122°18′45″E; 969 m; green mud; 10.4°C; 23 Apr 1908 (1357–1437); 12′ Agassiz beam trawl, mud bag: 1♀ [15.1]. *Camotes Sea east of Cebu:* sta 5410; 10°28′45″N, 124°05′30″E; 704 m; green mud; 18 Mar 1909 (1156–1210); 12′ Agassiz beam trawl, mud bag: 1 ovig ♀ [14.0].

Canigao Channel between Leyte and Bohol: sta 5233; 10°00′22″N, 124°45′06″E; 7 May 1908 (2100–2129); 3-meter open net towed horizontally at 183 m: 6♂ [10.9–13.3] 10♀ [9.0–14.7], 3 ovig [11.8–14.7]; sta 5234; 10°N, 124°46′06″E; 7 May 1908 (2142–2204); 3-meter open net towed horizontally at 27 m: 1♂ [11.0] 2♀ [11.1, 11.2]. *Sogod Bay, southern Leyte:* sta 5487; 10°02′45″N, 125°05′33″E; 1339 m; green mud; 11.3°C; 31 Jul 1909 (1403–1426); 12′ Agassiz beam trawl: 1♂ [13.8]; sta 5488; 10°N, 125°06′45″E; 1412 m; green mud; 11.3°C; 31 July 1909 (1652–1738); 12′ Agassiz beam trawl: 1 ovig ♀ [13.2]. *Surigao Strait off Panaon Island:* sta 5486; 10°02′N, 125°19′20″E; 1070 m; 11.2°C; 31 Jul 1909 (0837–0920); 12′ Agassiz beam trawl: 1♂ [11.8].

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: 1♂ [13.0]; sta 5494; 9°06′30″N, 125°18′40″E; 1240 m; green mud, sand; 11.8°C; 2 Aug 1909 (0917–1052); 12′ Agassiz beam trawl: 1♂ [14.0]; 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: 1♀ [11.7]; sta 5497; 9°07′15″N, 124°59′30″E; 1756 m; green mud, fine sand; 11.3°C; 3 Aug 1909 (0955–1059); 3-meter net towed horizontally at 1463 m: 8♂ [8.4–15.1] 4♀ [11.9–13.0], 2 ovig [11.9, 13.0]. *Iligan Bay, northern Mindanao:* sta 5507; 8°21′12″N, 124°12′06″E; 777 m; green mud, fine sand; 11.6°C; 5 Aug 1909 (1309–1344); 12′ Tanner beam trawl: 1♂ [13.8] 1 juv [6.8]; sta 5511; 8°15′20″N, 123°57′E; 750 m; gray mud, sand; 11.7°C; 7 Aug 1909 (1218–1238); 12′ Tanner beam trawl: 1 ovig ♀ [12.1]. *East of Siquijor Island:* sta 5525; 9°12′30″N, 123°44′07″E; 741 m; gray mud; 11.8°C; 11 Aug 1909 (0828–0850); 12′ Tanner beam trawl: 1♂ [13.1]. *North of Siquijor Island:* sta 5528; 9°24′45″N, 123°39′15″E; 803 m; globigerina ooze; 11.8°C; 11 Aug 1909 (1542–1611); 12′ Tanner beam trawl: 1 ovig ♀ [12.0]. *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: 4♂ [13.0–14.1] 1 ovig ♀ [14.2]. *Panay Gulf northwest of Sojoton Point, Negros:* sta 5185; 10°05′45″N, 122°18′30″E; 1167 m; green mud; 9.9°C; 30 Mar 1908 (1726–1814); 3-meter open net towed horizontally at 1000 m for 20 minutes, then raised vertically to surface in 48 minutes: 1♂ [11.6]. *Sulu Sea, northwest of Mindanao:* sta 5544; 8°16′30″N, 122°26′30″E; 1389 m; green mud, fine sand; 9.9°C; 6 Sep 1909 (1034–1117); 3-meter open net towed horizontally at 1097 m: 1 juv [6.1]. *Cagayan Islands, Sulu Sea:* sta 5424; 9°37′05″N, 121°12′37″E; 622 m; coral sand; 10.2°C; 31 Mar 1909 (1324–1344); 12′ Agassiz beam trawl, mud bag: 1♂ [10.8]; sta 5425; 9°37′45″N, 121°11′E; 905 m; gray mud, coral sand; 9.7°C; 31 Mar 1909 (1420–1457); 12′ Agassiz beam trawl, mud bag: 1 ovig ♀ [14.1]. *Central Sulu Sea:* sta 5359; 8°12′45″N, 120°37′15″E; 4160 m; 9 Jan 1909 (1531–?); 12′ Agassiz beam trawl, reversible net (longitude and latitude approximate): 1♂ [15.4]. *Sulu Sea off Honda Bay, Palawan:* sta 5430; 9°49′40″N, 119°03′20″E; 848 m; globigerina ooze; 10.0°C; 6 Apr 1909 (1007–1054); 12′ Agassiz beam trawl: 1♀ [11.0]. *Sulu Sea off Puerto Princesa, Palawan:* sta 5429; 9°41′30″N, 118°50′22″E; 1401 m; green mud; 5 Apr 1909 (0814–0832); 12′ Agassiz beam trawl, mud bag: 1 ovig ♀ [15.0].

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♂ [13.1]. 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: 1♂ [13.7]. *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♂ [16.9]. *Makassar Strait off southwestern Celebes:*

sta 5664; 4°43′22″S, 118°53′18″E; 732 m; hard bottom; 6.3°C; 18 Dec 1909 (0943–1004); 12′ Agassiz beam trawl: 1♀ [15.1]. *Southwest of Makassar, Celebes:* sta 5662; 5°43′00″S, 119°-18′00″E; 386 m; (no bottom specimen); 9.3°C; 21 Dec 1909 (0612–0632); 12′ Agassiz beam trawl: 1♀ [11.8].

RANGE.—From the uniquely vast collections available to Kemp (1939) from the *Discovery, Dana,* and other vessels, he determined that *A. quadrispinosa*—which differs from the North Atlantic *A. purpurea* in having a posterodorsal tooth on the fourth abdominal somite—is widespread in the Indo-Pacific region from eastern Africa to the mid-Pacific at 163°W longitude, between 25°N latitude and 42°S latitude; the apparent latitudinal disparity between its distribution in the North and South Pacific was dispelled by Aizawa (1974:32), who extended the known northern limit to "nearly 44°N" in the northwestern Pacific. This species and *A. pelagica* (or *A. sica*) are the only members of the *A. purpurea* group that are known from both the Pacific and the Atlantic oceans. Until recently, the evidence indicated that the northeastern Pacific was the only part of the world ocean where that group is not represented, especially after the specimen from off Vancouver Island, British Columbia, originally identified by Butler (1971:1616) as *A. quadrispinosa,* was subsequently determined by the same author (1980:68) to be *Systellaspis cristata*. That area has now been narrowly reclaimed by Krygier and Pearcy (1981:83), however, who recorded a single specimen of *A. quadrispinosa* from west of Oregon.

Although *A. quadrispinosa* was taken in bottom trawls at no less than 25 *Albatross* stations, in total depths of 386–4160 m, there is little doubt that the species is invariably pelagic. Thirty specimens were collected at the 25 stations with bottom trawls, whereas 50 specimens were taken at only nine stations with less frequently used midwater nets towed horizontally at depths of 27–1463 m. The documentation on the two largest lots strongly supports the belief that the species migrates toward the surface at night and toward the bottom during daylight: one lot of 16 specimens was found in 183 m at 2100 hrs (sta 5233), whereas a lot of 21 specimens was taken in 1463 m (300 m above the bottom) between 1000 and 1100 hrs (sta 5497). During the daytime, no specimens were found at depths shallower than 567 m, but, on one occasion at nearly 2200 hrs (sta 5234), three specimens were collected in 27 m, the shallowest depth at which the species was recorded during the Expedition.

11. *Acanthephyra rostrata* (Bate, 1888)

Hymenedora rostrata Bate, 1888:846, pl. 136: fig. 4 [type-locality: the type-series of 3 specimens came from 3 different localities: northern Coral Sea southeast of Torres Strait; 12°08′S, 145°10′E, 2561 m; South China Sea off Lingayen Gulf, Luzon, Philippines; 16°42′N, 119°22′[E], 1920 m; and North Pacific Ocean northwest of Midway Islands; 36°23′N, 174°31′E, 0–3110 m in total depth of 5075 m].

Acanthephyra rostrata.—Kemp, 1906:19, 20, 23.

DIAGNOSIS.—Integument soft and membranous; rostrum triangular, less than ½ as long as carapace, not overreaching antennular peduncle, ventral margin oblique, unarmed; carapace not dorsally carinate posteriorly, dorsal profile slightly convex, not noticeably depressed at cervical groove, branchiostegal spine buttressed by long, carina-like ridge; abdomen somewhat carinate dorsally on 4 posterior somites, 4th and 5th somites, only, with posteromesial tooth, 6th somite about twice as long as posterior height; maximum carapace length 12 mm.

RANGE.—Known only from the three syntypes from the northern Coral Sea, South China Sea off Luzon, and North Pacific Ocean in the Emperor Seamount Chain northwest of the Midway Islands; the specimen from the last station was collected in a tow-net between the surface and 3110 m in a total depth of 5075 m.

REMARKS.—The disturbing note by Kemp (1906:20) that the type-series of *Hymenodora rostrata* is "in an extremely bad state of preservation" suggests that the species may remain enigmatic indefinitely.

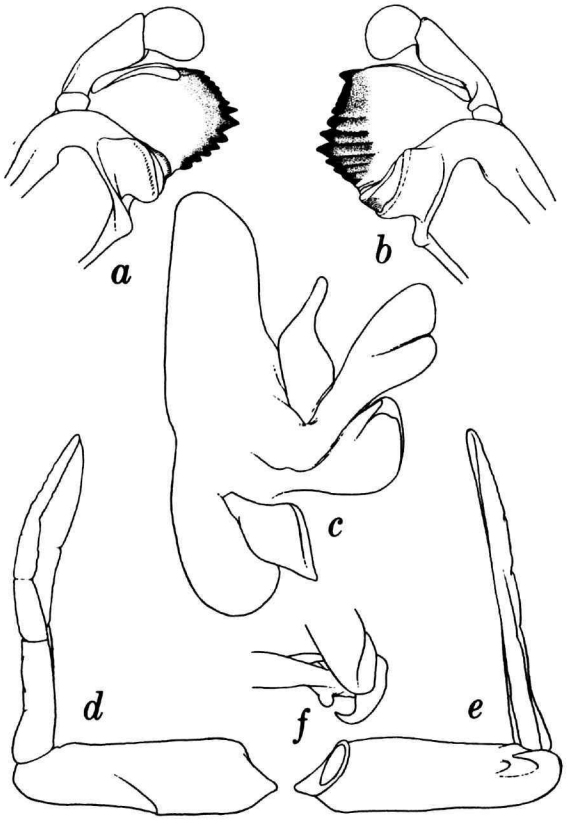

FIGURE 12.—*Acanthephyra purpurea*, male [17.7 mm], *Chain* sta RHB2574, northeast of Madeira Islands: *a*, left mandible (flexor or dorsal surface); *b*, right mandible; *c*, right 2nd maxilla; *d*, epipod (lateral aspect) from right 2nd pereopod; *e*, same (mesial aspect); *f*, same, mesial teeth (dorsal aspect).

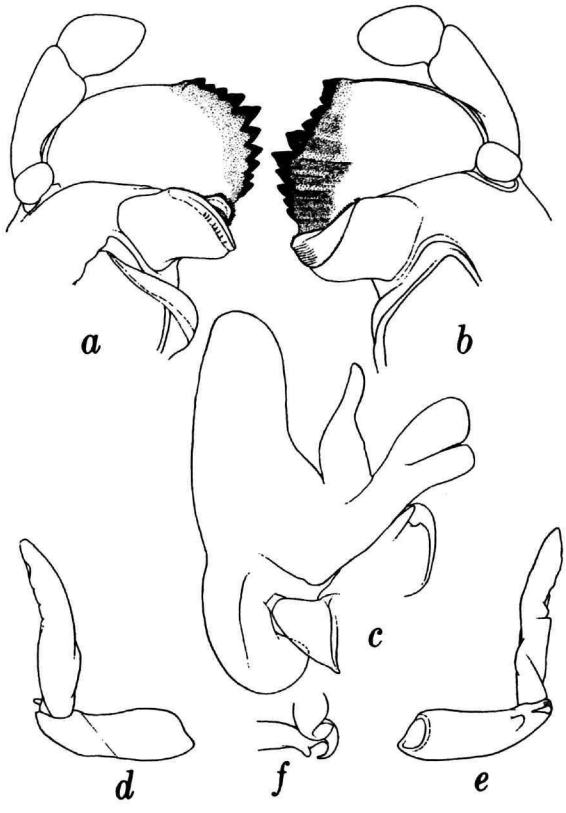

FIGURE 13.—*Acanthephyra stylorostratis*: *a*, left mandible (flexor or dorsal surface) of male [10.8 mm], *Knorr* sta 3126, east of Bermuda; *b*, right mandible of same specimen; *c*, right 2nd maxilla of male [14.8 mm], *Knorr* sta RHB3114-3115, east of Bermuda; *d*, epipod (lateral aspect) from right 2nd pereopod of male [10.8 mm], *Knorr* sta 3126; *e*, same (mesial aspect); *f*, same, mesial teeth (dorsal aspect).

*12. *Acanthephyra sanguinea* Wood-Mason and Alcock, 1892

FIGURES 3*i*, 4*u*, 5*u*, 7*h*, 10*d*

Acanthephyra sanguinea Wood-Mason and Alcock, 1892:358, fig. 1 [type-locality: the type-series consists of four specimens, each from a different *Investigator* station: 2 from the Laccadive Sea off Kerala State, India, 1995 and 1350 m; the Bay of Bengal west of the Andaman Islands, 3197 m; and the Andaman Sea off North Cinque Island, 896 m].—Wood-Mason, 1892: pl. 3: fig. 3.—Kemp, 1939: 576.

Acanthephyra kempii Balss, 1914:595 [type-locality: extreme southern part of Bay of Bengal; 70°01'N, 85°56'E; 0–2500 m].

Acanthephyra Kempi.—Balss, 1925:259, pl. 22.

DIAGNOSIS.—Integument firm; rostrum in adults usually longer than carapace and usually overreaching antennal scale, ventral margin convex, armed with several teeth; carapace with dorsal margin rounded, broadly so posteriorly, nearly level, branchiostegal spine buttressed, if at all, by very short, inconspicuous carina, suprabranchial ridge indistinct; abdomen dorsally carinate on all but anterior somite, 4 posterior somites with posteromesial tooth, 3rd somite with posterior margin somewhat excavate either side of median tooth, 6th somite barely twice as long

as posterior height; telson faintly sulcate anteriorly in dorsal midline, with 4 pairs of dorsolateral spines; eyestalk with bluntly triangular projection directed anteromesially from mesial margin; maximum carapace length 26 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♀ [13.6]. *Verde Island Passage, north of Mindoro:* sta 5287; 13°37′40°N, 120°39′E; 694 m; gray sand; 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♂ [16.0].

