2. Rostrum triangular in lateral aspect, overreaching antennular peduncle little if at all; carapace not carinate on posterior 1/2 of dorsal midline, without prominent carina near ventral margin; abdomen without distinct carina in dorsal midline of any somite 27. *S. braueri*
 Rostrum elongate anteriorly, extending at least to level of distal 1/4 of antennal scale; carapace carinate on dorsal midline as far as tubercle near posterior margin, with sharp carina near ventral margin extending posteriorly from near branchiostegal spine to posterior margin; abdomen with high sharp carina on dorsal midline of 3rd somite *28. *S. cristata*
3. Abdomen with posterior margins of tergum of 4th and 5th somites spinulose lateral to posteromesial tooth, 5th somite with sharp spine on posterior margin of pleuron, 6th somite dorsally rounded, about 1 2/3 times as long as 5th *29. *S. debilis*
 Abdomen with posterior margins of tergum of 4th and 5th somites not spinulose lateral to posteromesial tooth, at most with single spine near juncture with pleuron, 5th somite with rounded prominence but no spine on posterior margin of pleuron, 6th somite dorsally flattened or longitudinally sulcate, about twice as long as 5th 4
4. Abdomen with 6th somite distinctly sulcate in dorsal midline; telson deeply sulcate dorsally throughout length *30. *S. lanceocaudata*
 Abdomen with 6th somite dorsally flattened, not distinctly sulcate; telson shallowly sulcate dorsally in posterior 1/2 *31. *S. pellucida*

27. *Systellaspis braueri* (Balss, 1914)

FIGURES 34a-c, 35a,b

Acanthephyra Braueri Balss, 1914:594 [type-locality: the three original *Valdivia* specimens were taken at two sta-

tions in the Gulf of Guinea: 0°26'N, 6°32'W, 0-4000 m; and 0°56'N, 4°34'W, 0-4000 m].

Systellaspis densispina Stephensen, 1923:57, fig. 17 [type-locality: Bay of Biscay: 46°30'N, 7°00'W, more than 4000 m].

Systellaspis Braueri.—Balss, 1925:245, figs. 16-20, pl. 21.



FIGURE 35.—*Systellaspis* (*a, b, S. braueri*, male [25.0 mm], *Columbus Iselin* sta 10, Bahamas; *c, S. cristata*, male [12.7 mm], *Albatross* sta 5619, west of Halmahera; *d, S. cristata*, male [15.8 mm], *Albatross* sta 4655, off Peru; *e, f, S. debilis*, male [14.2 mm], *Albatross* sta 5447, Lagonoy Gulf, Philippines; *g, h, S. pellucida*, male [13.5 mm], *Albatross* sta 5111, Balayan Bay, Philippines): *a*, endopod of right 1st pleopod; *b*, right appendices interna and masculina; *c*, endopod of right 1st pleopod; *d*, right appendices interna and masculina; *e*, endopod of right 1st pleopod; *f*, right appendices interna and masculina; *g*, endopod of right 1st pleopod; *h*, right appendices interna and masculina.

DIAGNOSIS.—Rostrum triangular in lateral aspects, overreaching antennular peduncle little if at all; carapace not carinate on dorsal midline posterior to series of dorsal rostral teeth, with low, blunt, sinuous ridge extending posteriorly from orbital region nearly to posterior margin, without carina near ventral margin extending posteriorly from near branchiostegal spine to posterior margin; abdomen without distinct carina on dorsal midline of any somite, 4th and 5th somites not spinulose on posterior margin of tergum lateral to posteromesial tooth, 5th somite with sharp tooth on posterior margin of pleuron, 6th somite flattened dorsally, about twice as long as 5th; telson shallowly sulcate dorsally, with numerous small spines arranged in more than 2

irregular rows laterally; maximum carapace length 36 mm.

RANGE.—Bay of Bengal, eastern Pacific off Oregon, California, and Mexico, western North Atlantic from southeast of Newfoundland to the Bahamas, and eastern Atlantic from southwest of Ireland to off Congo; mesopelagic. The species was taken by the *Alpha Helix* in the Banda Sea.

***28. *Systellaspis cristata* (Faxon, 1893)**

FIGURES 34*d-f*, 35*c*

Acanthephyra cristata Faxon, 1893:206 [type-locality: the two specimens on which the species is based came from two *Albatross* stations in the eastern Pacific south of Panama:

6°10'00"N, 83°06'00"W and 4°56'00"N, 80°52'30"W]; 1895: 162, pl. 43: fig. 1.

DIAGNOSIS.—Rostrum elongate, extending anteriorly to level of distal ¼ of antennal scale or beyond; carapace carinate on nearly entire length of dorsal midline, with rather prominent and posteriorly sharp sinuous ridge or carina extending posteriorly from orbital region nearly to posterior margin, with sharp carina near ventral margin extending posteriorly from near branchiostegal spine to posterior margin; abdomen with sharp high carina on dorsal midline of 3rd somite, 4th and 5th somites not spinulose on posterior margin of tergum lateral to posteromesial tooth, 5th somite with sharp tooth on posterior margin of pleuron, 6th somite rounded dorsally, less than twice as long as 5th; telson shallowly sulcate dorsally, with 4–8 small spines on each lateral margin of sulcus and 20 or more similar spines in irregular 2nd row near ventral margin of telson; maximum carapace length 19 mm.

MATERIAL.—PHILIPPINES. *Western end of Verde Island Passage, east of Lubang Islands*: sta 5120; 13°45'30"N, 120°30'15"E; 719 m; green mud, sand; 6.5°C; 21 Jan 1908 (1441–1510); 3-meter open net towed horizontally at 640 m: 1 juv [4.3]. Batangas Bay, southern Luzon: sta 5288; 13°43'30"N, 121°E; [256 m]; sand, mud; 22 Jul 1908 (0814–0841); 3-meter open net towed horizontally at 192 m: 1 juv [6.1]. Lagonoy Gulf, east of southern Luzon: sta 5449; 13°21'36"N, 124°00'30"E; 549 m; 4 Jun 1909 (1438–1459); 12' Agassiz beam trawl, mud bag: 1♀ [11.3].

INDONESIA. *West of Halmahera*: sta 5618; 0°37'00"N, 127°15'00"E; 763 m; gray mud; 27 Nov 1909 (1449–1504); 12' Agassiz beam trawl: 1 ovig ♀ [15.2]; sta 5619; 0°35'00"N, 127°14'40"E; 795 m; fine gray sand, mud; 27 Nov 1909 (1612–1641); 12' Agassiz beam trawl: 1♂ [12.7]. *Southern end of Selat Patinti*: sta 5631; 0°57'00"S, 127°56'00"E; 1480 m; green mud; 2 Dec 1909 (1311–1416); 12' Agassiz beam trawl: 1 ovig ♀ [14.8].

RANGE.—Indian Ocean, Philippines, and Indonesia, eastern Pacific off Vancouver Island, British Columbia, to northern South America,

Gulf of Mexico, and eastern Atlantic from the Bay of Biscay to Angola; mesopelagic.

REMARKS.—The Philippine and Indonesian specimens seem to have a longer rostrum and higher dorsal crest on the third abdominal somite than do those from the eastern Pacific, but the evidence is not yet sufficient to justify recognizing the two forms as distinct taxa.

***29. *Systellaspis debilis* (A. Milne-Edwards, 1881)**

FIGURES 34g–i, 35e,f

Acanthephyra debilis A. Milne-Edwards, 1881b:13 [type-locality: "trouvee a une profondeur de 500 brasses dans le canal de Bahama"].

Miersia gracilis Smith, 1882:70, pl. 11: fig. 4 [type-locality: east of Cape Lookout, North Carolina; 34°28'25"N, 75°22'50"W].

Acanthephyra debilis Var. *Europoea* A. Milne-Edwards, 1883, pl. 33: fig. 2 [type-locality unknown].

Systellaspis Bouvieri Coutière, 1905:8, fig. 3 [type-locality: Azores Plateau; 36°46'N, 26°41'W, 0–3250 m].

Systellaspis debilis, var. *indica* De Man, 1916:151 [type-locality: eastern Halmahera Sea east of Kofiau; 1°10.5'S, 130°09'E; 798 m].

Systellaspis debilis.—Chace, 1940:181, fig. 51.