INDONESIA. *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: 1 ovig ♀ [12.0]. *Makassar Strait, off southwestern Celebes:* sta 5664; 4°43′22″S, 118°53′18″E; 732 m; hard bottom; 6.3°C; 28 Dec 1909 (0943–1004); 12′ Agassiz beam trawl: 1♂ [12.2].

RANGE.—Indopacific region from eastern Africa to 138°E longitude, between 18°N latitude and 12°S latitude; mesopelagic.

REMARKS.—Kemp (1939:577) was probably correct in believing that the unique holotype of *A. kempii* is an ovigerous female of this species with a curiously deformed rostrum.

13. *Acanthephyra sibogae* De Man, 1916

FIGURES 3*j*, 4*v*, 5*v*, 7*i*, 10*e*

Acanthephyra (Meningodora) Sibogae De Man, 1916:149 [type-locality: entrance to Teluk Bone, Celebes, Indonesia; 5°S, 121°18′E, 1944 m]; 1920:69, pl. 7.

DIAGNOSIS.—Integument soft and membranous; rostrum triangular, about ⅕ as long as carapace, not overreaching antennular peduncle, ventral margin oblique, usually unarmed; carapace sharply carinate in dorsal midline throughout most of length, faintly notched at cervical

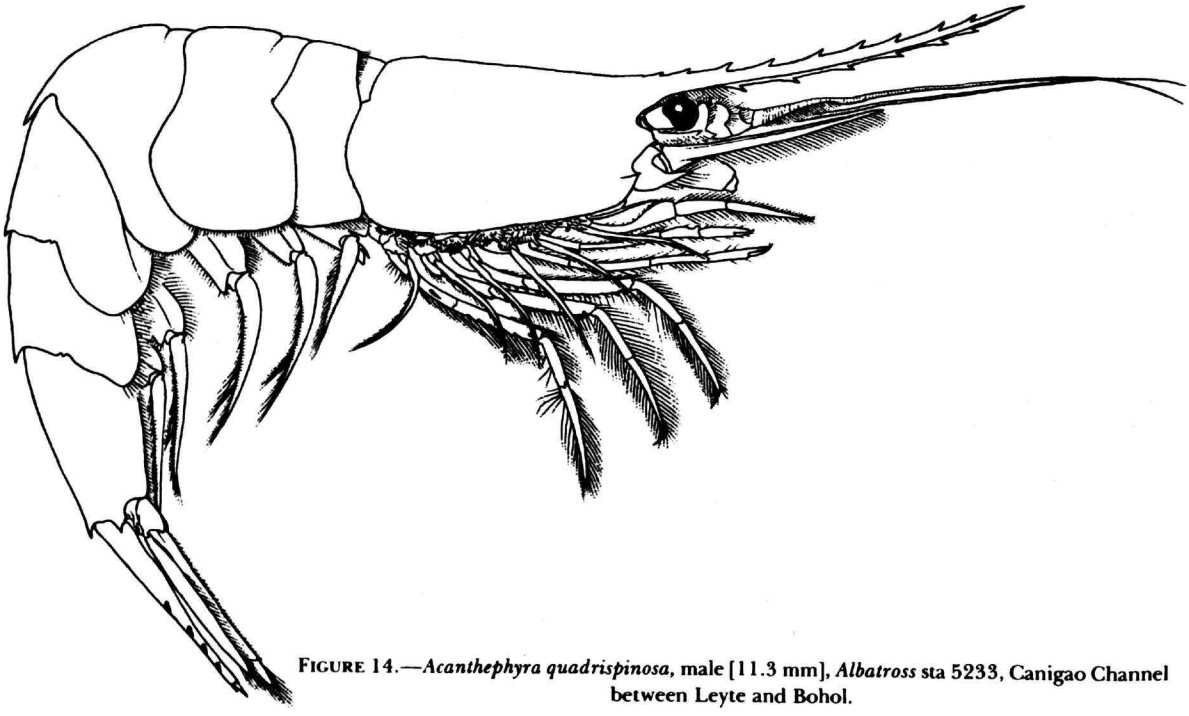

FIGURE 14.—*Acanthephyra quadrispinosa*, male [11.3 mm], *Albatross* sta 5233, Canigao Channel between Leyte and Bohol.

groove, branchiostegal spine set back from margin, outstanding, buttressed by carina extending posteriorly to about hepatic groove, another lateral carina extending posteriorly from near hepatic groove nearly to posterior margin of carapace; abdomen without median dorsal carina on 2 anterior somites, feebly carinate on 3rd somite, strongly so on 3 posterior somites with posteromesial tooth, 3rd somite with posterior margin nearly straight and unarmed, 6th somite more than twice as long as posterior height; telson with broad, sharply margined sulcus in dorsal midline; eyestalk with blunt papilla arising from mesial margin at junction with cornea and directed anteromesially, not nearly reaching level of distal surface of cornea; maximum carapace length 26 mm.

RANGE.—Known previously only from the type-locality off southern Celebes. There are specimens in the Smithsonian collections from the Banda Sea, Indonesia, and from the eastern South Pacific east of the Marquesas Islands. Open net collections suggest that the species usually occurs in midwater depths of nearly 1000 m or deeper.

14. *Acanthephyra smithi* Kemp, 1939

FIGURES 3*k*, 4*w*, 5*w*, 7*j*, 10*f*

Acanthephyra smithi Kemp, 1939:573, 577 [type-locality: Indo-Pacific from eastern Africa to 131°W, latitudinally to 14°S in the west and to 20°N to 24°S in the east; mesopelagic].

DIAGNOSIS.—Integument firm; rostrum in adults shorter than carapace, not overreaching antennal scale, ventral margin convex, armed with several teeth; carapace with semblance of low, blunt ridge anteriorly, broadly rounded posteriorly, nearly level, branchiostegal spine obscurely buttressed, with obscure longitudinal suture terminating on anterior margin just dorsal to spine, suprabranchial ridge indistinct; abdomen strongly carinate dorsally on all but anterior somite, 4 posterior somites with posteromesial tooth, 3rd somite with posterior margin somewhat excavate either side of median tooth, 6th somite no more than 1½ times posterior height; telson distinctly sulcate in dorsal midline, with 3 pairs of dorsolateral spines; eyestalks with triangular projection directed mesially from mesial margin; maximum carapace length 27 mm.

RANGE.—Of the three species of the *A. purpurea* group recorded from the central Indian Ocean, the Philippines, and Indonesia, *A. smithi* has been found farthest east in the Pacific. It seems to have a broader latitudinal range than *A. sanguinea* but it does not appear to wander far enough south to be represented in the South African or South Atlantic faunas, like *A. quadrispinosa*.

**Ephyrina* Smith, 1885

FIGURES 15–19

Ephyrina Smith, 1885:506. [Type-species, by monotypy: *Ephyrina Benedicti* Smith, 1885:506; gender: feminine.]

DIAGNOSIS.—Integument soft but not membranous; rostrum compressed into subtriangular or subrectangular vertical lamina, unarmed except for often acute anterodorsal angle; carapace not denticulate dorsally, with blunt, somewhat sinuous ridge or carina extending posteriorly from behind orbit nearly to posterior margin, without hepatic spine, hepatic furrow abruptly delimited posteriorly by oblique carina; abdomen without dorsal carina in midline of any somites, 6th somite longer than 5th; telson superficially blunt or subtruncate, not tapering regularly to sharply acute posterior end, without spinose endpiece; eye with cornea at least as wide as eyestalk in lateral aspect; antennal scale without lateral teeth proximal to distolateral spine; mandibles slightly dissimilar, incisor process unarmed over about ½ of opposable margin nearest palp; 2nd maxilla with proximal endite bearing papilla and submarginal lamina; 1st maxilliped with slender central lobe subdivided by 2 transverse sutures; 2nd maxilliped with distal segment ovoid, attached diagonally to preceding segment; 3rd maxilliped and 1st pereopod with exopods not unusually broad or rigid; pereopods with ischium and merus unusually broad and compressed, 4th pair with epipod vestigial; appendix masculina

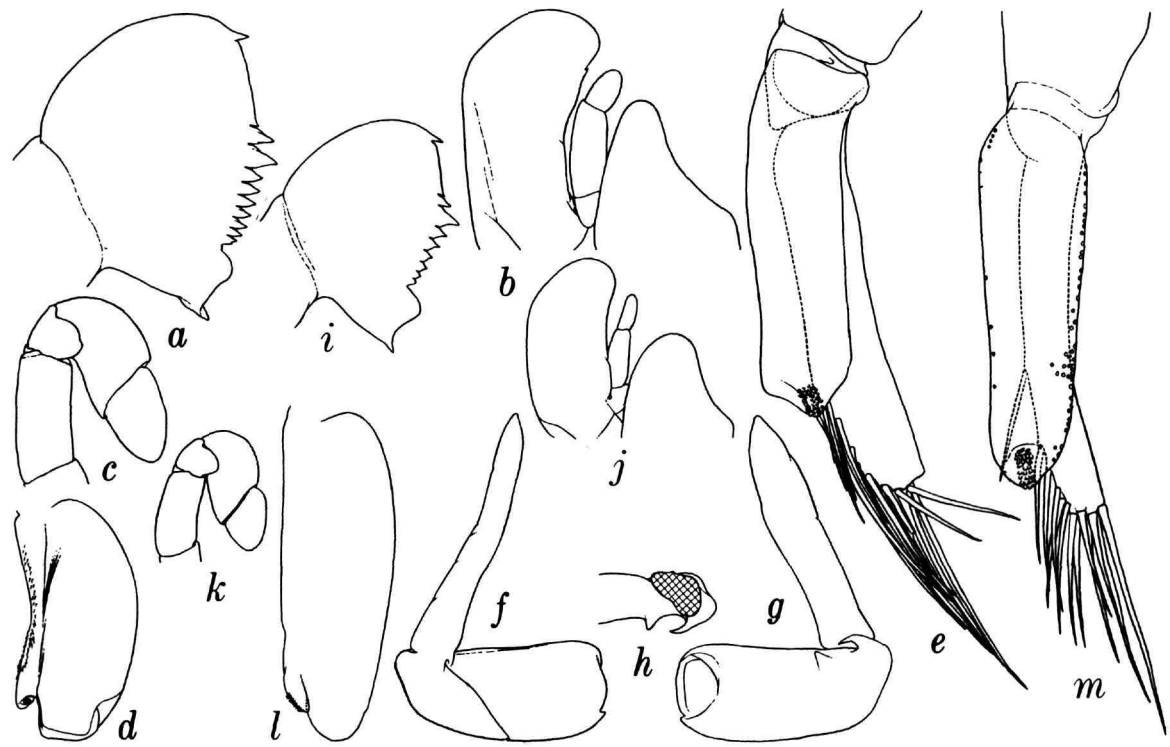

FIGURE 15.—*Ephyrina* (*a–h, E. bifida,* male [35.5 mm], *Albatross* sta 2653, Tongue of the Ocean, Bahamas; *i–m, E. figueirai,* male [23.0 mm], *Albatross II* sta 20323, Gulf Stream off Chesapeake Bay): *a,* extensor (ventral) surfaces of incisor and molar processes of right mandible; *b,* distal part of right 1st maxilliped; *c,* terminal segments of right 2nd maxilliped; *d,* endopod of right 1st pleopod; *e,* right appendices interna and masculina; *f,* epipod from right 2nd pereopod (lateral aspect); *g,* same (mesial aspect); *h,* same, mesial teeth (dorsal aspect); *i,* extensor (ventral) surfaces of incisor and molar processes of right mandible; *j,* distal part of right 1st maxilliped; *k,* terminal segments of right 2nd maxilliped; *l,* endopod of right 1st pleopod; *m,* right appendices interna and masculina.

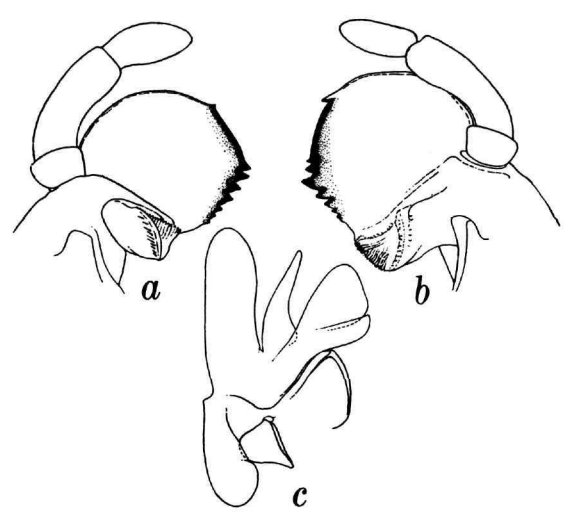

FIGURE 16.—*Ephyrina benedicti,* female or juvenile, [11.0 mm], *Atlantis II* sta RHB3055, north of Venezuela: *a,* left mandible (flexor or dorsal surface); *b,* right mandible; *c,* right 2nd maxilla.

present on 2nd pleopod of males; eggs large and few (less than 50).

RANGE.—Indian Ocean, Philippines, Indonesia, Japan, eastern Pacific, western North Atlantic, and eastern North and South Atlantic; mesopelagic and bathypelagic.

CLASSIFICATION.—Crosnier and Forest (1973) are to be commended for their skillful analysis of this genus, resulting in the confirmation of five valid species. In extension of that important syllogism, a sixth species is described below.

Key to the Species of *Ephyrina*

1. Third abdominal somite armed with flattened posteromesial tooth 2
   Third abdominal somite without tooth on posterior margin 3
2. Rostrum, in adults, with anteroventral margin oblique; 3rd abdominal somite with posteromesial tooth simple, triangular; telson overreaching mesial branch of uropod, row of dorsolateral spines submarginal, numbering 22–27 pairs . . . . . ***E. benedicti*** Smith, 1885:506
   (Japan and northeastern Philippine Sea west of Bonin Islands; western North Atlantic and eastern North and Equatorial Atlantic; mesopelagic and bathypelagic)

   Rostrum, in adults, with anteroventral margin nearly vertical; 3rd abdominal somite with posteromesial tooth bifid, margins subparallel; telson not reaching distal end of mesial branch of uropod, row of dorsolateral spines not submarginal, nearer dorsal surface, numbering 4–7 pairs . . . . . ***E. bifida*** Stephensen, 1923:58
   (Western North Atlantic and eastern North and Equatorial Atlantic; mesopelagic)
3. Pleuron of 5th abdominal somite rather sharply acute posteroventrally; telson armed with 14–34 dorsolateral spines disposed in 2 rows on each side . . . . . *16. ***E. figueirai***

   Pleuron of 5th abdominal somite bluntly rounded posteroventrally; telson with 4–12 dorsolateral spines in single row on each side 4
4. Adults with 6th abdominal somite distinctly sulcate in dorsal midline; telson with row of dorsolateral spines submarginal . . . 17. ***E. ombango***

   Adults with 6th abdominal somite transversely convex or very feebly depressed in dorsal midline; telson with row of dorsolateral spines not submarginal, situated nearer dorsal surface 5
5. Rostrum, in adults, with anteroventral margin convexly oblique anteriorad, apex distinctly advanced beyond margin; telson with 6–8 pairs of dorsolateral spines; 3rd pereopod with dactyl longer than propodus . . . . . 15. ***E. childressi***

   Rostrum, in adults, with anterior margin convexly subvertical or curved posteriorad dorsally, apex not advanced beyond margin; telson with 4–6 pairs of dorsolateral spines; 3rd pereopod with dactyl about as long as propodus . . . . . ***E. hoskynii*** Wood-Mason, in Wood-Mason and Alcock, 1891:194
   (Arabian Sea and Bay of Bengal; presumably mesopelagic)

15. *Ephyrina childressi*, new species

FIGURE 17

DIAGNOSIS.—Rostrum directed rather steeply anterodorsad, anteroventral margin oblique, curving with uncommon regularity from orbit to apex; abdomen with 3rd somite unarmed posteromesially, pleuron of 5th somite subrectangularly rounded posteroventrally, 6th somite transversely convex dorsally, without median sulcus; telson about as long as 6th somite, not overreaching mesial branch of uropod, bearing 6–8 pairs of dorsolateral spines aligned in single row somewhat removed from margin; 3rd pereopod with dactyl longer than propodus and merus about 2½ times as long as wide; maximum carapace length more than 22 mm.

SIZE.—Carapace length of ovigerous female holotype, 21.9 mm, of remaining juvenile and female specimens, 8.1–19.2 mm.

MATERIAL.—Eleven juveniles and females (1 ovigerous) collected in the Halmahera Sea by R/V *Alpha Helix*, 17–21 May 1975, during the Southeast Asian Expedition of the University of California, Santa Barbara, under the leadership of James J. Childress. The holotype is the ovigerous female from station 148 (USNM 211378).

TYPE-LOCALITY.—*Halmahera Sea, Indonesia:*

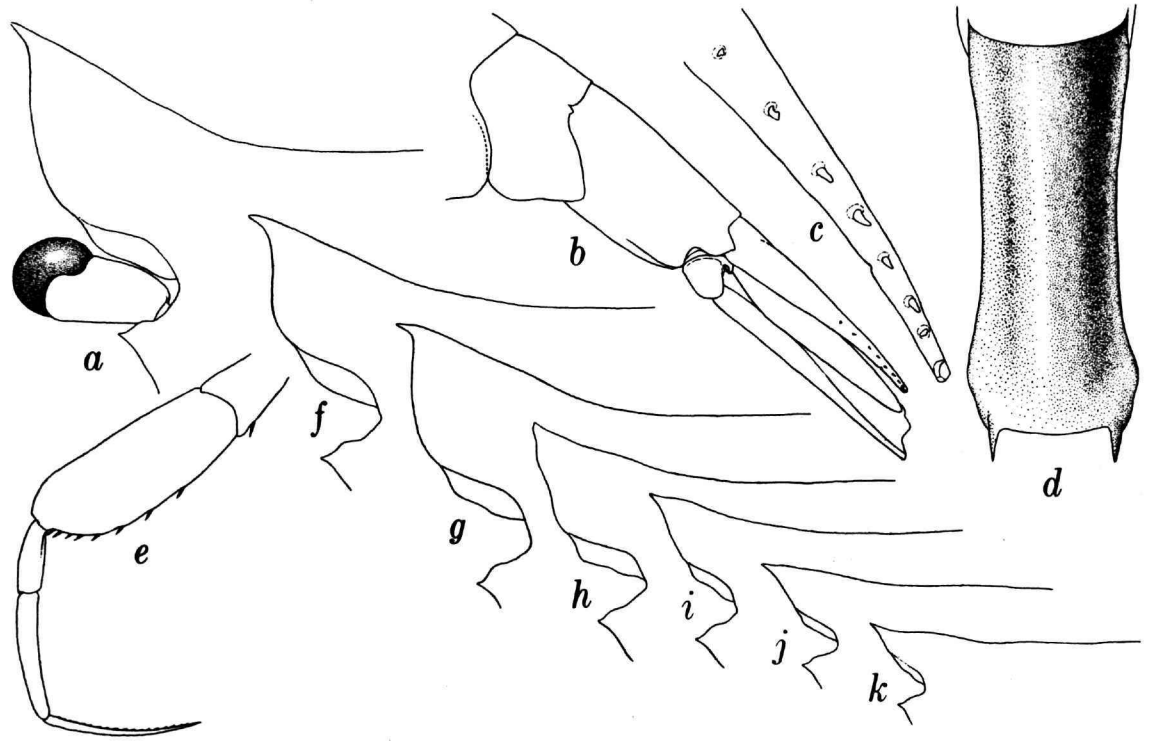

FIGURE 17.—*Ephyrina childressi*, new species: *a*, rostrum and eye of ovigerous female holotype [21.9 mm], *Alpha Helix* sta 148, Halmahera Sea; *b*, posterior end of abdomen of holotype; *c*, posterior part of telson (lateral aspect) of holotype; *d*, 6th abdominal somite (dorsal aspect) of holotype; *e*, left 3rd pereopod of holotype; *f*, rostrum of female paratype [19.2 mm], *Alpha Helix* sta 142; *g*, rostrum of female paratype [18.2 mm], *Alpha Helix* sta 123; *h*, rostrum of male paratype [16.0 mm], *Alpha Helix* sta 130; *i*, rostrum of juvenile paratype [11.8 mm], *Alpha Helix* sta 142; *j*, rostrum of juvenile paratype [10.3 mm], *Alpha Helix* sta 148; *k*, rostrum of juvenile paratype [8.1 mm], *Alpha Helix* sta 148.

0°33′42″S, 128°52′06″E; 950–1200 m; 21 May 1975; midwater trawl RMT-8.

RANGE.—Known only from the Halmahera Sea, Indonesia, in midwater depths of 600–1500 m.

REMARKS.—The inclusion of a species not represented in the *Albatross* collections is inconsistent with the intent expressed in the first part of this series to avoid the time-consuming study of collateral collections from the Philippine-Indonesian region. The temptation to examine some of the fine *Alpha Helix* material recently acquired by the Smithsonian was virtually irresistible because it seemed to offer an opportunity to determine whether *E. ombango* occurs in the Philippines and Indonesia. The discovery of this undescribed species resulted from that departure from my "game plan," and it seemed a rather minor accessory transgression to call attention to a taxon that was otherwise unknown from the area explored by the *Albatross* Philippine Expedition.

Ephyrina childressi seems to be quite distinct from its previously known congeners. The configuration of the rostrum approaches that in *E. benedicti*, but the unarmed third abdominal somite, the far fewer dorsolateral teeth on the telson, and the proportionately longer dactyl of the third pereopod serve to refute any close relationship between those species. The total absence of a dorsal longitudinal sulcus on the sixth abdominal somite seems to be duplicated only in *E. hoskynii* (except for *E. benedicti* and *E. bifida*, which are distinguished by the dentate third abdominal somite), and *E. hoskynii* differs markedly from *E. childressi* in the shape of the rostrum. Although juveniles of the latter species and of *E. ombango* in which the dorsal sulcus has not yet developed on the sixth abdominal somite might be confused, the form of the rostrum, the position of the row of telson spines, and the length of the dactyl of the third pereopod should reveal differences sufficient to separate the species.

ETYMOLOGY.—It is fit and proper that this species should bear the name of James J. Childress, whose generosity in making the caridean shrimps of the *Alpha Helix* Southeast Asian Expedition available to me exclusively provoked the chain of events that led to the dissemination of the above description.

*16. *Ephyrina figueirai* Crosnier and Forest, 1973

FIGURE 15*i–m*

Ephyrina figueirai Crosnier and Forest, 1973:73, figs. 20*b*, 21*g,h*, 22*c,d*, 23 [type-locality: Bay of Biscay; 0–2350 m].

DIAGNOSIS.—Rostrum directed moderately anterodorsad, anteroventral margin steeply oblique, not curving regularly from orbit to apex; abdomen with 3rd somite unarmed posteromesially, pleuron of 5th somite rather sharply acute posteroventrally, 6th somite with longitudinal sulcus in dorsal midline in adults, sometimes distinct only posteriorly; telson longer than 6th somite, reaching nearly as far as distal end of mesial branch of uropod, bearing 14–34 pairs of dorsolateral spines disposed in 2 rows; 3rd pereopod with dactyl longer than propodus and merus 2–3 times as long as wide; maximum carapace length 26 mm.

MATERIAL.—PHILIPPINES. *Western end of Verde Island Passage, north of Mindoro:* sta 5285; 13°39′36″N, 120°32′55″E; 497 m; soft mud; 8.1°C; 20 Jul 1908 (1005–1033); 12′ Agassiz beam trawl, mud bag: 1 ovig ♀ [18.5]. *Sibuyan Sea south of Bondoc Peninsula, Luzon:* sta 5379; 12°59′15″N, 122°30′40″E; 1682 m; 10.3°C; 4 Mar 1909 (1446–1602); 12′ Agassiz beam trawl, mud bag: 1 juv [11.0].

RANGE.—Indian Ocean, Philippines, Indonesia (*Alpha Helix* record from Halmahera Sea), and western and eastern North Atlantic; mesopelagic.

REMARKS.—Crosnier and Forest (1973:75, 81) noted that the ovigerous female from *Albatross* station 5285, examined by them, differed from available Atlantic specimens in the more extensive dorsal sulcus on the sixth abdominal somite, broader pereopodal meri, and slightly longer pereopodal dactyli. Fourteen specimens

that I have been able to examine—one male and seven immature specimens from the western North Atlantic and the ovigerous female and five immature specimens from the Philippines and Indonesia—are insufficient to confirm that the Indo-Pacific and Atlantic populations are taxonomically distinct. The sulcus on the sixth abdominal somite is not developed in juvenile specimens; to be sure, it is much deeper and more extensive in the ovigerous female from the Philippines than it is in the male from the North Atlantic, but more evidence is needed to determine the reliability of a character, such as this one, that may be subject to alteration by preservation. The merus of the third pereopod of the Philippine ovigerous female is barely 2.4 times as long as wide, but it is only 2.6 times as long as wide in the Atlantic male; it varies from 2.4 to 3.1 times as long as wide in Philippine and Indonesian juveniles and from 2.0 to 3.1 in those from the Atlantic. The greater relative length of the dactyl of the third pereopod may prove to be significant when more material becomes available for study; as indicated by Crosnier and Forest (1973:81), the propodus of the third pereopod in the Philippine ovigerous female is only two-thirds as long as the dactyl, whereas it is noticeably longer, proportionately, in juveniles from both regions. It is evident, however, that a clear distinction between the two populations is not yet apparent.

17. *Ephyrina ombango* Crosnier and Forest, 1973

FIGURES 18, 19

Ephyrina ombango Crosnier and Forest, 1973:68, figs. 20*a*, 21*a–f*, 22*a,b* [type-locality: off São Tomé, Gulf of Guinea; 0°30′N, 6°30′E, 0–1000 m in total depth of 2900m].

Ephyrina sp. A.—Crosnier and Forest, 1973:78–82, fig. 24*c–e*.

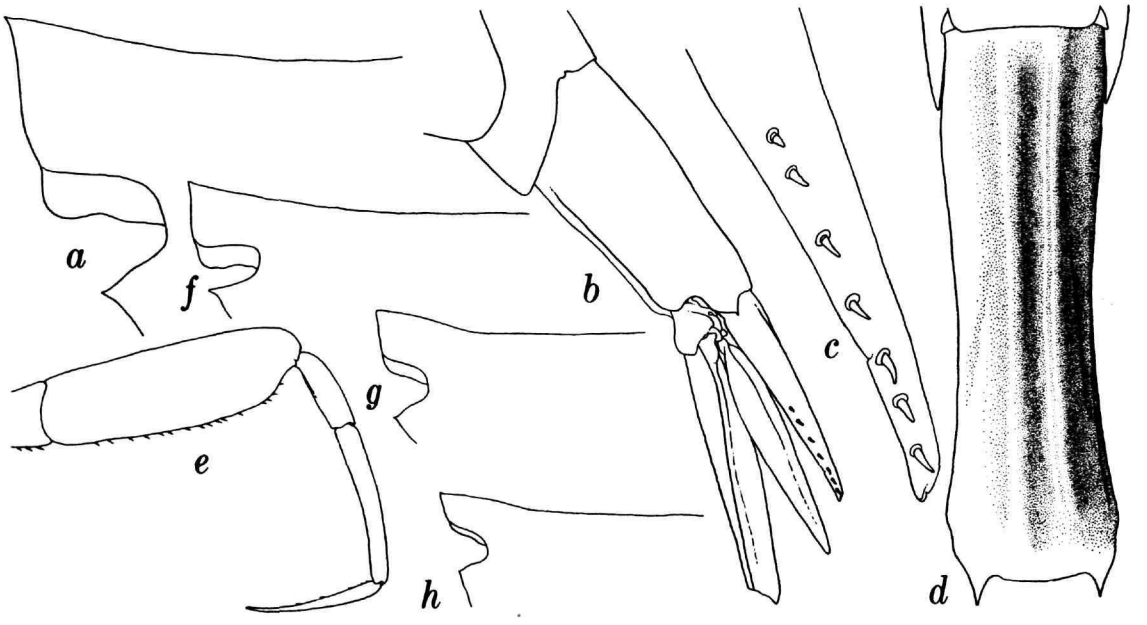

FIGURE 18.—*Ephyrina ombango*: *a*, rostrum of ovigerous female, [23.0 mm], *Alpha Helix* sta 97, Banda Sea; *b*, posterior end of abdomen of same specimen; *c*, posterior part of telson (lateral aspect) of same specimen; *d*, 6th abdominal somite (dorsal aspect) of same specimen; *e*, right 3rd pereopod of same specimen; *f*, rostrum of juvenile [13.3 mm], *Alpha Helix* sta 112, Banda Sea; *g*, rostrum of juvenile [9.7 mm], *Alpha Helix* sta 97, Banda Sea; *h*, rostrum of juvenile [7.5 mm], *Alpha Helix* sta 97, Banda Sea.

DIAGNOSIS.—Rostrum directed moderately anterodorsad, anteroventral margin steeply oblique to nearly vertical, not curving regularly from orbit to apex; abdomen with 3rd somite unarmed posteromesially, pleuron of 5th somite bluntly acute, rounded posteroventrally, 6th somite with pronounced longitudinal sulcus in dorsal midline in adults; telson shorter than 6th somite, not reaching distal end of mesial branch of uropod, bearing 5–12 pairs of dorsolateral spines aligned in single submarginal row; 3rd pereopod with dactyl shorter than propodus and merus 2½–3¼ times as long as wide; maximum carapace length 27 mm.