DIAGNOSIS.—Rostrum elongate, overreaching antennal scale; carapace not carinate on posterior ½ of dorsal midline, without lateral ridge extending posteriorly from orbital region nearly to posterior margin, without carina near ventral margin extending posteriorly from near branchiostegal spine; abdomen bluntly carinate on dorsal midline of 3rd somite, 4th and 5th somites spinulose on posterior margin of tergum lateral to posteromesial tooth, 5th somite with sharp tooth on posterior margin of pleuron, 6th somite dorsally rounded, about 1½ times as long as 5th; telson narrowly sulcate dorsally, with 4–8 dorsolateral spinules in single row; maximum carapace length about 17 mm.

MATERIAL.—PHILIPPINES. *Western end of Verde Island Passage, east of Lubang Islands*: sta 5120; 13°45'30"N, 120°30'15"E; 719 m; green mud, sand; 6.5°C; 21 Jan 1908 (1441–1510); 3-meter open net towed horizontally at 640 m: 1♀ [13.1]. *Verde Island Passage north of Mindoro*: sta

5287; gray sand; 6.3°C; 20 Jul 1908 (1458–1548); 3-meter open net towed horizontally at 567 m for 20 minutes, then raised vertically to surface in 24 minutes: 1♂ [9.0] 3 juv [5.9–7.3]. *Lagonoy Gulf, east of southern Luzon*: sta 5447; 13°28'N, 123°46'18"E; 567 m; green mud; 7.4°C; 4 Jun 1909 (0614–0635); 12' Agassiz beam trawl: 1♂ [14.2]; sta 5466; 13°38'36"N, 123°41'45"E; 988 m; gray mud; 17 Jun 1909 (1040–1102); 12' Agassiz beam trawl, mud bag: 1♂ [12.9].

INDONESIA. *Selat Patinti, Halmahera*: sta 5628; 0°28'30"S, 127°45'00"E; 2361 m; gray mud; 30 Nov 1909 (1122–1245); 12' Agassiz beam trawl: 1 ovig ♀ [14.3].

RANGE.—South Africa, Indian Ocean, Philippines, Indonesia, Hawaii, western Atlantic from south of Greenland to Gulf of Mexico and Bahamas, and eastern Atlantic from the Faeroe Islands to Angola; mesopelagic, commonly between 650 and 800 m during the day time and about 150 m at night.

***30. *Systellaspis lanceocaudata* Bate, 1888**

FIGURES 34j–l, 36

Systellaspis lanceocaudata Bate, 1888:758, pl. 124: fig. 7 [type-locality: Sagami Nada, Japan; 35°11'N, 139°28'E; 631 m].

DIAGNOSIS.—Rostrum elongate, overreaching antennal scale; carapace not carinate on posterior ½ of dorsal midline, without lateral ridge extending posteriorly from orbital region nearly to posterior margin, without carina near ventral margin extending to posteriorly from near branchiostegal spine; abdomen sharply carinate on dorsal midline of 3rd somite, 4th and 5th somites with posterior margin of tergum entire, not spinulose, between posteromesial tooth and single tooth near juncture with pleuron, 5th somite with rounded prominence but no spine on posterior margin of pleuron, 6th somite distinctly sulcate in dorsal midline, about twice as long as 5th; telson deeply sulcate dorsally, margins of sulcus armed with 3 pairs of small spines; maximum carapace length 17 mm.

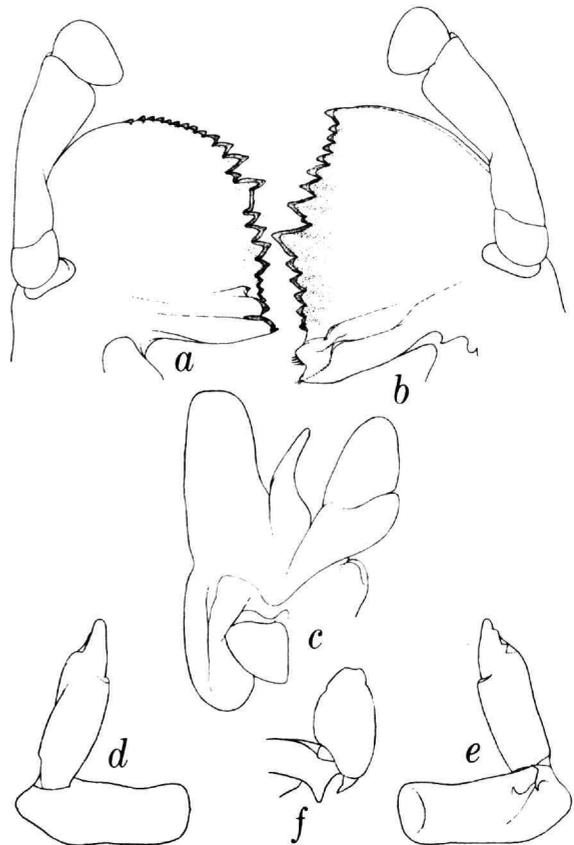


FIGURE 36.—*Systellaspis lanceocaudata*, female [13.0 mm], *Albatross* sta 5065, Suruga Wan, Japan: a, left mandible (flexor or dorsal surface); b, right mandible; c, right 2nd maxilla; d, epipod (lateral aspect) from right 2nd pereopod; e, same (mesial aspect); f, same, mesial teeth (dorsal aspect).

MATERIAL.—PHILIPPINES. *Babuyan Channel, north of Luzon*: sta 5329; 18°33'N, 121°37'30"E; 388 m; blue mud; 10.8°C; 19 Nov 1908 (1125–1135); 12' Tanner beam trawl, mud bag: 1♀ [10.7].

RANGE.—This species seems to have been positively recorded previously only from the female holotype taken by the *Challenger* in Sagami Nada, Honshu, Japan, in 631 m. The single female from off Zanzibar identified at this species by Balss (1925:243) may belong to *S. pellucida*, of which a fine series from the Zanzibar area was compared with the holotype of *S. lanceocaudata* by

Calman (1939:190). In addition to the Philippine female reported above, there is in the Smithsonian collections (USNM) a slightly larger female (carapace length 13.1 mm) collected at station 5065 in Suruga Wan in 430–386 m (less than 100 km from the type-locality of *S. lanceocaudata*) during the Northwestern Pacific Cruise of the *Albatross* in 1906. It would seem, therefore, that *S. lanceocaudata* is certainly known only from three female specimens from southeastern Honshu, Japan, and off northern Luzon, Philippines in depths of about 380–630 m. The indication that all three specimens were taken in bottom trawls or a dredge and that all were found in relative proximity to land might suggest that this species, like *S. pellucida*, lives on or near the bottom, at least during daylight hours.

***31. *Systellaspis pellucida* (Filhol, 1885)**

FIGURES 34*m–o*, 35*g,h*

Acanthephyra pellucida Filhol, 1885:144, 162 [type-locality (based on lectotype selection by Crosnier and Forest, 1973:93): off Cabo Bojador, Spanish Sahara; 26°20'N, 14°53'W, 782 m].

Acanthephyra affinis Faxon, 1896:162, pl. 2: figs. 1–3 [type-locality: off Grenada; 12°03'15"N, 61°46'25"W, 291 m].

Systellaspis pellucida.—Crosnier and Forest, 1973:92, figs. 26*c*, 27*c*.

DIAGNOSIS.—Rostrum elongate, overreaching antennal scale; carapace not carinate on posterior ½ of dorsal midline, without lateral ridge extending posteriorly from orbital region nearly to posterior margin, without carina near ventral margin extending posteriorly from near branchiostegal spine; abdomen strongly carinate in dorsal midline of 3rd somite, 4th and 5th somites with posterior margin of tergum entire, not spinulose, between posteromesial tooth and single tooth near junction with pleuron, 5th somite with rounded or rectangular prominence but no sharp spine on posterior margin of pleuron, 6th somite dorsally flattened but not distinctly sulcate in dorsal midline, about twice as long as 5th; telson shallowly sulcate dorsally in posterior ½, margins

of sulcus armed with 3 pairs of small spines; maximum carapace length 19 mm.