RANGE.—*Ephyrina ombango* has probably been found off the Cocos-Keeling Islands, Indian Ocean; in the Sulu Sea, Philippines; the Banda Sea, Indonesia; the eastern Pacific off Panama; the western North Atlantic; and the eastern North and South Atlantic. It is a mesopelagic species.

REMARKS.—Crosnier and Forest (1973:82) believed that specimens collected by the *Dana* Expedition off Cocos-Keeling Islands and in the eastern Pacific off Panama were conspecific with *E. ombango* but that the specimen taken by the same vessel in the Sulu Sea (page 78) represented a distinct species that they called "*Ephyrina* sp. A." As no species of *Ephyrina* other than *E. figueirai* was found in the *Albatross* Philippine

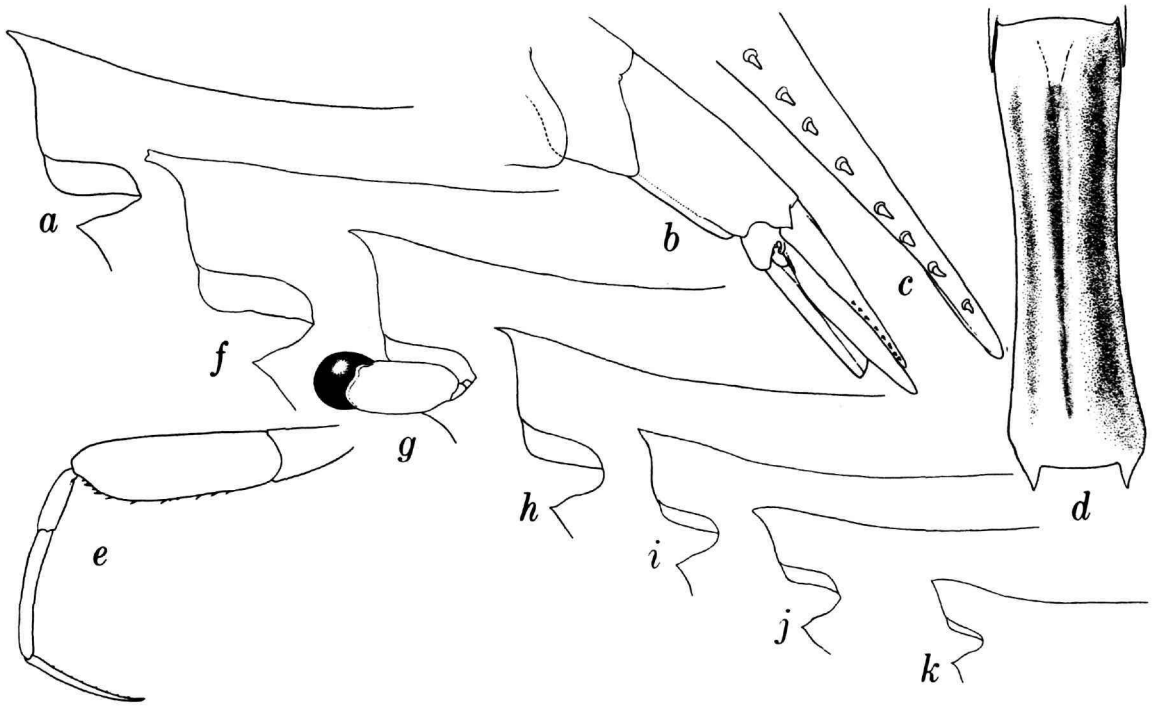

FIGURE 19.—*Ephyrina ombango*, variety ("sp. A" Crosnier and Forest, 1973): *a*, rostrum of female [18.2 mm], *Alpha Helix* sta 180, Sulu Sea; *b*, posterior end of abdomen of same specimen; *c*, posterior part of telson (lateral aspect) of same specimen; *d*, 6th abdominal somite (dorsal aspect) of same specimen; *e*, left 3rd pereopod of same specimen; *f*, rostrum of ovigerous female [21.3 mm], *Alpha Helix* sta 167, Sulu Sea; *g*, rostrum and eye of female [16.3 mm], *Alpha Helix* sta 180, Sulu Sea; *h*, rostrum of female [15.7 mm], *Alpha Helix* sta 193, Sulu Sea; *i*, rostrum of female, [12.5 mm], *Alpha Helix* sta 193; *j*, rostrum of juvenile [10.0 mm], *Alpha Helix* sta 187, Sulu Sea; *k*, rostrum of juvenile [8.3 mm], *Alpha Helix* sta 173, Sulu Sea.

material, I have examined the collections of the *Alpha Helix* Southeast Asian Expedition in an attempt to determine the probable status of *E.* sp. A. This effort revealed the presence of three different forms that might be referable to that taxon in the Sulu Sea, the Halmahera Sea, and the Banda Sea, respectively. The population in the Halmahera Sea has been desribed above as a distinct species. Those in the Sulu and Banda seas seem to differ only in the form of the rostrum (Figures 18, 19), specimens from the Banda Sea resembling the typical *E. ombango* and those from the Sulu Sea having the rostrum like that depicted for *E.* sp. A. This study has led to the conjecture that *E. ombango* is a variable species that has spawned varietal populations in parts of its range.

Heterogenys, new genus

TYPE-SPECIES.—*Acanthephyra microphthalma* Smith, 1885:502.

DIAGNOSIS.—Integument firm; rostrum with fewer dorsal than ventral teeth; carapace not carinate or denticulate dorsally, without lateral carinae, without hepatic spine, hepatic furrow not abruptly delimited posteriorly; abdomen dorsally carinate on 3rd through 6th somites, 6th somite longer than 5th; telson superficially blunt, not tapering regularly to sharply acute posterior end, without spinose endpiece; eye with cornea much narrower than eyestalk; antennal scale without lateral teeth proximal to distolateral spine; mandibles distinctly dissimilar, molar process with transverse distal surface triangular on right member of pair, compressed, sub-bilinear on left, incisor process armed with blunt teeth along entire opposable margin, sharply tapered to narrow opposable margin on left member of pair; 2nd maxilla with proximal endite bearing papilla and acute submarginal lamina; 1st maxilliped with slender central lobe subdivided by 2 transverse sutures; 2nd maxilliped with distal segment subtriangular, attached diagonally to preceding segment; 3rd maxilliped and 1st pereopod with exopods not unusually broad or rigid; pereopods with neither ischium nor merus broadly compressed, 4th pair with epipod vestigial; appendix masculina present on 2nd pleopod of male; eggs small and numerous (more than 80).

RANGE.—Bay of Bengal, Celebes Sea, off Japan, south of Tuamotu Archipelago, west of Oregon, and western and eastern North Atlantic; 2000–4792 m; probably benthic.

CLASSIFICATION.—This genus differs from *Acanthephyra,* with which it seems to be most closely allied, in having fewer dorsal than ventral teeth on the rostrum, unusual dentition on the abdominal somites, and, especially, the most dissimilar mandibles in the family, with relatively few, blunt teeth on the incisor process, and the other mouthparts uncommonly elongate. Only one species is currently recognized.

ETYMOLOGY.—From the Greek *heteros,* different, plus *genys,* jaw. The gender is feminine.

18. *Heterogenys microphthalma* (Smith, 1885), new combination

FIGURE 20

Acanthephyra microphthalma Smith, 1885:502 [type-locality: northwestern Sargasso Sea, east of North Carolina: 36°16′30″N, 68°21′00″W, 4707 m]; 1886b:668, pl. 13: fig. 3.

Acanthephyra longidens Bate, 1888:735, pl. 124: fig. 4 [type-locality: the two *Challenger* specimens were taken at two widely distant stations: eastern Celebes Sea: 2°55′N, 124°53′E, 3932 m, and South Pacific south of Tuamotu Archipelago: 32°36′S, 137°43′W, 4344 m].

DIAGNOSIS.—Rostrum directed anterodorsad, about as long as carapace, overreaching antennal scale, armed with 3 small dorsal teeth above orbit and 8 or 9 ventral teeth on anterior ⅔ of length; carapace rounded in dorsal midline, postcervical groove distinct laterally, not mesially, branchiostegal spine without buttress; abdomen with 3rd somite bearing long, slender posterodorsal spine overreaching 4th somite and preventing full extension of abdomen, 4th and 5th somites posteriorly unarmed, 6th with inconspicuous posterodorsal tooth; telson overreaching both branches

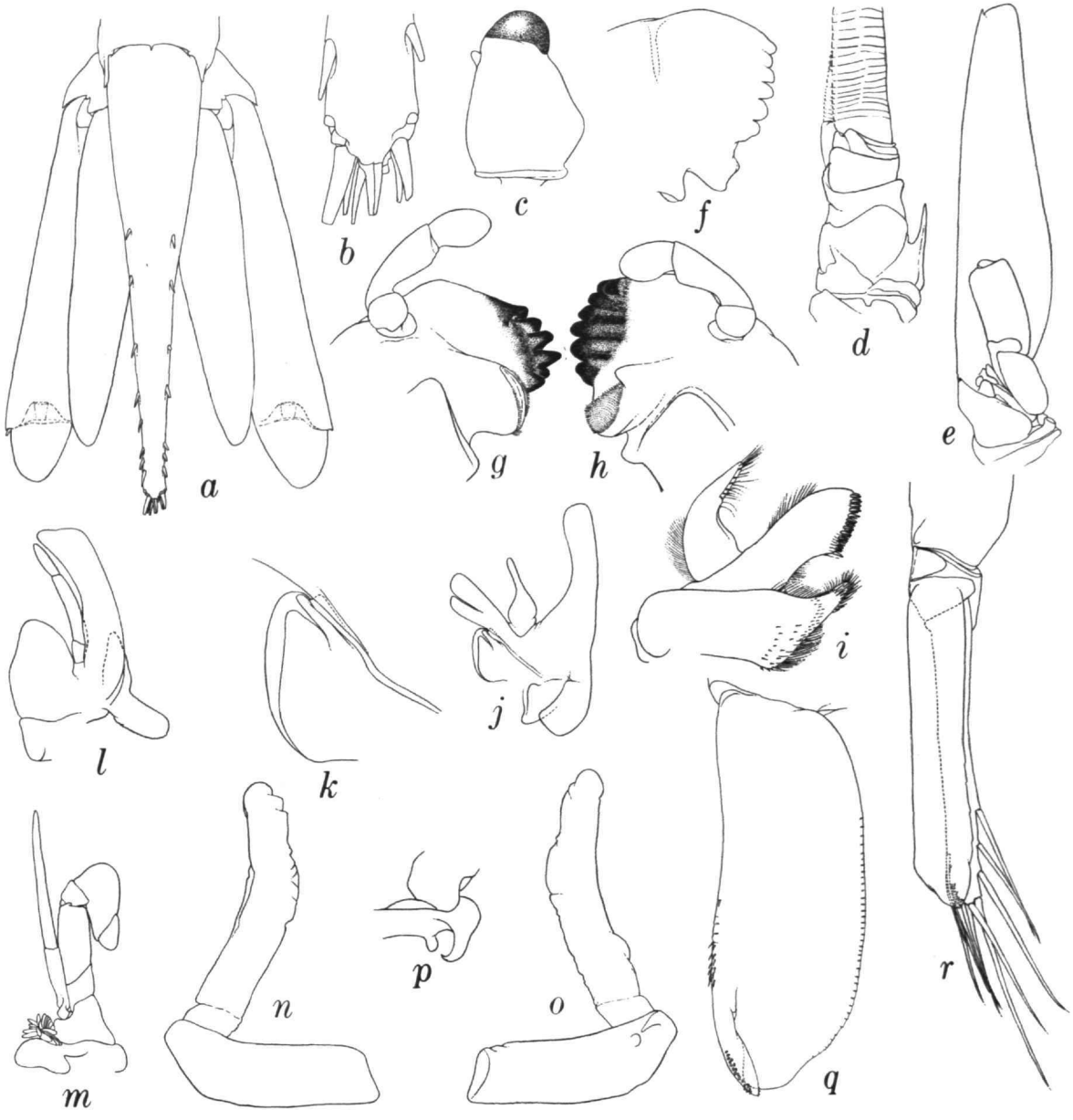

FIGURE 20.—*Heterogenys microphthalma*, male [20.8 mm], *Columbus Iselin* sta 3, Bahamas: *a*, telson and uropods; *b*, posterior end of telson; *c*, right eye (dorsal aspect); *d*, right antennular peduncle (dorsal aspect); *e*, right antenna (ventral aspect); *f*, extensor (ventral) surfaces of incisor and molar processes of right mandible; *g*, left mandible (flexor or dorsal surface); *h*, right mandible (same aspect); *i*, right 1st maxilla; *j*, left 2nd maxilla; *k*, same, proximal endite; *l*, left 1st maxilliped; *m*, right 2nd maxilliped; *n*, epipod (lateral aspect) from right 2nd pereopod; *o*, same (mesial aspect); *p*, same, mesial teeth (dorsal aspect); *q*, endopod of right 1st pleopod; *r*, right appendices interna and masculina.