MATERIAL.—PHILIPPINES. *Balayan Bay, southern Luzon*: sta 5111; 13°45'15"N, 120°46'30"E; 432 m; green mud; 16 Jan 1908 (1508–1538); 12' Tanner beam trawl, mud bag: 1♂ [13.5]. *Mindoro Strait, west of Mindoro*: sta 5333; 12°26'30"N, 120°37'45"E; 567 m; sand; 23.2°[?]; 14 Dec 1908 (0740–0826); 12' Agassiz beam trawl, mud bag: 1♂ [9.5]. *Southeast of Cebu*: sta 5534; 9°26'00"N, 123°26'37"E; 609 m; gray globigerina ooze; 11.8°C; 19 Aug 1909 (0823–0853); 12' Tanner beam trawl: 1♂ [9.7]. *Macajalar Bay, Mindanao*: sta 5506; 8°40'N, 124°31'45"E; 479 m; green mud; 11.8°C; 5 Aug 1909 (0912–0926); 12' Tanner beam trawl: 1♂ [13.5]. *West of Jolo Island, Sulu Archipelago*: sta 5548; 6°00'20"N, 120°45'35"E; 424 m; sand, broken shells; 11.9°C; 17 Sep 1909 (0755–0820); 9' Tanner beam trawl, mud bag: 1♀ [11.3]. *Southwest of Jolo Island, Sulu Archipelago*: sta 5566; 5°52'12"N, 120°31'00"E; 446 m; fine sand, shells; 11.4°C; 21 Sep 1909 (1407–1434); 9' Tanner beam trawl: 8 ovig ♀ [13.2–15.7]. *Between Jolo and Tawitawi islands, Sulu Archipelago*: sta 5567; 5°48'00"N, 120°33'45"E; 490 m; fine sand; 11.1°C; 21 Sep 1909 (1536–1557); 9' Tanner beam trawl, mud bag: 1♂ [12.0] 5♀ [12.6–14.2], 4 ovig [12.6–13.7]. *Tawitawi Island, Sulu Archipelago*: sta 5569; 5°33'15"N, 120°15'30"E; 555 m; coral sand; 11.3°C; 22 Sep 1909 (0849–0859); 9' Tanner beam trawl, mud bag: 1 ovig ♀ [14.3].

INDONESIA. *Celebes Sea off Sabah* (North Borneo): sta 5583; 4°19'00"N, 118°56'20"E; 818 m; fine sand; 4.6°C; 27 Sep 1909 (1348–1433); 9' Tanner beam trawl, mud bag: 1♂ [12.7]. *Makassar Strait west of Celebes*: sta 5666, 2°54'30"S, 118°47'00"E; 497 m; green mud; 8.6°C; 29 Dec 1909 (0839–0918); 12' Agassiz beam trawl: 1♂ [12.5].

RANGE.—Western Indian Ocean, South China Sea, Philippines, Indonesia, Gulf of Mexico, Bahamas, West Indies, and off northwest Africa from Morocco to Gabon; usually found on or near bottom in 291–3292 m, commonly between 300 and 600 m.

***NEMATOCARCINIDAE Smith, 1884**

NEMATOCARCININAE Smith, 1884:368.

DIAGNOSIS.—Rostrum immovably attached to remainder of carapace, laterally compressed, narrow in lateral aspect; carapace relatively smooth, not strongly sculptured; antennular flagella simple, without accessory branches; mandible with palp, molar and incisor processes deeply separated; 1st maxilliped with flagellum on exopod; 2nd maxilliped with terminal segment applied as narrow strip to penultimate segment; 3rd maxilliped elongate, not unusually expanded, 5-segmented, bearing well-developed exopod and straplike epipod; 4 anterior pairs of pereopods with exopods and straplike epipods lacking end-piece extending vertically into branchial chamber, 2 anterior pairs with well-developed chela and undivided carpus, 3 posterior pairs unusually long, with carpus several times as long as propodus; pleopods with appendix interna.

RANGE.—Probably all tropical and temperate seas and as far south as 71°S in the Weddell Sea off Antarctica; usually benthic in 51–3931 m.

Only one genus is recognized.

****Nematocarcinus* A. Milne-Edwards, 1881**

Nematocarcinus A. Milne-Edwards, 1881b:14. [Type-species, by monotypy: *Nematocarcinus cursor* A. Milne-Edwards, 1881b:14; gender: masculine.]

DIAGNOSIS.—See “Diagnosis” for the family, above.

RANGE.—See “Range” for the family, above.

CLASSIFICATION.—The shrimps of this genus apparently represent a dominant and often very common element of the deeper benthic communities, especially in depths greater than 500 meters, but identification of the species is often difficult. Thanks to the intensive work of Crosnier and Forest (1973), the Atlantic species are now reasonably well known, but the systematic arrangement of the Indo-Pacific populations has progressed little since the majority of the nomi-

nal species were described by Bate (1888) in the *Challenger* report. Attempts to use the *Albatross* Philippine collections to alleviate this situation have not been as successful as had been hoped for. The form of the pleuron of the fifth abdominal somite and of the pre-anal tooth on the sixth, the shape and proportions of the antennal scale, and the relative lengths of the two distal segments of the third and fourth pereopods proved to be so variable that they had to be abandoned as specific characters of the Philippine-Indonesian representatives of the genus. The usefulness of even those characters that were adopted—the length, curvature, and dentition of the rostrum; the presence or absence of a protuberance near the posterior end of the ventral surface of the sixth abdominal somite; and the proportions of the appendix masculina—was minimized by inconsistencies in aberrant specimens. It has been impossible, therefore, to construct a key that would be reliable for all specimens found in the region; the one offered below should be used with caution.

The eight species previously recognized from the area were described by Bate (1888). On the basis of evidence available, I have been unable to distinguish two of those species (*N. intermedius* and *N. tenuipes*) from *N. productus*, and they have been tentatively synonymized with the latter pending subsequent investigation. Although *N. productus* and *N. undulatipes* have been synonymized with *N. ensifer* (Smith, 1882:77) and *N. cursor* A. Milne-Edwards, 1881b:14, respectively, by most authors since Bate, the discovery by Crosnier and Forest (1973) of minor but apparently consistent differences in Atlantic populations of these two species has led me to retain Bate's names until the genus is carefully reviewed on a worldwide basis. The proposed new species described below seems to be consistently different from all of those known previously, but it is represented by only four females from two widely separated stations, and confirmation of its validity must await the eventual collection of additional material, particularly of males.

Key to the Philippine-Indonesian Species of *Nematocarcinus*

- 1. Rostrum typically not overreaching antennular peduncle 2
 Rostrum of adults typically overreaching antennular peduncle 4
- 2. Sixth abdominal somite with double tubercle near posterior end of ventral
 midline *33. *N. bituberculatus*, new species
 Sixth abdominal somite about tubercles on ventral surface 3
- 3. Dorsal teeth of rostrum closely and subequally spaced throughout; 3rd
 and 4th pereopods with dactyl shorter than propodus
 *34. *N. gracilis*
 Dorsal teeth of rostrum more widely spaced anteriorly than posteriorly;
 3rd and 4th pereopods with dactyl longer than propodus
 *38. *N. undulatipes*
- 4. Rostrum armed with 7–11 dorsal teeth, including 3–5 on carapace pos-
 terior to orbital margin; 6th abdominal somite typically with protuber-
 ance near posterior end of ventral midline *37. *N. tenuirostris*
 Rostrum armed with 14–34 dorsal teeth, including 6–9 on carapace
 posterior to orbital margin; 6th abdominal somite without protuberance
 on ventral surface 5
- 5. Rostrum armed with more than 30 dorsal teeth 36. *N. proximatus*
 Rostrum armed with less than 30 dorsal teeth 6
- 6. Rostrum with posterior teeth of dorsal series grouped in narrowly spaced
 series above and posterior to orbit, remainder much more widely spaced
 on rostrum proper 32. *N. altus*
 Rostrum with dorsal teeth forming continuous series, anterior teeth
 spaced only slightly more widely than those above orbit
 *35. *N. productus*

32. *Nematocarcinus altus* Bate, 1888

Nematocarcinus altus Bate, 1888:809, pl. 132: fig. 4 [type-
 locality: eastern Celebes Sea; 2°55'N, 124°53'E; 3931
 m].

DIAGNOSIS.—Rostrum slightly overreaching antennal scale, armed dorsally with 10 close-set teeth above and posterior to orbit and about 8 much more widely spaced teeth on rostrum proper, armed ventrally with 5 inconspicuous teeth; abdomen with 3rd somite noticeably produced posteromesially; telson short, not overreaching mesial branch of uropod; carapace length 35 mm.

RANGE.—Known only from the unique type-specimen from the Celebes Sea.

***33. *Nematocarcinus bituberculatus*,
 new species**

FIGURE 37

DIAGNOSIS.—Rostrum curving slightly dorsad, reaching about to level of distal end of antennular peduncle, armed dorsally with 2–4 teeth posterior to orbit and 6 teeth becoming more widely spaced anteriorly on rostrum proper, ventral margin unarmed or with single subapical tooth; abdomen with 3rd somite rounded posteriorly, only moderately produced, pleuron of 5th somite armed with sharp posteroventral tooth, 6th somite with paired tubercles near posterior end of ventral midline; telson reaching about as far as distal end of lateral branch of uropod; maximum carapace length about 25 mm.



FIGURE 37.—*Nematocarcinus bituberculatus*, new species: *a*, anterior carapace and appendages of female holotype [24.8 mm], *Albatross* sta 5624, west of Halmahera; *b*, 3rd abdominal somite of holotype; *c*, 5th abdominal somite of holotype; *d*, posterior end of 6th abdominal somite of holotype (right aspect); *e*, pre-anal tooth of holotype (right aspect); *f*, telson and uropods of holotype; *g*, posterior end of telson of holotype; *h*, right antennal scale of holotype; *i*, right mandible of holotype; *j*, right 1st maxilla of holotype; *k*, right 2nd maxilla of holotype; *l*, right 1st maxilliped of holotype; *m*, right 2nd maxilliped of holotype; *n*, right 3rd maxilliped of holotype; *o*, rostrum of ovigerous female paratype [25.4 mm], type-lot; *p*, rostrum of ovigerous female paratype [24.3 mm], type-lot.

DESCRIPTION.—Rostrum (Figure 37*a*) curving slightly dorsad, reaching about to level of distal end of antennular peduncle; dorsal margin armed with 8–10 basally articulated, somewhat appressed teeth becoming more widely spaced anteriorly, 2–4 teeth of dorsal series situated on carapace posterior to level of orbital margin; ventral margin unarmed or with single small fixed tooth near apex. Carapace without prominent grooves or ridges except for rather broad groove on anterior $\frac{1}{4}$ extending posteriorly and slightly ventrad from orbital region. Antennal and pterygostomial spines well developed, sharp. Abdomen with pleura rounded on 4 anterior

somites; 3rd somite (Figure 37*b*) rounded posteriorly, not much produced posteromesially; 5th somite (Figure 37*c*) with pleuron armed with sharp posteroventral tooth; 6th somite with paired tubercles near posterior end of ventral midline (Figure 37*d*); pre-anal tooth (Figure 37*e*) sharp, curved spine extending posteriorly from rather deep flange between bases of uropods. Telson (Figure 37*f*) reaching about as far as distal end of lateral branch of uropod, armed with 9 or 10 pairs of dorsolateral spinules and 2 pairs of posterior spines (Figure 37*g*), lateral pair more than twice as long as mesial pair.

Eyes about as broad as long.

Antennular peduncle with stylocerite reaching about as far as dorsodistal margin of first segment, deeply and rather sharply notched dorsally in lateral view.

Antennal scale (Figure 37h) nearly $3\frac{1}{4}$ times as long as wide, distomesial angle of scale reaching fully as far as distolateral spine.

Mouthparts as illustrated (Figures 37i–n). Incisor process of mandible armed with 7 teeth. Third maxilliped reaching almost as far as end of antennal scale, exopod nearly reaching distal $\frac{1}{5}$ of antepenultimate segment.

First pereopod overreaching antennal scale by chela and about $\frac{1}{6}$ of carpus. Remaining pereopods detached or missing in all specimens.

Eggs small and numerous, measuring about 0.5 mm in major diameter.

SIZE.—Carapace length of nonovigerous female holotype, 24.8 mm; of nonovigerous female paratype, 24.2 mm; of ovigerous female paratypes, 24.3 and 25.4 mm.

MATERIAL.—PHILIPPINES. *Lagonoy Gulf, east of southern Luzon*: sta 5447; 13°28'N, 123°46'18"E; 567 m; green mud; 7.4°C; 4 Jun 1909 (0614–0935); 12' Agassiz beam trawl: 1♀ [24.2].

INDONESIA. *West of Halmahera*: sta 5624; 0°12'15"N, 127°29'30"E; 527 m; fine sand, mud; 29 Nov 1909 (1058–1118); 12' Agassiz beam trawl: 3♀ [24.3–25.4], 2 ovig [24.3, 25.4], nonovigerous ♀ is holotype (USNM 211375).

TYPE-LOCALITY.—West of Halmahera, Indonesia; 0°12'15"N, 127°29'30"E; 527 m.

RANGE.—Known only from the type-series from Lagonoy Gulf, Philippines, and west of Halmahera, Indonesia, in depths of 527 and 567 m.

REMARKS.—Because of the variability of many Indo-Pacific species of *Nematocarcinus* and because this form is represented by only four females, final validation of the species must await the availability of additional material, especially males. The short rostrum and its dentition are similar to those characters in *N. undulatifipes*, but the rather prominent tubercles on the ventral surface of the sixth abdominal somite may indicate a relationship with *N. tenuirostris*.

ETYMOLOGY.—The Latin *bi-* (two, double) plus the New Latin *tuberculatus* (tuberculate) refers to the paired tubercles on the ventral surface of the sixth abdominal somite.

*34. *Nematocarcinus gracilis* Bate, 1888

FIGURE 38

Nematocarcinus gracilis Bate, 1888:815, pl. 132: fig. 8 [type-locality: the *Challenger* specimens came from two stations: Fiji Islands; 19°07'50"S, 178°19'35'E, 1116 m; and near the Kermadec Islands; 28°33'S, 177°50'W, 1097 m]. —De Man, 1920:90, pl. 8, fig. 21a–h, pl. 9: fig. 21.

DIAGNOSIS.—Rostrum nearly horizontal, reaching to or slightly beyond level of distal end of second segment of antennular peduncle, armed dorsally with 13–22 upstanding, basally articulated, subequally spaced teeth, including 4–7 on carapace posterior to orbit; ventral margin typically armed with single strong fixed subapical tooth; abdomen with 3rd somite rounded posteriorly, only moderately produced, pleuron of 5th somite armed with sharp posteroventral tooth, 6th somite without tubercles on ventral surface; telson reaching about as far as distal end of lateral branch of uropod; pereopods with 3rd

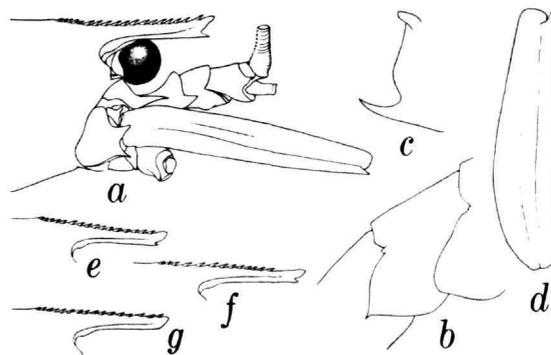


FIGURE 38.—*Nematocarcinus gracilis*: a, anterior carapace and appendages of ovigerous female [20.8 mm], *Albatross* sta 5634, Ceram Sea south of Pulau Obi; b, 5th abdominal somite of same specimen; c, pre-anal tooth of same specimen; d, right antennal scale of same specimen; e, rostrum of ovigerous female [17.9 mm], same station in Ceram Sea; f, rostrum of ovigerous female [18.9 mm], same station; g, rostrum of ovigerous female [18.1 mm], same station.

and 4th pairs having dactyl shorter than propodus; maximum carapace length 24 mm.

MATERIAL.—PHILIPPINES. *Off Arangasa Islands, eastern Mindanao*: sta 5236; 8°50'45"N, 126°26'52"E; 203 m; fine gray sand; 5.1 °C; 11 May 1908 (1027–1102); 12' Agassiz beam trawl, 3 mud bags: 1♂ [19.0].

INDONESIA. *Ceram Sea south of Pulau Obi*: sta 5634; 1°54'00"S, 127°36'00"E; 602 m; 3 Dec 1909 (0625–0702); 12' Agassiz beam trawl: 5 ovig ♀ [17.9–20.8]; sta 5635; 1°53'30"S, 127°39'00"E; 732 m; coral, rock, soapstone; 3 Dec 1909 (0956–1001); 12' Agassiz beam trawl: 1y♂ [10.5] 1? [?].

RANGE.—Arabian Sea to Hawaii; 165–1170 meters.

REMARKS.—The single male taken at station 5236 has the rostrum broken, and the identification is therefore tentative. In all of the other *Albatross* specimens, the tip of the rostrum is blunt, except in the larger, damaged specimen from station 5635, in which the rostrum is distally acute.