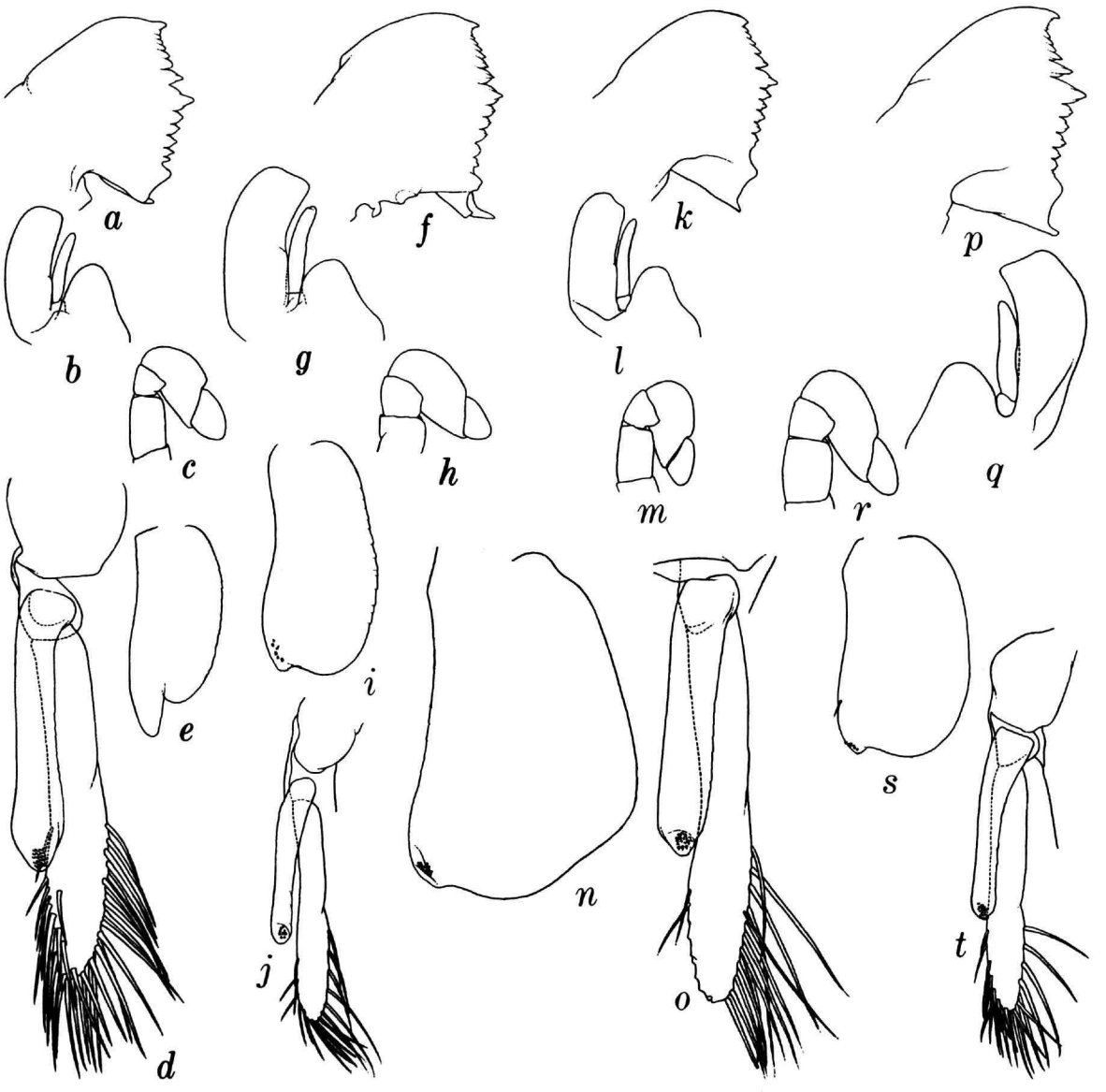

FIGURE 21.—*Hymenodora* (*a–e, H. acanthitelsonis; f–j, H. frontalis,* male [12.0 mm], *Albatross* sta 4764, Aleutian Islands; *k–o, H. glacialis,* male [~20 mm], *Triton,* off England; *p–t, H. gracilis,* male [~12 mm], *Columbus Iselin* sta 10, Bahamas): *a,* extensor (ventral) surfaces of incisor and molar processes of right mandible of male [18.8 mm], *Yaquina* sta 6907C, BMT-94, off Oregon; *b,* distal part of right 1st maxilliped of same specimen; *c,* terminal segments of right 2nd maxilliped of same specimen; *d,* right appendices interna and masculina of same specimen; *e,* endopod of right 1st pleopod of male holotype 13.2 mm], *Yaquina* sta 7003b, BMT-189; *f,* right mandible; *g,* right 1st maxilliped; *h,* right 2nd maxilliped; *i,* endopod of right 1st pleopod; *j,* right appendices interna and masculina; *k,* right mandible; *l,* right 1st maxilliped; *m,* right 2nd maxilliped; *n,* endopod of right 1st pleopod; *o,* right appendices interna and masculina; *p,* right mandible, *q,* left 1st maxilliped; *r,* right 2nd maxilliped; *s,* endopod of right 1st pleopod; *t,* right appendices interna and masculina.

of uropod, sulcate in anterior part of dorsal midline and armed with 7 or 8 dorsolateral spines; maximum carapace length 23 mm.

RANGE.—Although the number of published records of *H. microphthalma* is relatively low, they represent such remote localities (see generic "Range") as to suggest a nearly worldwide distribution in tropical and temperate seas. Most of the records are based on specimens taken in bottom trawls between 2000 and 4792 m, but two (Coutière, 1911, and Aizawa, 1974) refer to open midwater nets, and Wasmer (1972b:261) concluded, from an analysis of the foregut contents of a specimen taken in a beam trawl that the species "is probably not confined to the immediate neighborhood of the bottom." It seems to me, however, that a nektonic species would be seriously hampered by the unusual posteromesial spine on the third abdominal somite, which effectively prevents extension of the abdomen.

Hymenodora G.O. Sars, 1877

FIGURES 21, 22

Hymenodora G.O. Sars, 1877:340. [Type-species, by monotypy: *Pasiphaë glacialis* Buchholz, 1874:279; gender: feminine.]

DIAGNOSIS.—Integument thin, sometimes membranous; rostrum dentate on dorsal margin only; carapace not denticulate dorsally, without uninterrupted lateral carina extending from near orbit to near posterior margin, without hepatic spine, posterior slope of hepatic furrow not abruptly delimited by oblique carina; abdomen without carina or posteromesial teeth in dorsal midline on any somites, 6th somite longer than 5th; telson superficially blunt, not tapering regularly to sharply acute posterior end, rarely with spinose endpiece; eye with cornea narrower than eyestalk; antennal scale without lateral teeth proximal to distolateral spine; mandibles dissimilar, molar process with transverse distal surface triangular on right member of pair, compressed, sub-bilinear on left, incisor process toothed along entire opposable margin; 2nd maxilla with proximal endite lacking papilla and submarginal lamina; 1st maxilliped with slender central lobe subdivided by only 1 transverse suture; 2nd maxilliped with distal segment somewhat ovoid, attached diagonally to preceding segment; 3rd maxilliped and 1st pereopod with exopods not unusually broad or rigid; pereopods with neither ischium nor merus broadly compressed, 4th pair with epipod vestigial or absent; appendix masculina present on 2nd pleopod of males; eggs large and few (less than 50).

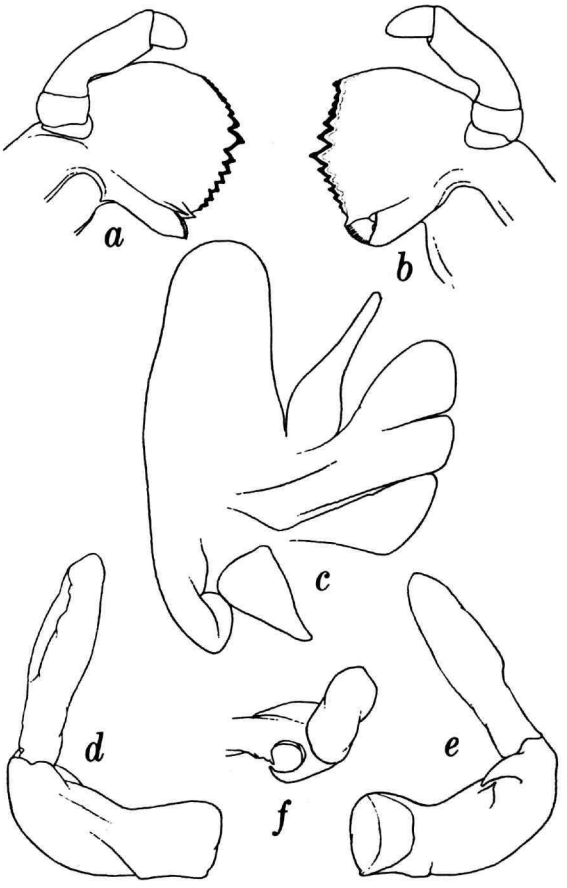

FIGURE 22.—*Hymenodora glacialis*, male [~20 mm], *Triton*, off England: *a*, left mandible (flexor or dorsal surface); *b*, right mandible; *c*, right 2nd maxilla; *d*, epipod (lateral aspect) from right 2nd pereopod; *e*, same (mesial aspect); *f*, same mesial teeth (dorsal aspect).

RANGE.—South Africa, Indian Ocean, Australian Basin, Philippine Sea, northern and eastern

Pacific and western and eastern North and South Atlantic; mesopelagic and bathypelagic. I am unaware of any records of *Hymenodora* from either the Philippines or Indonesia, proper.

CLASSIFICATION.—In some respects, *Hymenodora* seems to bridge the gap between some of the species of the possibly polyphyletic genus *Acanthephyra* and other oplophorid genera, even sharing some characters with the very different appearing large-eyed genera *Janicella* and *Oplophorus*. The only other genus without a semblance of a dorsal carina on any of the abdominal somites is *Ephyrina*, which has very different mouthparts, especially mandibles. The sharply sulcate telson is similar to that found in *Meningodora* and *Notostomus*, but a similar form is noticed in *Systellaspis cristata*, and the surprising occurrence of an endpiece in *Hymenodora acanthitelsonis* is certainly reminiscent of the similar structure in *Janicella* and *Systellaspis*. The rather unusual molar process on the left mandible may be intermediate between the form characteristic of *Acanthephyra* and the very different one found in *Systellaspis*. The second maxilla seems to lack both a papilla and a submarginal lamina on the proximal endite, an extreme condition that seems to be approached only in *Janicella*, and, of course, *Hymenodora* and *Janicella* are the only oplophorid genera in which there is only a single transverse suture subdividing the slender central lobe of the first maxilliped. The terminal segment of the second maxilliped is similar in shape to the one in *Ephyrina*, and both of them are intermediate between the triangular outline in *Acanthephyra* and *Notostomus* and the almost regularly ovoid segment in *Janicella*, *Oplophorus*, and *Systellaspis*. Finally, the large eggs produced by the species of *Hymenodora* are like those found otherwise in *Ephyrina*, *Janicella*, *Oplophorus*, and *Systellaspis*, whereas small eggs are characteristic of *Acanthephyra*, *Notostomus*, and the other genera.

Key to the Species of *Hymenodora*

1. Rostrum reaching at least as far as distal end of antennular peduncle; antennal scale with anteromesial angle of blade produced distally, reaching nearly to level of tip of distolateral spine . . . . . ***H. frontalis*** Rathbun, 1902:904
(Sea of Okhotsk, off Aleutian Islands and Pacific coast of North America to southern California; mesopelagic)

   Rostrum rarely overreaching eyes; antennal scale with distal end of blade subtruncate, not produced 2

2. Integument thin but not membranous; telson provided posteriorly with posteriorly rounded endpiece flanked by pair of long lateral spines and fringed on entire margin with about 30 long, contiguous spines . . . . . ***H. acanthitelsonis*** Wasmer, 1972a:87
(Off Pacific coast of Oregon; bathypelagic, 2400–3000 m

   Integument membranous; telson not terminating in spinose endpiece . . 3

3. Carapace with hepatic region delimited posterodorsally by anteriorly convex groove extending from epibranchial groove nearly to groove extending posterodorsally from near middle of hepatic furrow; antennal peduncle with dorsal lobe of 2nd segment (dorsal to base of antennal scale) regularly convex; 2nd maxilliped without podobranch . . . . . ***H. glacialis*** (Buchholz, 1874:279)

(Known with certainty from Arabian Sea, southern Indian Ocean, eastern Pacific off Oregon and Bay of Panama, Arctic region southward in North Atlantic, both west and east, to at least 30° N latitude, and South Atlantic off Argentina and Tristan da Cunha; mesopelagic and bathypelagic)

Carapace with hepatic region between suprabranchial groove and groove extending posterodorsally from near middle of hepatic furrow not delimited by transverse groove posterodorsally; antennal peduncle with dorsal lobe of 2nd segment produced laterally into blunt tooth; 2nd maxilliped with podobranch . . . . . .

. . . . . ***H. gracilis*** Smith, 1886b:76[680]

(South Africa, Arabian Sea, southern Indian Ocean, eastern Pacific off Oregon and seamounts west of Mexico, North Atlantic from Greenland to Gulf of Mexico and Bahamas in west and to off Congo in east; mesopelagic and bathypelagic)

**Janicella*, new genus

TYPE-SPECIES.—*Oplophorus spinicauda* A. Milne-Edwards, 1883.

DIAGNOSIS.—Integument firm; rostrum with more teeth in dorsal series than in ventral; carapace not denticulate dorsally, without lateral carina extending from near orbit to near posterior margin, without hepatic spine, hepatic furrow not abruptly delimited posteriorly by oblique carina; abdomen dorsally carinate on 2nd and 4th somites, with strong posteromesial tooth on 2nd, 3rd, and 4th, 6th somite longer than 5th; telson terminating posteriorly in sharply pointed, laterally spinose endpiece flanked by pair of long lateral spines; eye large, cornea wider than eyestalk; antennal scale with lateral teeth proximal to distolateral spine; mandibles similar, molar processes reduced, subtriangular, not directly opposable, incisor process toothed along entire opposable margin; 2nd maxilla with papilla and submarginal lamina on proximal endite reduced, not prominent; 1st maxilliped with slender central lobe subdivided by only 1 transverse suture; 2nd maxilliped with distal segment symmetrically oval, attached only slightly diagonally to preceding segment; 3rd maxilliped and 1st pereopod with exopods broad but not rigid; pereopods with neither ischium nor merus broadly compressed, 3rd pair with dactyl longer than propodus, 4th pair with epipod well-developed except for vertical component; no appendix masculina on 2nd pleopod of male; eggs large, 9 or 10 in number.

RANGE.—Perhaps pantropical, except for extreme eastern Pacific Ocean off American continents; mesopelagic.

CLASSIFICATION.—*Janicella* seems to be intermediate between *Oplophorus* and *Systellaspis*. It agrees with most species of *Oplophorus* and differs from most of those of *Systellaspis* in having the carapace carinate throughout the length of the dorsal midline; in lacking lateral spines on the posterior margins of the fourth and fifth abdominal terga; in having the antennal scale laterally dentate; and in having the exopods on the third maxilliped and first pereopod broadly compressed. It agrees with *Systellaspis* and differs from *Oplophorus* in having the sixth abdominal somite nearly twice as long as, rather than shorter than, the fifth; the telson terminating in a spinose endpiece; and the exopods on the third maxil-

liped and first pereopod flexible, rather than rigid. It differs from both *Oplophorus* and *Systellaspis* in lacking a posteromesial tooth on the fifth abdominal somite; in having the molar process of the mandible reduced and differently formed; in having only one transverse suture in the slender central lobe of the first maxilliped; and in having the dactyl of the third pereopod longer than the propodus. Finally, *Janicella* disagrees with all other members of the Oplophoridae and most other natantian shrimps in having a strong posteromesial spine on the second abdominal somite and in lacking any trace of an appendix masculina on the male second pleopod. Only one species is currently recognized.

ETYMOLOGY.—My wife, Janice, is fully aware of my opposition to the practice of naming biological taxa for relatives and personal friends who have not participated directly in activities associated with the description of those organisms. Credit for this first and last ostensible exception to that creed must go to some of my colleagues who have convinced me, after repeated appeals, that someone who has clearly modified her life style for more than 50 years in deference to the foibles of a spouse addicted to the rapture of descriptive zoology has surely contributed importantly to his professional research. The die having thus been cast, it is appropriate that *Janicella* be proposed as a component of the only crustacean family that is familiar to the honoree, as the result of editorial assistance rendered on my oplophorid doctoral dissertation during our courtship more than half a century ago. The gender of the name is feminine.