***35. *Nematocarcinus productus* Bate, 1888**

FIGURE 39

Nematocarcinus productus Bate, 1888:810, pl. 132: fig. 5 [type-locality: the *Challenger* series came from four rather widely separated stations: China Sea off Lingayen Gulf, Luzon, Philippines; 16°42'N, 119°22'E; 1920 m; Banda Sea south of Ceram, Indonesia; 4°21'S, 129°07'E; 2606 m; southeast of Sagami Nada, Honshu, Japan; 34°37'N, 140°32'E; 3429 m; North Fiji Basin; 18°30'S, 173°52'E; 2651 m].

Nematocarcinus tenuipes Bate, 1888:812, pl. 132: fig. 6 [type-locality: the type-series was taken at three stations by the *Challenger*: south of Honshu, Japan; 34°07'N, 138°00'E; 1033 m; north of New Guinea; 2°33'S, 144°04'E; 1701 m; Sagami Nada, Honshu, Japan; 35°11'N, 139°28'E; 631 m].

Nematocarcinus intermedius Bate, 1888:821, pl. 132: fig. 13 [type-locality: north of New Guinea; 2°33'S, 144°04'E; 1701 m].

Nematocarcinus ensifer var. *producta*.—De Man, 1920:76, pl. 8: figs. 18, 18a.

DIAGNOSIS.—Rostrum curving somewhat dorsad, rarely horizontal, overreaching antennular peduncle in adults, armed dorsally with 14–27

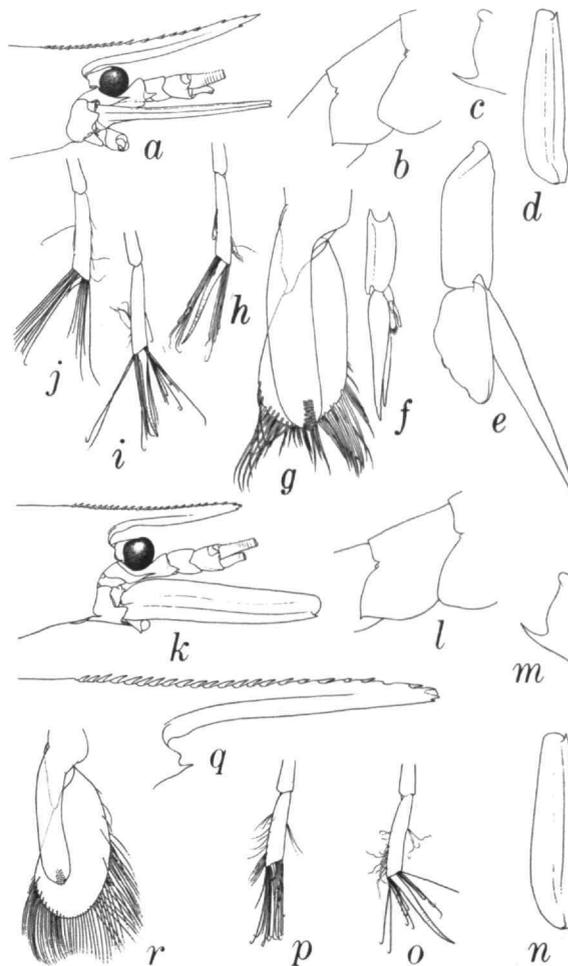


FIGURE 39.—*Nematocarcinus productus*: a, anterior carapace and appendages of male [15.0 mm], *Albatross* sta 5492, eastern Mindanao Sea; b, 5th abdominal somite of same specimen; c, pre-anal tooth of same specimen; d, right antennal scale of same specimen; e, right 1st pleopod of same specimen; f, right 2nd pleopod of same specimen; g, same, appendices interna and masculina; h, dactyl and propodus of right 3rd pereopod of female [17.7 mm], *Albatross* sta 5494, eastern Mindanao Sea; i, dactyl and propodus of left 4th pereopod of same specimen; j, dactyl and propodus of right 5th pereopod of same specimen; k, anterior carapace and appendages of female [16.9 mm], *Albatross* sta 5636, Ceram Sea; l, 5th abdominal somite of same specimen; m, pre-anal tooth of same specimen; n, right antennal scale of same specimen; o, dactyl and propodus of left 3rd pereopod of same specimen; p, dactyl and propodus of left 5th pereopod of same specimen; q, rostrum of male [18.0 mm], *Albatross* sta 5636, Ceram Sea; r, right appendices interna and masculine of same specimen.

basally articulated teeth in continuous series, including 6–9 on carapace posterior to orbit, ventral margin typically armed with single subapical tooth, occasionally with 2 or none; abdomen with 3rd somite not strongly produced in dorsal midline, pleuron of 5th somite armed with sharp posteroventral tooth, 6th somite without tubercles on ventral surface; telson reaching nearly as far as distal end of lateral branch of uropod; appendix masculina on endopod of male second pleopod no more than twice as long as broad; maximum carapace length 26 mm.

MATERIAL.—**PHILIPPINES.** *Lagonoy Gulf, east of southern Luzon:* sta 5468; 13°35'39"N, 123°40'28"E; [1041 m]; green mud; 18 Jun 1909 (0958–1031); 12' Agassiz beam trawl, mud bag: 1♂ [19.9]; sta 5470; 13°37'30"N, 123°41'09"E; [1024 m]; [mud]; 18 Jun 1909 (1526–1600); 12' Agassiz beam trawl: 1♂ [15.8]. *Eastern Mindanao Sea:* sta 5491; 9°24'N, 125°12'E; 1346 m; green mud, coral; 11.3°C; 1 Aug 1909 (1012–1043); 12' Agassiz beam trawl: 6♂ [14.8–18.6] 9♀ [15.5–20.7]; sta 5492; 9°12'45"N, 125°20'E; 1344 m; gray mud; 11.3°C; 1 Aug 1909 (1331–1359); 12' Agassiz beam trawl: 4♂ [14.8–17.3] 6♀ [16.7–17.9]; sta 5494; 9°06'30"N, 125°18'40"E; 1240 m; green mud, sand; 11.8°C; 2 Aug 1909 (0917–0952); 12' Agassiz beam trawl: 6♀ [16.1–18.9]; sta 5495; 9°06'30"N, 125°00'20"E; 1785 m; gray mud; 11.3°C; 2 Aug 1909 (1244–1354); 12' Agassiz beam trawl: 3♂ [16.9–19.5] 8♀ [17.7–22.1]. *Sulu Sea east of Palawan:* sta 5428; 9°13'N, 118°51'15"E; 2021 m; gray mud; 9.8°C; 3 Apr 1909 (1014–1123); 12' Agassiz beam trawl, mud bag: 1♂ [17.7].

INDONESIA. *Makassar Strait west of Celebes:* sta 5668; 2°28'15"S, 118°49'00"E; 1648 m; gray mud; 3.4°C; 29 Dec 1909 (1645–1704); 12' Agassiz beam trawl: 1♂ [19.7]; sta 5670; 1°19'00"S, 118°43'00"E; 2160 m; gray mud; 3.4°C; 30 Dec 1909 (0818–0838); 12' Agassiz beam trawl: 1y♂ [13.9] 2♂ [20.1, 20.3] 7♀ [21.9–24.0], 4 ovig [22.2–22.8]. *Makassar Strait off northwestern Celebes:* sta 5671; 1°05'00"S, 118°56'00"E; 1756 m; gray mud; 3.4°C; 30 Dec 1909 (1241–1345); 12' Agassiz beam trawl: 2♀

[23.0, 24.2], 1 ovig [23.0]. *Teluk Tomini, Celebes:* sta 5606; 0°16'28"N, 121°33'30"E; 1525 m; 17 Nov 1909 (1007–1027); 12' Agassiz beam trawl: 1 ovig ♀ [22.0]; sta 5608; 0°08'00"S, 121°19'00"E; 1992 m; gray mud; 2.4°C; 18 Nov 1909 (1248–1402); 12' Agassiz beam trawl: 1♀ [25.2]; sta 5609; 0°11'00"S, 121°16'00"E; 1997 m; green mud; 2.4°C; 18 Nov 1909 (1537–1651); 12' Agassiz beam trawl: 3♂ [15.1–17.3] 2♀ [21.3, 24.8]. *Molucca Sea:* sta 5614; 0°31'00"N, 125°58'45"E; 2012 m; gray mud, sand, globigerina; 22 Nov 1909 (0644–0758); 12' Agassiz beam trawl: 1♂ [18.6]. *Selat Patinti, Halmahera:* sta 5628; 0°28'30"S, 127°45'00"E; 2361 m; gray mud; 30 Nov 1909 (1122–1245); 12' Agassiz beam trawl: 2♀ [15.0, 21.8], 1 ovig [21.8]. *Ceram Sea south of Pulau Obi:* sta 5636; 1°55'00"S, 127°42'30"E; 2308 m; gray mud, fine sand; 3 Dec 1909 (1151–1318); 12' Agassiz beam trawl: 1♂ [18.0] 1♀ [16.9].

RANGE.—See "Remarks."

REMARKS.—On the basis of Bate's descriptions, I have been unable to recognize *N. tenuipes* or *N. intermedius* as species distinct from *N. productus*; the latter has been selected as the senior synonym because of page priority. On the other hand, the Philippine-Indonesian material of that species seems to be sufficiently different from the typical form of *N. ensifer* (Smith, 1882:77) from the Atlantic, especially in regard to the less produced posterior margin of the third abdominal somite, to justify the belief that the two populations are specifically distinct. Until, however, populations from different parts of the world, particularly the eastern Pacific, are carefully compared, the distributional limits of *N. productus* must remain indeterminate.

36. *Nematocarcinus proximatus* Bate, 1888

Nematocarcinus proximatus Bate, 1888:808, pl. 132: fig. 3 [type-locality: the *Challenger* series came from five rather widely separated Indo-Pacific stations: southern Indian Ocean between Prince Edward and Crozet islands; 46°46'S, 45°31'E, 2514 m; Aarafura Sea south of New Guinea; 9°59'S, 139°42'E, 51 m; southeast of Sagami Nada, Honshu, Japan; 34°37'N, 140°32'E, 3429 m; eastern Pacific off Islas Juan Fernandez, Chile; 33°42'S,

78°18'W, 2514 m; and eastern Pacific west of southern Chile; 42°43'S, 82°11'W, 2651 m].

DIAGNOSIS.—Rostrum overreaching antennal scale in adults, armed dorsally with continuous series of more than 30 teeth gradually becoming more widely spaced anteriorly, about 9 teeth of series placed on carapace posterior to orbit, ventral margin armed with 1 or 2 teeth considerably removed from apex; telson reaching about as far as distal end of lateral branch of uropod; carapace length 30 mm.

RANGE.—Known only from the type-series recorded from the southern Indian Ocean, south of Japan, the Arafura Sea, and the eastern Pacific west of Chile. The indication that the 15 specimens taken by the *Challenger* in the Arafura Sea were living at a depth of only 51 m, whereas all of the other specimens of the species taken by that vessel occurred in depths greater than 2500 m, suggests that the specimens from that station may belong to a different species and that the true *N. proximatus* may not be represented even in areas adjacent to the Philippine-Indonesian region.

*37. *Nematocarcinus tenuirostris* Bate, 1888

FIGURE 40

Nematocarcinus tenuirostris Bate, 1888:817, pl. 132: fig. 10 [type-locality: this species was recorded from two *Challenger* stations: southern Philippine Sea off Kepulauan Talaud; 4°33'N, 127°06'E, 914 meters; and Fiji Islands; 19°07'50"S, 178°19'35"E, 1116 m].

Nematocarcinus tenuirostris var. *sibogae* De Man, 1917:279 [type-locality: off the south coast of Roti, Lesser Sunda Islands; 10°48'36"S, 123°23'06"E, 918 m].

Nematocarcinus tenuirostris var. *Sibogae*.—De Man, 1920:79, pl. 8: fig. 19–19d.

DIAGNOSIS.—Rostrum horizontal or slightly concave dorsally, overreaching antennular peduncle and even antennal scale in large specimens, armed dorsally with 3–5 teeth posterior to level of orbital margin and 3–6 teeth becoming more widely spaced anteriorly on rostrum proper, ventral margin typically armed with single tooth anterior to anteriormost tooth of dorsal

series but some distance from apex, rarely unarmed ventrally; abdomen with posterior margin of 3rd somite not produced posteriorly in dorsal midline, pleuron of 5th somite armed with short posteroventral tooth, 6th somite usually bearing broad protuberance near posterior end of ventral midline; telson reaching fully as far as distal end of lateral branch of uropod; maximum carapace length more than 30 mm.

MATERIAL.—PHILIPPINES. *Off western Lubang Islands*: sta 5274; 13°57'30"N, 120°03'25"E; 960 m; gray mud, sand; 5.2°C; 16 Jul 1908 (0959–1029); 12' Agassiz beam trawl: 1 ovig ♀ [25.8]. *Lagonoy Gulf, east of southern Luzon*: sta 5469; 13°36'48"N, 123°38'24"E; [914 m]; green mud; 18 Jun 1909 (1329–1411); 12' Agassiz beam trawl: 1♀ [28.7]. *North of Samar*: sta 5445; 12°44'42"N, 124°59'50"E; 700 m; green mud, sand; 6.8°C; 3 Jun 1909 (1201–1238); 12' Agassiz beam trawl: 2♀ [27.2, 28.9], 1 ovig [27.2]. *Off Arangasa Islands, eastern Mindanao*: sta 5236; 8°50'45"N, 126°26'52"E; 903 m; fine gray sand; 5.1°C; 11 May 1908 (1027–1102); 12' Agassiz beam trawl, 3 mud bags: 2♀ [26.2, 26.9]. *Northern Palawan Passage*: sta 5349; 10°54'N, 118°26'20"E; 1335 m; coral, sand; 4.8°C; 27 Dec 1908 (1340–1400); 12' Tanner beam trawl, mud bag: 1♂ [20.2].

INDONESIA. *Celebes Sea off Sabah* (North Borneo): sta 5585; 4°07'00"N, 118°49'54"E; 871 m; gray mud; 5.1°C; 28 Sep 1909 (0931–0951); 9' Tanner beam trawl, mud bag: 1 ovig ♀ [28.1]. *Teluk Tomini, Celebes*: sta 5607; 0°04'00"S, 121°36'00"E; 1392 m; fine sand; 18 Nov 1909 (0920–0940); 12' Agassiz beam trawl: 3♂ [19.1–23.2] 2♀ [18.8, 23.9]. *Molucca Sea*: sta 5601; 1°13'10"N, 125°17'05"E; 1399 m; sand, globigerina, pteropods; 13 Nov 1909 (1418–1439); 12' Agassiz beam trawl, mud bag: 2♂ [25.8, 26.8] 1♀ [22.8]. *West of Halmahera*: sta 5618; 0°37'00"N, 127°15'00"E; 763 m; gray mud; 27 Nov 1909 (1444–1504); 12' Agassiz beam trawl: 2♀ [22.3, 25.0], 1 ovig [25.0]; sta 5623; 0°16'30"N, 127°30'00"E; 497 m; fine sand, mud; 29 Nov 1909 (0922–0942); 12' Agassiz beam trawl: 1 ovig ♀ [24.3]. *Southern end of Selat*