*19. *Janicella spinicauda* (A. Milne-Edwards, 1883), new combination

FIGURES 23, 24

Oplophorus spinicauda A. Milne-Edwards, 1883 [type-locality: off Casablanca, Morocco: *Travailleur* sta 65; 34°13′30″N, 7°43′W, 636 m; muddy sand; 30 Jul 1882].—Chace, 1940:184, fig. 54.

Oplophorus foliaceus Rathbun, 1906:922, pl. 20: fig. 8 [type-locality: western end of Kaiwi Channel, Hawaii: *Albatross* sta 3471; 21°10′30″N, 157°48′30″W, 616 m; fine white sand; 4 Dec 1891; large beam trawl].

Acanthephyra anomala Boone, 1927:104, fig. 21 [type-locality: north of Glover Reef, Gulf of Honduras: *Pawnee I*, 885 m; 20 Apr 1925].

DIAGNOSIS.—Integument firm but softer than in species of *Oplophorus*; rostrum up to twice as long as carapace, armed dorsally with 10–13 prominent teeth, including 2 or 3 situated on carapace posterior to orbital margin, ventrally with 6–8; carapace without discrete antennal spine separate from ventral angle of orbit, with submarginal ventral carina becoming marginal posterior to branchiostegal spine; abdomen with ventral margins of pleura of 1st and 2nd somites convexly incised in males, less distinctly so in females; telson faintly grooved in dorsal midline, overreaching both branches of uropod; antennal scale armed with 3 or 4 lateral teeth, distal margin of blade separated from distolateral spine by deep notch; mandible with large incisor process, much reduced molar process; 2nd maxilliped with penultimate segment transverse distally, terminal segment longer than broad; maximum carapace length 11 mm.

MATERIAL.—PHILIPPINES. *Verde Island Passage, north of Mindoro:* sta 5270; 13°35′45″N, 120°58′30″E; 430 m; 8 June 1908 (1507–1527); 3-meter open net towed horizontally at 256 m; 1 juv [4.4]. *Albay Gulf, east of southern Luzon:* sta 5458; 13°10′54″N, 123°59′38″E; [366 m]; 8 Jun 1909 (1404–1427); 12′ Agassiz beam trawl: 2♀ [6.1, 8.0] 30 juv [2.1–3.9]. *North of Tawitawi Island, Sulu Archipelago:* sta 5574; 5°30′45″N, 129°07′57″E; 622 m; 23 Sep 1909 (0720–0744); 9′ Tanner beam trawl, mud bag: 1 ovig ♀ [8.9].

RANGE.—As indicated above, *J. spinicauda* seems to be widespread mesopelagically in the tropical seas of the world, except in the eastern Pacific off the Americas. It is represented in considerable numbers in the midwater collections of the *Alpha Helix* from the Sulu, Halmahera, and Banda seas.

REMARKS.—*Janicella spinicauda* is the only oplophorid shrimp, of which adults cannot be sexed by reference to the appendix masculina. With experience, however, one can identify most mature males by the depth of the sinuses in the

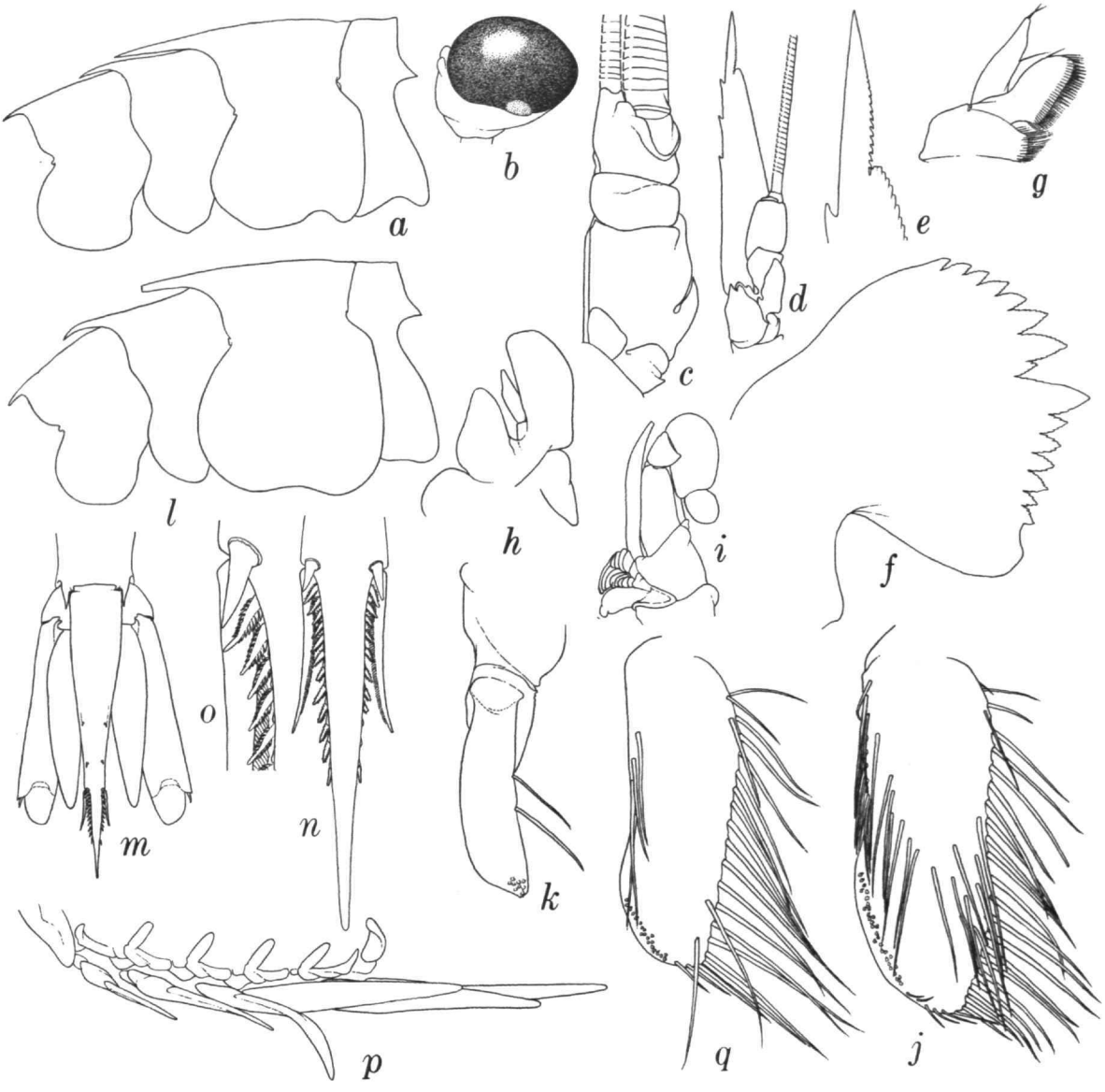

FIGURE 23.—*Janicella spinicauda: a,* anterior abdominal somites of male [8.6 mm], *Alpha Helix* sta 188, Sulu Sea; *b,* eye of same specimen; *c,* right antennular peduncle (dorsal aspect) of same specimen; *d,* right antenna (ventral aspect) of same specimen; *e,* apex of antennal scale of same specimen; *f,* extensor (ventral) surfaces of incisor and molar processes of right mandible of same specimen; *g,* right 1st maxilla of same specimen; *h,* left 1st maxilliped of same specimen; *i,* right 2nd maxilliped of same specimen; *j,* endopod of right 1st pleopod of same specimen; *k,* appendix interna on right 2nd pleopod of same specimen; *l,* anterior abdominal somites of ovigerous female [8.5 mm], *Alpha Helix* sta 182, Sulu Sea; *m,* telson and uropods of same specimen; *n,* posterior end of telson; *o,* same, detail of spination; *p,* right series of epipods and exopods of same specimen; *q,* endopod of right 1st pleopod of same specimen.

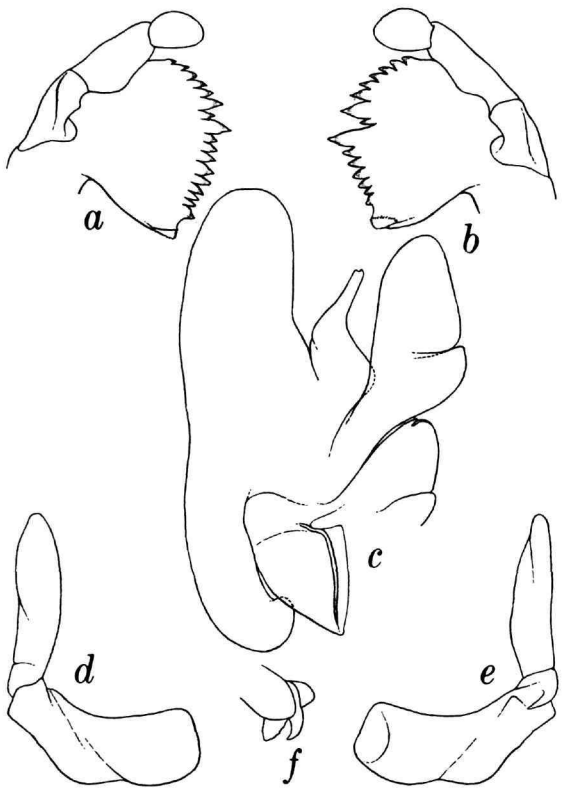

FIGURE 24.—*Janicella spinicauda*, male [8.6 mm], *Alpha Helix* sta 188, Sulu Sea: *a*, left mandible (flexor or dorsal surface); *b*, right mandible; *c*, right 2nd maxilla; *d*, epipod (lateral aspect) from right 2nd pleopod; *e*, same (mesial aspect); *f*, same, mesial teeth (dorsal aspect).

ventral margins of the pleura of the first and second abdominal somites.

Kemphyra, new genus

FIGURE 25

TYPE-SPECIES.—*Notostomus corallinus* A. Milne-Edwards, 1883.

DIAGNOSIS.—Integument thin but not membranous; rostrum with more teeth in dorsal series than in ventral; carapace with median dorsal carina not denticulate, without uninterrupted longitudinal carina extending from near orbit to near posterior margin, with hepatic spine, hepatic furrow not sharply delimited posteriorly; abdomen dorsally carinate on all somites, with posteromesial tooth on 3rd through 6th, 6th somite longer than 5th; telson superficially blunt posteriorly, not tapering regularly to sharply acute posterior end, without spinose endpiece; antennal scale without lateral teeth proximal to distolateral spine; mandibles dissimilar, molar process with transverse distal surface triangular on right member, compressed, sub-bilinear on left, incisor process toothed along entire, rather short opposable margin; 2nd maxilla with proximal endite bearing papilla and submarginal lamina; 1st maxilliped with slender central lobe subdivided by 2 transverse sutures; 2nd maxilliped with distal segment subtriangular, attached diagonally to preceding joint; 3rd maxilliped and 1st pereopod with exopods not unusually broad or rigid; pereopods with neither ischium nor merus broadly compressed, 4th pair with epipod vestigial; appendix masculina present on 2nd pleopod of male; eggs small and numerous (more than 80).

RANGE.—Off South Africa, the Horse Latitudes of the Indian and South Atlantic oceans, and the eastern North Atlantic off northern Portugal; about 1000 to more than 2700 m. There are two juvenile specimens in the Smithsonian collections that are certainly congeneric with *K. corallina* from Hawaii (1760–1937 m) and from the North Atlantic southwest of the Azores (3200 m).

CLASSIFICATION.—There is little doubt that this genus, like *Heterogenys*, is closely related to *Acanthephyra*. I must confess that the decision to remove *K. corallinus* from the enigmatic genus *Acanthephyra* was prompted chiefly by the unusual presence of an hepatic spine in that species. A spine in this position is unique in the family and it is uncommon in most caridean families, except the Palaemonidae, where it is often assumed to be of generic importance. In the latter family, however, an hepatic spine usually represents a displaced branchiostegal spine, whereas both hepatic and branchiostegal spines are present in *Kemphyra*. The two monotypic genera

FIGURE 25.—*Kemphyra corallina: a,* posterior margin of telson (spines missing) of female [26.0 mm], *Africana II* sta 190, west of Cape Town, South Africa; *b,* right eye (dorsal aspect) of same specimen; *c,* right antennular peduncle (dorsal aspect) of same specimen; *d,* right antenna (ventral aspect) of same specimen; *e,* left mandible (flexor or dorsal surface) of same specimen; *f,* right mandible of same specimen; *g,* right 1st maxilla of same specimen; *h,* right 2nd maxilla of same specimen; *i,* right 1st maxilliped of same specimen; *j,* right 2nd maxilliped of same specimen; *k,* distal end of right 3rd maxilliped of same specimen; *l,* right 1st chela of same specimen; *m,* distal ends of fingers of same; *n,* right 2nd chela of same specimen; *o,* distal ends of fingers of same; *p,* epipod (dorsal aspect) from right 2nd pereopod of same specimen; *q,* mesial tooth of same (dorsal aspect); *r,*right 5th pereopod of same specimen; *s,* dactyl of right 4th pereopod of male [38.0 mm], *Africana II* sta 319, west of Cape Town, South Africa; *t,* endopod of right 1st pleopod of same specimen; *u,* right appendices interna and masculina of same specimen.

removed herein from the genus *Acanthephyra*—*Heterogenys* and *Kemphyra*— differ greatly in general appearance, but they do seem to have something in common: both are probably confined to the deep-sea floor and both display similar mouthparts (mandibles with relatively narrow incisor process and second maxilla and first and second maxillipeds more elongate than usual in the genus *Acanthephyra*).

ETYMOLOGY.—This genus is dedicated to Stanley W. Kemp (1882–1945), who added so much to our knowledge of the Oplophoridae, from 1906 when he first recorded *Acanthephyra* from off the coast of Ireland to 1939 when he completed his masterful analysis of the *A. purpurea* group, and who devoted an extraordinary amount of time more than 50 years ago to cordial and much appreciated correspondence with an apprehensive young carcinologist who was trying to understand oplophorid systematics without other pertinent assistance. The name is formed by combining the surname Kemp with *Ephyra,* the oldest generic name in the family Oplophoridae, albeit a twice preoccupied junior homonym; I am indebted to L.B. Holthuis for suggesting the name. The gender is feminine.

REMARKS.—*Notostomus corallinus,* the type-species of the genus, was originally illustrated by A. Milne-Edwards (1883) from a specimen collected by the *Travailleur* off northern Portugal in 1882. A second specimen was taken by the *Valdivia* in the south central Indian Ocean and was described by Balss (1914:595) as *Acanthephyra valdiviae* and beautifully illustrated by the same author (1925:260, pl. 23). No less than seven specimens were found by the *Africana II* in 1959 off the Cape of Good Hope (Kensley, 1968:314, figs. 15–17). Finally, Burukovsky and Romensky (1982:1800) recorded a single specimen from the southeastern Atlantic west of the Cape of Good Hope.

**Meningodora* Smith, 1882

Meningodora Smith, 1882:73. [Type-species, by monotypy: *Meningodora mollis* Smith, 1882:74; gender: feminine.]

DIAGNOSIS.—Integument thin, typically membranous; rostrum with more dorsal than ventral

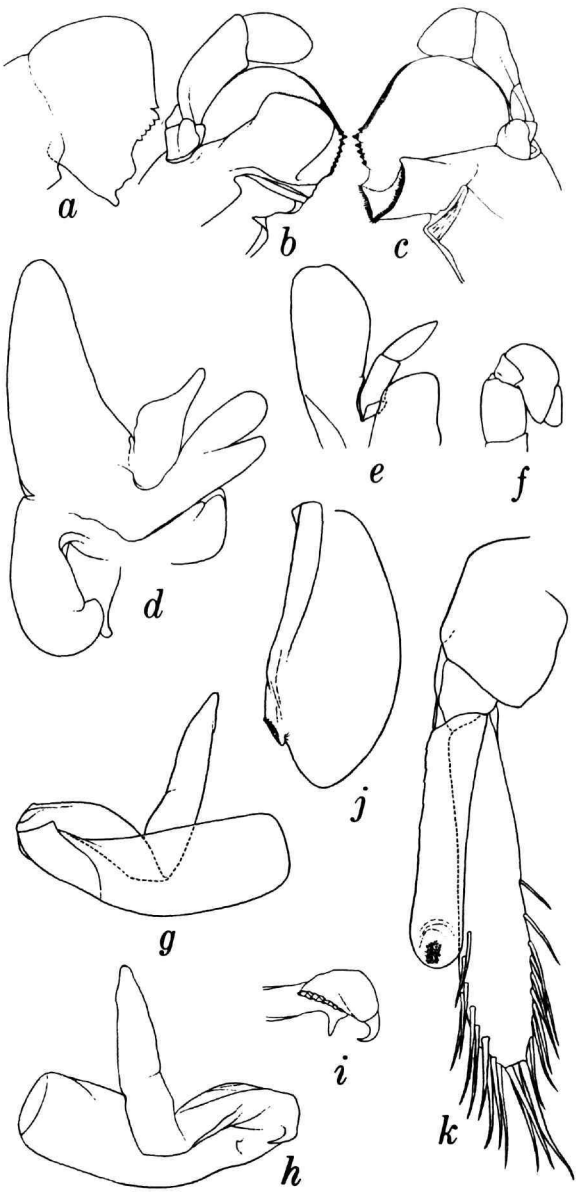

FIGURE 26.—*Meningodoro mollis,* male [22+ mm], *Oregon* sta 1028, Gulf of Mexico: *a,* extensor (ventral) surfaces of incisor and molar processes of right mandible; *b,* left mandible (flexor or dorsal surface); *c,* right mandible (same aspect); *d,* right 2nd maxilla; *e,* distal part of right 1st maxilliped; *f,* terminal segments of right 2nd maxilliped; *g,* epipod (lateral aspect) from right 2nd pereopod; *h,* same (mesial aspect); *i,* same, mesial teeth (dorsal aspect); *j,* endopod of right 1st pleopod; *k,* right appendices interna and masculina.

teeth; carapace not denticulate dorsally, with single uninterrupted carina extending posteriorly from near orbit to near posterior margin, without hepatic spine, hepatic furrow abruptly delimited posteriorly by oblique carina; abdomen dorsally carinate on at least 3rd through 6th somites and posteromesially dentate on at least 4th, 5th, and 6th, 6th somite at least as long as 5th; telson not terminating posteriorly in spinose endpiece; eye with cornea usually about as wide as eyestalk but typically much narrower; mandibles dissimilar, molar process with transverse distal surface triangular on right member of pair, compressed, sub-bilinear on left, incisor process unarmed over about ½ of opposable margin nearest palp; 2nd maxilla with papilla and submargial lamina on proximal endite; 1st maxilliped with slender central lobe subdivided by 2 transverse sutures; 2nd maxilliped with distal segment subtriangularly ovoid, attached diagonally to preceding segment; 3rd maxilliped and 1st pereopod with exopods not unusually broad or rigid; pereopods with neither ischium nor merus broadly compressed, 4th pair with epipod vestigial; appendix masculina present on 2nd pleopod of male; eggs small and numerous (more than 80).

RANGE.—Off South and eastern Africa, Indian Ocean, Indonesia, Philippines, South China Sea, eastern Pacific off Galapagos Islands, Panama, and Oregon, and western and eastern North and South Atlantic; mesopelagic.

CLASSIFICATION.—The restoration of *Meningodora* by Holthuis (1955:13, 17) was certainly proper, but my current study has engendered some doubt about the congeneric status, with *M. mollis,* of the four species now assigned to the genus that were originally described in the genus *Notostomus. Meningodora mollis* seems to differ from the other four species in the membranous, fragile integument; the eye with the cornea distinctly narrower than the eyestalk; the right mandible with the dentate part of the opposable margin of the incisor process less extensive and the anterior limit of the unarmed part not marked by a small tooth; the distal lobe of the scaphognathite of the second maxilla more nearly triangular than usual in the family; the lateral lobe of the first maxilliped not projecting mesiad at the distal end; and the appendix masculina overreaching the appendix interna by less than half the length of the latter, rather than being more than twice as long. The reason that I hesitate to propose a separate genus for *M. compsa, M. marptocheles, M. miccyla,* and *M. vesca* at this time is the fact that the mouthparts of *M. miccyla* are not as different from those of *M. mollis* as are those of the other three species.

Key to the Species of *Meningodora*

1. Third abdominal somite without posteromesial tooth 2
   Third abdominal somite bearing posteromesial tooth 4
2. Integument membranous; eye with cornea much narrower than eyestalk ..... *21. ***M. mollis***
   Integument soft but firm; cornea at least as wide as eyestalk in lateral aspect 3
3. Abdomen with 2nd somite dorsally carinate, 6th somite little longer than 5th ..... ***M. compsa*** (Chace, 1940:156)
   (Western and eastern North Atlantic; mesopelagic)
   Abdomen with 2nd somite not carinate dorsally, 6th somite about twice as long as 5th ..... *22. ***M. vesca***
4. Abdomen with posteromesial tooth on 3rd somite acutely triangular like those on following somites; chelipeds with movable finger terminating in 2 long slender spines; maximum carapace length 23 mm ..... 20. ***M. marptocheles***

Abdomen with posteromesial tooth on 3rd somite broadly truncate or concave distally; chelipeds with movable finger terminating in 2 small blunt spines; maximum carapace length 10 mm . . . . . ***M. miccyla*** (Chace, 1940:161)
(Off South Africa and western and eastern North Atlantic; mesopelagic)

20. *Meningodora marptocheles* (Chace, 1940)

Notostomus marptocheles Chace, 1940:158, figs. 33, 34 [type-locality: Northeast Providence Channel, Bahamas; 25°-29′N, 77°18′W; mesopelagic].

DIAGNOSIS.—Integument rather firm, not membranous; abdomen with 2nd somite dorsally carinate, 3rd somite armed with acutely triangular posteromesial tooth, 6th somite fully twice as long as 5th; eye with cornea about as wide as eyestalk in lateral aspect, narrower than eyestalk in dorsal aspect; chelipeds with movable finger terminating in 2 long curved spines; maximum carapace length 23 mm.

RANGE.—Banda Sea, Indonesia (one specimen apparently of this species collected by the *Alpha Helix*) and western North Atlantic; mesopelagic and bathypelagic.

*21. *Meningodora mollis* Smith, 1882

FIGURE 26

Meningodora mollis Smith, 1882:74, pl. 11: figs. 8, 8a, 9, pl. 12: figs. 5,5a, 6–9 [type-locality: east of Cape Lookout, North Carolina; 34°28′25″N, 75°22′50″W, 2985 m].
Hymenodoro mollis.—Bate, 1888:841, pl. 136: fig. 5.
Notostomus fragilis Faxon, 1893:207 [type-locality: southeast of Isla del Cooco, Costa Rica; 5°26′20″N, 86°55′00″W; 1408 m].
Acanthephyra mollis.—De Man, 1920:41, 45.
Notostomus mollis.—Balss, 1925:266, fig. 37.—Chace, 1940:164, fig. 38.

DIAGNOSIS.—Integument fragile; abdomen without dorsal carina on 2nd somite, without posteromesial tooth on 3rd somite, 6th somite about 1⅔ times as long as 5th; eye with cornea distinctly narrower than eyestalk; chelipeds with movable finger terminating in 2 small, blunt, unequal teeth; maximum carapace length 26 mm.

MATERIAL.—SOUTH CHINA SEA. *Luzon Strait west of Batan Islands, Philippines:* sta 5320; 20°58′N, 120°03′E; 3300 m; gray mud; 2.3°C; 6 Nov 1908 (1518–1551); 3-meter open net or ⅓-meter plankton net towed horizontally at 914 m: 1♀ [19.0].

RANGE.—Off South and eastern Africa, Indian Ocean, South China Sea, eastern Pacific between the Galapagos Islands and Panama and off Oregon, and western and eastern North and South Atlantic; mesopelagic and bathypelagic.

*22. *Meningodora vesca* (Smith, 1886)

FIGURE 27

Notostomus viscus Smith, 1886a:189, 192 [nomen nudum].
Notostomus vescus Smith, 1886b:676 [72] [type-locality: Gulf Stream east of Chesapeake Bay; 37°12′20″N, 69°39′00″W, 5393 m; globigerina ooze; beam trawl].—Chace, 1940:153, fig. 29.
Acanthephyra brevirostris Bate, 1888:751, pl. 126: figs. 5, 6 [type-locality: equatorial Atlantic ENE of St. Peter and St. Paul Rocks; 1°22′N, 26°36′W, 2743 m; globigerina ooze; trawled; not *A. brevirostris* Smith, 1885].
Acanthephyra batei Faxon, 1895:167 [replacement name for *A. brevirostris* Bate, not Smith].
Acanthephyra parvirostris Coutière, 1911:157 [erroneous spelling of *A. brevirostris*].
Meningodora vesca.—Crosnier and Forest, 1973:46, fig. 10*d*.

DIAGNOSIS.—Integument rather firm, not membranous; abdomen without dorsal carina on 2nd somite, 3rd somite unarmed, 6th somite fully twice as long as 5th; eye with cornea fully as wide as eyestalk in lateral aspect, narrower than eyestalk in dorsal aspect; chelipeds with movable finger terminating in 2 short spines; maximum carapace length 18 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♀ [8.7].

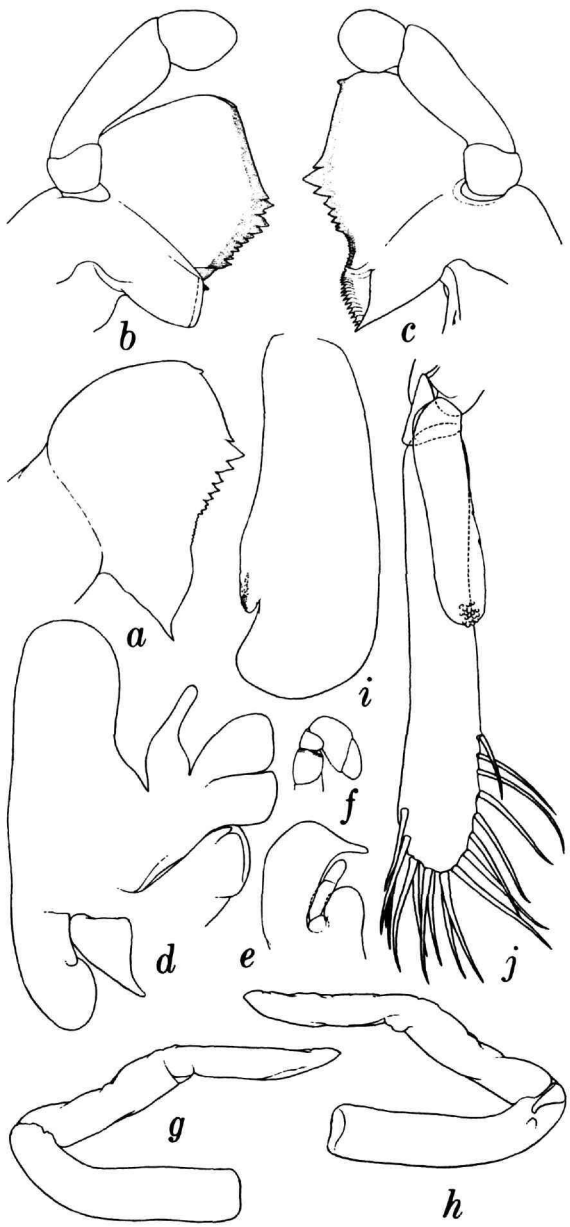

FIGURE 27.—*Meningodora vesca*, male [9.5 mm], *Albatross* sta 5544, Sulu Sea: *a*, extensor (ventral) surfaces of incisor and molar processes of right mandible; *b*, left mandible (flexor or dorsal surface); *c*, right mandible (same aspect); *d*, right 2nd maxilla; *e*, distal part of right 1st maxilliped; *f*, terminal segments of right 2nd maxilliped; *g*, epipod (lateral aspect) from right 2nd pereopod; *h*, same (mesial aspect); *i*, endopod of right 1st pleopod; *j*, right appendices interna and masculina.

Eastern end of Mindanao Sea: sta 5497; 9°07′15″N, 124°59′30″E; 1756 m; green mud, fine sand; 11.3°C; 3 Aug 1909 (0955–1059); 3-meter open net towed horizontally at 1463 m: 1♂ [9.5]. *Sulu Sea northwest of Mindanao:* sta 5544; 8°16′30″N, 122°26′30″E; 1389 m; green mud, fine sand; 9.9°C; 6 Sep 1909 (1034–1117); 3-meter open net towed horizontally at 1097 m: 3♂ [7.5–9.3] 2♀ [9.0, 10.0].

RANGE.—Bay of Bengal, Philippines, Indonesia, western North Atlantic, and eastern North and South Atlantic; mesopelagic.

REMARKS.—Comparison of 28 specimens collected by the *Alpha Helix* in Indonesia and the Philippines, received from James J. Childress, with 47 specimens from the western North Atlantic collected by vessels from the Woods Hole Oceanographic Institution, provided by David C. Judkins, has revealed differences in the rostral dentition of the two populations that may eventually prove to be taxonomically significant. The presumably typical form from the western Atlantic bears from 8 to 12 (average 9.8) teeth in the dorsal rostral series as opposed to 5–11 (average 8.9) in those from Indonesia and the Philippines. In the western Atlantic population, 40%–80% (average about 55%) of the teeth in the dorsal rostral series arise from the carapace posterior to the level of the posterior orbital margin; in the Philippine-Indonesian specimens, 50–90% (average about 65%) arise from the carapace posterior to the orbital margin. In the Atlantic series, 20–65% (average 45%) of the rostrum, proper, is dorsally unarmed anteriorly; in the Philippine-Indonesian sample, 30–95% (average nearly 60%) of the rostrum is dorsally unarmed. Most strikingly, 33 of 46 western Atlantic specimens have the rostrum armed with one tooth on the ventral margin, seven specimens have two ventral teeth, and six specimens have the rostrum unarmed ventrally, whereas only three of 27 Philippine Indonesian specimens have a single ventral rostral tooth, the other 24 specimens having no ventral teeth on the rostrum. These quantitative differences seem to suggest a clear distinction between these two populations; in the absence of other differences—except for a

slightly shorter appendix masculina—it seems best to postpone even a subspecific designation for the Philippine-Indonesian form until representatives from other parts of the world can be similarly compared with the typical facies.