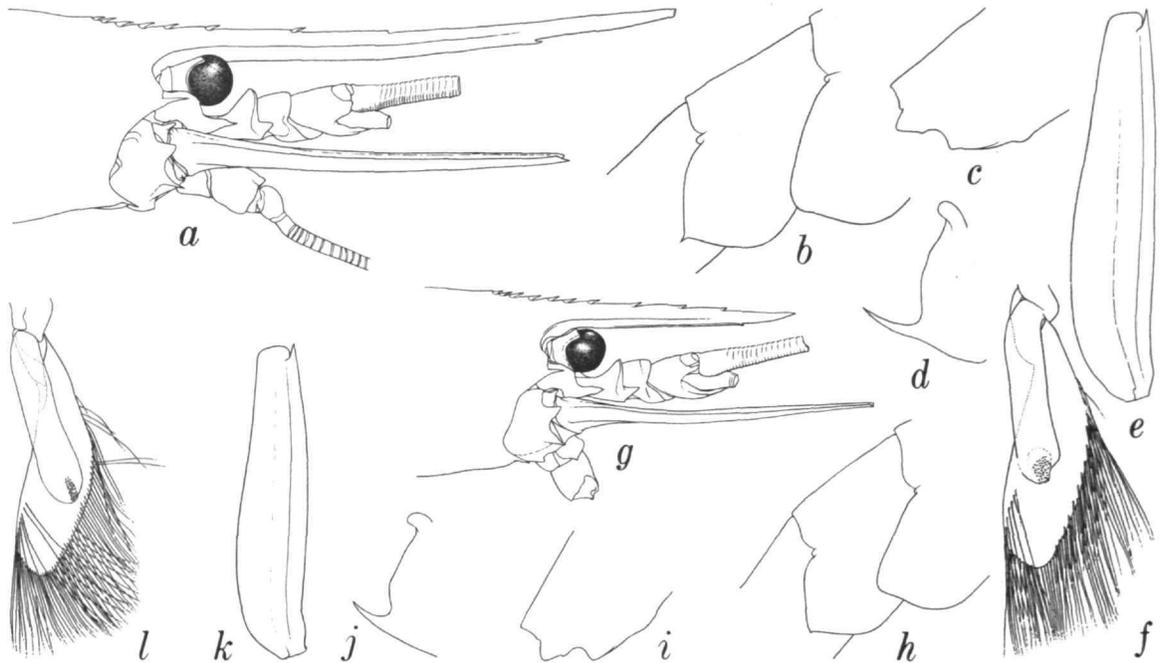


FIGURE 40.—*Nematocarcinus tenuirostris*: a, anterior carapace and appendages of male [28.3 mm], *Albatross* sta 5630, southern Halmahera; b, 5th abdominal somite of same specimen; c, posterior end of 6th abdominal somite (right aspect) of same specimen; d, pre-anal tooth of same specimen; e, right antennal scale of same specimen; f, right appendices interna and masculina of same specimen; g, anterior carapace and appendages of male [23.0 mm], *Albatross* sta 5651, Teluk Bone, Celebes; h, 5th abdominal somite of same specimen; i, posterior end of 6th abdominal somite of same specimen; j, pre-anal tooth of same specimen; k, right antennal scale of same specimen; l, appendices interna and masculina of same specimen.

Patinti, southern Halmahera: sta 5630; 0°56'30"S, 129°05'00"E; 1041 m; coral sand, mud; 2 Dec 1909 (0936–1000); 12' Agassiz beam trawl: 1♂ [28.3] 1♀ [21.1]. *Off southern Buru*: sta 5638; 3°47'15"S, 126°23'40"E; 946 m; fine gray sand; 10 Dec 1909 (1400–1436); 12' Agassiz beam trawl: 1♀ [22.4]. *Teluk Bone, Celebes*: sta 5650; 4°53'45"S, 121°29'00"E; 988 m; green mud; 4.5°C; 17 Dec 1909 (0922–0932); 12' Agassiz beam trawl: 1 ovig ♀ [30.8]; sta 5651; 4°43'50"S, 121°23'24"E; 1280 m; green mud; 3.7°C; 17 Dec 1909 (1432–1452); 12' Agassiz beam trawl: 1♂ [23.0] 1♀ [18.7]; sta 5652; 4°35'00"S, 121°23'06"E; 960 m; green

mud; 5.1°C; 17 Dec 1909 (1639–1724); 12' Agassiz beam trawl: 1♂ [22.1]; sta 5658; 3°32'40"S, 120°31'30"E; 933 m; gray mud; 5.1°C; 19 Dec 1909 (1423–1443); 12' Agassiz beam trawl: 1 ovig ♀ [29.0].

RANGE.—Off southeastern India to Hawaii; 301–1611 m.

Remarks.—Of the 27 *Albatross* specimens assigned to this species, four females lack the protuberance near the posterior end of the ventral surface of the sixth abdominal somite; there is a slight possibility that the absence of this swelling is correlated with the lack of a ventral tooth on the rostrum.

***38. *Nematocarcinus undulatipes* Bate, 1888**

FIGURES 41, 42

Nematocarcinus undulatipes Bate, 1888:801, pl. 130 [type-locality: the type-series consists of specimens from four different *Challenger* stations: western Moro Gulf, Mindanao, Philippines; 6°47'N, 122°28'E, 457 m; southern Philippine Sea off Kepulauan Talaud; 4°33'N, 127°06'E, 914 m; Banda Sea off Kepulauan Banda; 4°34'S, 129°57'30"E, 366 m; and off Kermadec Islands; 28°33'S, 177°50'W, 1097 m].—De Man, 1920:83, pl. 8: fig. 20–20h.

DIAGNOSIS.—Rostrum nearly horizontal, usually reaching to level of about midlength of 3rd segment of antennular peduncle, armed dorsally

with 7–14 basally articulated teeth becoming more widely spaced anteriorly, including 3–6 teeth on carapace posterior to orbital margin, ventral margin typically armed with single tooth short distance from apex, occasionally unarmed ventrally; abdomen with 3rd somite rounded posteriorly, only slightly produced, pleuron of 5th somite armed with variably distinct posteroventral tooth, 6th somite without tubercles on ventral surface; telson variable in length, reaching about as far as distal end of mesial branch of uropod to slightly beyond lateral branch; maximum carapace length 26 mm or more.

MATERIAL.—PHILIPPINES. *Western Verde Island Passage, north of Mindoro*: sta 5282; 13°53'N,

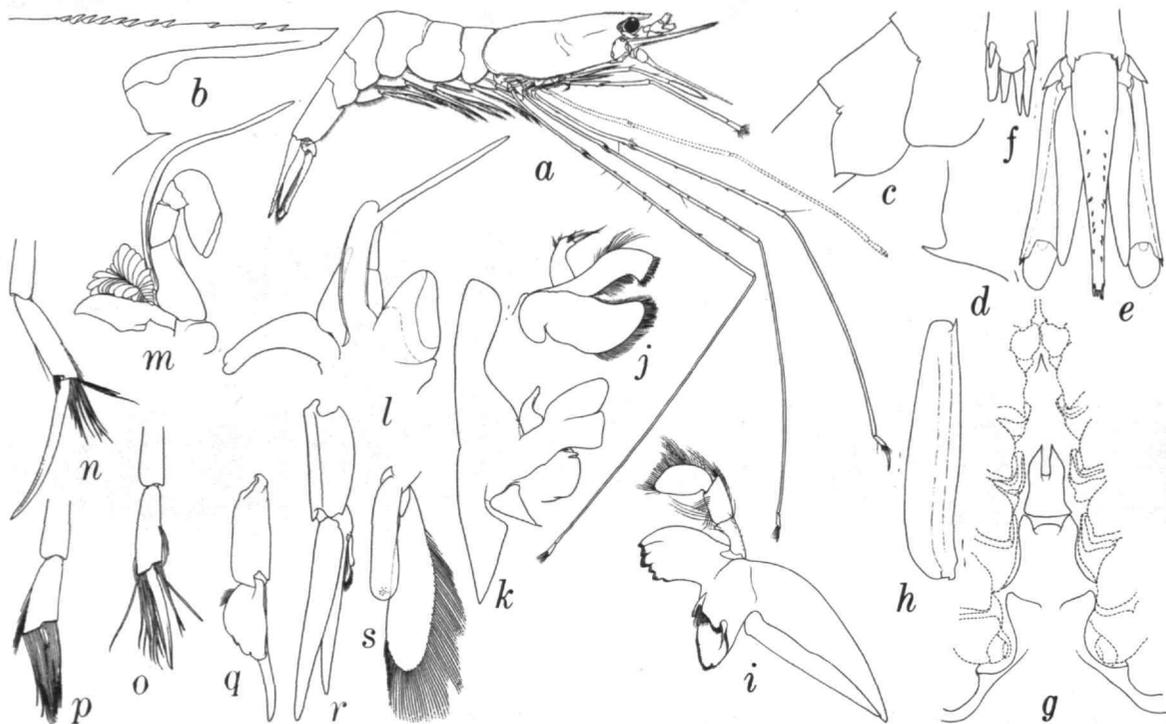


FIGURE 41.—*Nematocarcinus undulatipes*, male [19.3 mm], *Albatross* sta 5620, west of Halma-hera: a, entire shrimp in lateral aspect; b, rostrum; c, 5th abdominal somite; d, pre-anal tooth; e, telson and uropods; f, posterior end of telson; g, thoracic sternum; h, right antennal scale; i, right mandible; j, right 1st maxilla; k, right 2nd maxilla; l, right 1st maxilliped; m, right 2nd maxilliped; n, dactyl and propodus of right 3rd pereopod (lateral setae removed); o, dactyl and propodus of left 4th pereopod; p, dactyl and propodus of left 5th pereopod; q, right 1st pleopod; r, right 2nd pleopod; s, appendices interns and masculina.

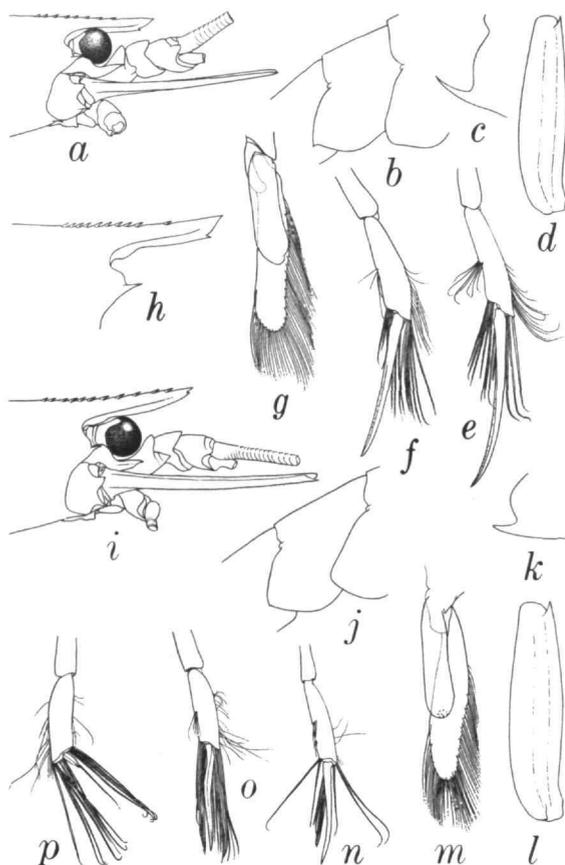


FIGURE 42.—*Nematocarcinus undulatipes*: a, anterior carapace and appendages of male [15.9 mm], *Albatross* sta 5259, northwest of Panay; b, 5th abdominal somite of same specimen; c, pre-anal tooth of same specimen; d, right antennal scale of same specimen; e, dactyl and propodus of right 3rd pereopod of same specimen (proximal setae removed); f, dactyl and propodus of right 4th pereopod of same specimen; g, right appendices interna and masculina of same specimen; h, rostrum of female [21.7 mm], same station northwest of Panay; i, anterior carapace and appendages of female [18.3 mm], *Albatross* sta 5467, Lagonoy Gulf, Philippines; j, 5th abdominal somite of same specimen; k, pre-anal tooth of same specimen; l, right antennal scale of same specimen; m, right appendices interna and masculina of same specimen; n, dactyl and propodus of right 3rd pereopod (proximal setae removed) of female [17.2 mm], *Albatross* sta 5468, Lagonoy Gulf; o, dactyl and propodus of right 4th pereopod of same specimen; p, dactyl and propodus of right 5th pereopod of same specimen.

120°26'45"E; 454 m; dark gray sand; 8.5°C; 18 Jul 1908 (1144–1204); 12' Agassiz beam trawl, mud bag: 1♂ [18.6] 1 ovig ♀ [22.3]. *Balayan Bay, southern Luzon*: sta 5111; 13°45'15"N, 120°46'30"E; 432 m; green mud; 16 Jan 1908 (1508–1538); 12' Tanner beam trawl, mud bag: 1 ovig ♀ [22.7]; sta 5365; 13°44'24"N, 120°45'30"E; [391 m]; 22 Feb 1909 (0904–0940); 25' Agassiz beam trawl: 3♂ [16.2–17.3] 8♀ [15.6–21.2], 1 ovig [20.1]. *Lagonoy Gulf, east of southern Luzon*: sta 5449; 13°21'36"N, 124°00'30"E; 549 m; 4 Jun 1909 (1438–1459); 12' Agassiz beam trawl, mud bag: 1y♂ [15.9]; sta 5463; 13°40'57"N, 123°57'45"E; [549 m]; [sand]; 16 Jun 1909 (1028–1044); 12' Agassiz beam trawl, mud bag: 4♂ [17.8–19.2] 2♀ [16.2, 30.7], 1 ovig [30.7]; sta 5465; 13°39'42"N, 123°40'39"E; [914 m]; gray mud; 17 Jun 1909 (0839–0859); 12' Agassiz beam trawl, mud bag: 1♀ [22.5]; sta 5467; 13°35'27"N, 123°37'18"E; [878 m]; gray mud; 18 Jun 1909 (0752–0834); 12' Agassiz beam trawl, mud bag: 10♂ [15.2–21.9] 32♀ [16.9–25.3], 2 ovig [21.3, 23.8]; sta 5468; 13°35'39"N, 123°40'28"E; [1041 m]; green mud; 18 Jun 1909 (0958–1031); 12' Agassiz beam trawl, mud bag: 1y♂ [12.0] 10♂ [15.6–21.5] 11♀ [12.1–23.2]; sta 5469; 13°36'48"N, 123°38'24"E; [914 m]; green mud; 18 Jun 1909 (1329–1411); 12' Agassiz beam trawl: 4♂ [18.2–21.9] 4♀ [17.8–24.2]; sta 5470; 13°37'30"N, 123°41'09"E; [1024 m]; [mud]; 18 Jun 1909 (1526–1600); 12' Agassiz beam trawl: 2♂ [16.1, 20.1] 10♀ [17.2–24.1]. *North of Samar*: sta 5444; 12°43'51"N, 124°58'50"E; 564 m; green mud; 7.4°C; 3 Jun 1909 (1032–1049); 12' Agassiz beam trawl: 3♂ [19.0–20.6] 5♀ [19.8–25.4], 2 ovig [22.2, 25.4]; sta 5445; 12°44'42"N, 124°59'50"E; 700 m; green mud, sand; 6.8°C; 3 Jun 1909 (1202–1238); 12' Agassiz beam trawl; 1♂ [19.3] 3♀ [20.6–26.0], 1 ovig [26.0]. *Northwest of Panay*: sta 5259; 11°57'30"N, 121°42'15"E; 571 m; gray mud, globigerina; 9.6°C; 3 Jun 1908 (1031–1051); 12' Agassiz beam trawl, mud bag: 2♂ [10.6, 15.9] 6♀ [17.9–21.7], 2 ovig [19.2, 21.0].

INDONESIA. *West of Halmahera*: sta 5619;

0°35'00"N, 127°14'40"E; 795 m; fine gray sand, mud; 27 Nov 1909 (1612-1646); 12' Agassiz beam trawl: 3♂ [15.1-21.2] 3♀ [15.8-24.7], 1 ovig [24.4]; sta 5620; 0°21'30"N, 127°16'45"E; 655 m; gray mud; 28 Nov 1909 (0624-0645); 12' Agassiz beam trawl: 18♂ [15.0-21.0] 12♀ [10.3-23.0], 3 ovig [20.8-21.3]; sta 5622; 0°19'20"N, 127°28'30"E; 503 m; gray mud; 29 Nov 1909 (0803-0824); 12' Agassiz beam trawl, mud bag: 4♂ [17.3-21.0]; sta 5623; 0°16'30"N, 127°30'00"E; 497 m; fine sand, mud; 29 Nov 1909 (0922-0944); 12' Agassiz beam trawl: 1♀ [15.1]. *Teluk Bone, Celebes*: sta 5655; 3°34'10"S, 120°50'30"E; 1112 m; gray mud, fine sand; 4.0°C; 18 Dec 1909 (1100-1120); 12' Agassiz beam trawl: 1♂ [21.2]; sta 5657; 3°19'40"S, 120°36'30"E; 900 m; gray mud; 5.2°C; 19 Dec 1909 (1108-1128); 12' Agassiz beam trawl: 1♂ [16.9] 1 ovig ♀ [22.2].

RANGE.—Eastern Africa to the Kermadec Islands, north of New Zealand; 366-1269 m.

REMARKS.—This is an exasperatingly variable species as regards the form and inclination of the rostrum, the distinctness of the tooth on the pleuron of the fifth abdominal somite, the length of the telson, the shape of the antennal scale, the proportionate lengths of the distal segment of

the third and fourth pereopods, and even the form of the appendix masculina. Individual lots are likely to be composed of specimens so similar in appearance that the presence of several specific populations is suggested, but the examination of additional material dispels the thought that *N. undulatipes* can be subdivided as Crosnier and Forest (1973) were able to do with the corresponding Atlantic species, *N. cursor*.

In spite of the variability of *N. undulatipes*, I have decided that it is best for the time being to consider it as distinct from the related Atlantic species. In nearly all of the Philippine-Indonesian specimens examined, the dorsal margin of the rostrum is horizontal or slightly concave anteriorly, not slightly convex near the tip as in typical specimens of *N. cursor*. In this respect, *N. undulatipes* resembles *N. africanus* Crosnier and Forest (1973:101), but the dorsal teeth of the rostrum seem to be more widely spaced anteriorly in the Philippine populations. Finally, although the tooth on the pleuron of the fifth abdominal somite may be almost vestigial in a few of the *Albatross* specimens, in none of them is it entirely lacking as in *N. rotundus* Crosnier and Forest (1973:103).

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