**Notostomus* A. Milne-Edwards, 1881

FIGURES 28–31

Notostomus A. Milne-Edwards, 1881b:7. [Type-species, by original designation: *Notostomus gibbosus* A. Milne-Edwards, 1881b:7; gender: masculine.]

DIAGNOSIS.—Integument thin but not membranous; rostrum with more dorsal than ventral teeth; carapace with denticulate median carina throughout length, with 2 or more longitudinal carinae extending onto posterior ½ of lateral surface, without hepatic spine, hepatic furrow abruptly delimited posteriorly by oblique carina; abdomen carinate in dorsal midline of all somites and posteromesially dentate on 3rd through 6th, 6th somite longer than 5th; telson not terminating posteriorly in spinose endpiece; eye with cornea at least as wide as eyestalk; mandibles dissimilar, molar process with transverse distal surface triangular on right member of pair, compressed, sub-bilinear on left, incisor process unarmed over about ½ of opposable margin nearest palp; 2nd maxilla with papilla and submarginal lamina on proximal endite; 1st maxilliped with slender central lobe subdivided by 2 transverse sutures; 2nd maxilliped with distal segment subtriangular, attached diagonally to preceding segment; 3rd maxilliped and 1st pereopod with exopods not unusually broad or rigid; pereopods with neither ischium nor merus broadly compressed, 4th pair with epipod vestigial; appendix masculina present on 2nd pleopod of male; eggs small and numerous (more than 80).

RANGE.—Probably all tropical and temperate seas; mesopelagic.

REMARKS.—The following provisional key to the species of *Notostomus* that seem to me to be valid at the present time is offered with considerable reluctance because it may inhibit some of the intensive study that must be pursued before a complete understanding of the genus can be achieved. The species concepts on which the key is based stem in large part from the conclusions convincingly proposed, or merely suggested, by Crosnier and Forest (1973:49–64). The chief deterrent to definitive knowledge of the species of the genus has been the continuing paucity of available study material, especially of clearly adult specimens. Even the series of 32 specimens of *N. japonicus* which prompted the redescription of that species by Stevens and Chace (1965) contained no ovigerous females, and the largest males are considerably smaller than the male holotype of the species. It is regrettable that Stanley Kemp did not live to complete his promising study of the numerous specimens of *Notostomus*—incuding at least one undescribed species (see Crosnier and Forest, 1973:63, footnote)—collected by the *Dana* Expedition, and it is to be hoped that someone else will have the opportunity to conclude that study in the near future.

Key to the Species of *Notostomus*

1. Two lateral carinae on base of rostrum 2
   One lateral carina, coincident with dorsal margin of orbit, on base of rostrum 6
2. Two lateral carinae ventral to carina supporting branchiostegal spine . . 3
   One longitudinal carina ventral to carina supporting branchiostegal spine 5
3. Upper lateral rostral carina not extending posteriorly beyond level of posterior margin of orbit nor reaching anteriorly as far as extremity of

lower lateral rostral carina; anterior abdominal somite with median dorsal carina more than ½ as long as tergite, measured laterally; stylocerite not reaching 3rd segment of antennular peduncle . . . . . *23. ***N. elegans***

Upper lateral rostral carina extending posteriorly beyond level of posterior margin of orbit and anteriorly overreaching lower lateral rostral carina; anterior abdominal somite with median dorsal carina less than ½ as long as tergite, measured laterally; stylocerite overreaching 2nd segment of antennular peduncle 4

4. Lateral rostral carinae extending anteriorly nearly to anterior extremity of rostrum; gastro-orbital carina sinuous at posterior extremity; anterior abdominal somite with median dorsal carina not dentate anteriorly; telson with 5 pairs of dorsolateral spinules . . . . . ***N. auriculatus*** Barnard, 1950:670
(Off Cape of Good Hope and South Atlantic Ocean south of 25°S latitude; mesopelagic)

Lateral rostral carinae extending anteriorly little beyond level of distal extremity of antennular peduncle; gastro-orbital carina curving slightly dorsad at posterior extremity, not sinuous; anterior abdominal somite with median dorsal carina dentate anteriorly; telson with 2 or 3 pairs of dorsolateral spinules . . . . . ***N. crosnieri*** Macpherson, 1984:54
(Eastern Atlantic Ocean between 25°N latitude and 19°S latitude; mesopelagic)

5. Short carina extending posterodorsad from midlength of dorsal longitudinal lateral (gastro-orbital) carina on carapace . . . . . ***N. japonicus*** Bate, 1888:830
(South of Honshu, Japan, and eastern North Pacific off northwestern United States; mesopelagic)

No carina extending posterodorsad from midlength of dorsal longitudinal lateral (gastro-orbital) carina on carapace . . . . . ***N. murrayi*** Bate, 1888:829
(South central Atlantic west of Tristan da Cunha)

6. Dorsal margin of carapace rather regularly convex in adults; lower lateral rostral carina continuous with gastro-orbital carina on carapace . . . . . 24. ***N. gibbosus***

Dorsal margin of carapace nearly straight in central part in adults; lower lateral rostral carina not continuous with gastro-orbital carina on carapace 7

7. Dorsal teeth at base of rostrum smaller than those on slender anterior part; subhepatic carina not extending nearly to posterior margin of carapace . . . . . ***N. distirus*** Chace, 1940:166
(Western North Atlantic off Bermuda; 1829 m)

Dorsal teeth at base of rostrum enlarged; subhepatic carina extending posteriorly nearly to posterior margin of carapace . . . . . ***N. robustus*** Smith, 1884:377
(Western temperate North Atlantic; mesopelagic)

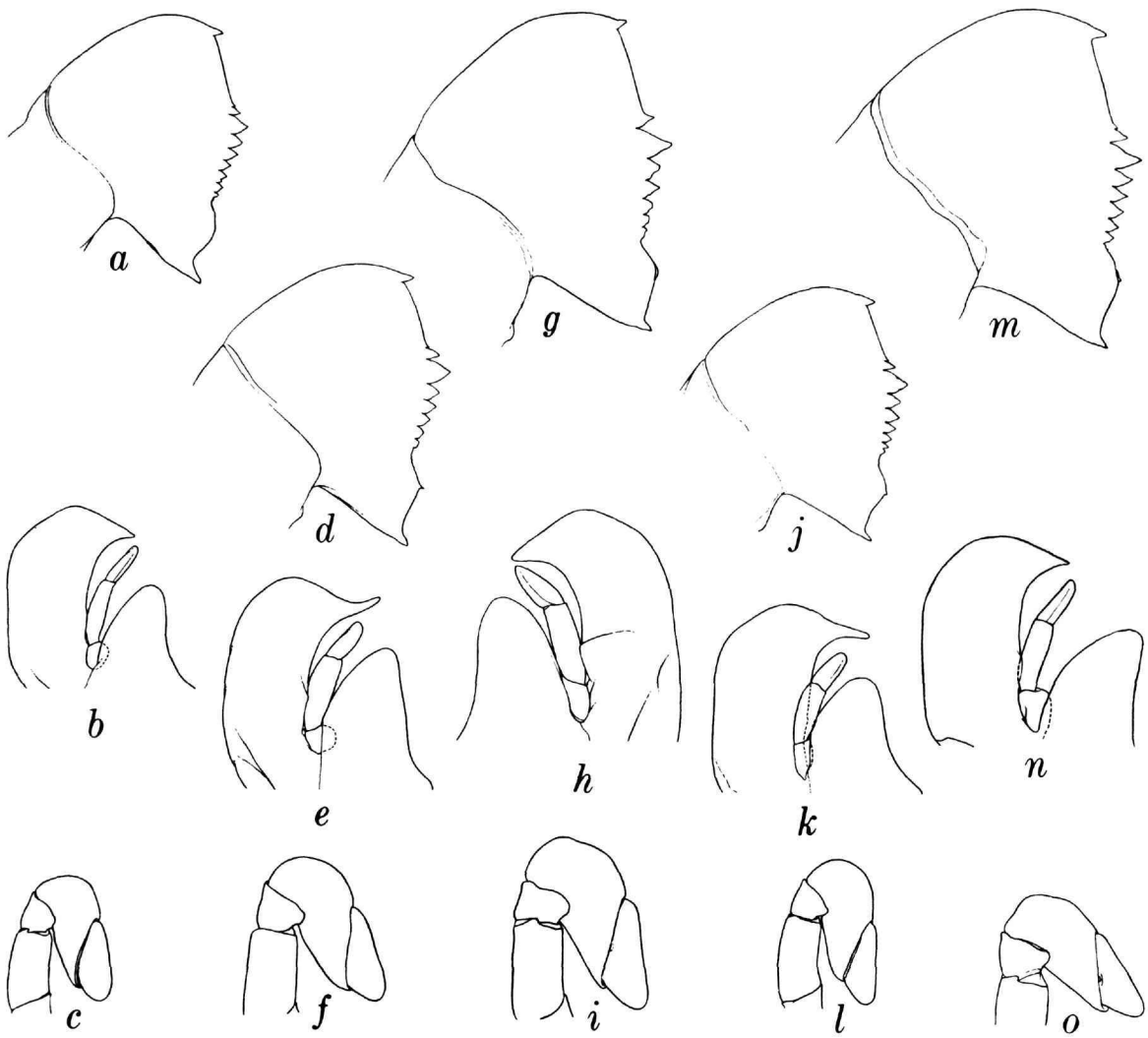

FIGURE 28.—*Notostomus* (*a–c, N. crosnieri,* male [30.0 mm], *Atlantis II* sta RHB2075, south of Cape Verde Islands; *d–f, N. elegans,* male [35.8 mm], *Oregon* sta 1303, Gulf of Mexico; *g–i, N. gibbosus,* male [50.0 mm], *Albatross* sta 2381, Gulf of Mexico; *j–l, N. japonicus,* male [31.9 mm], *Brown Bear* sta 199-74, northeastern Pacific west of Vancouver; *m–o, N. robustus,* male syntype [46.0 mm], *Albatross* sta 2042, western North Atlantic east of New Jersey): *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) surfaces of incisor and molar processes 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 left 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 1st maxilliped; *o,* terminal segments of right 2nd maxilliped.

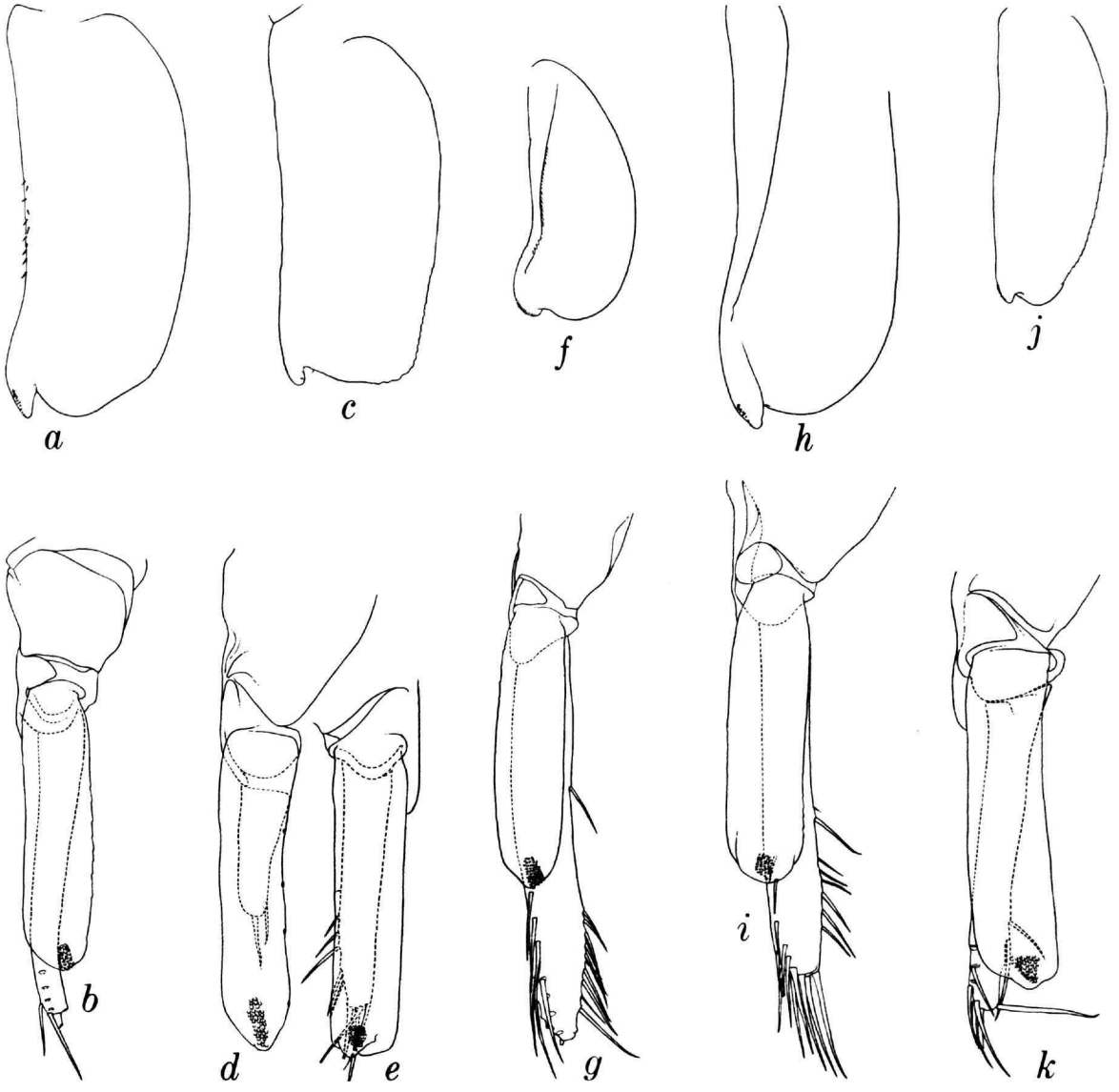

FIGURE 29.—*Notostomus* (*a,b, N. crosnieri,* male [30.0 mm], *Atlantis II* sta RHB2075, south of Cape Verde Islands; *c–e, N. elegans,* male [35.8 mm], *Oregon* sta 1303, Gulf of Mexico; *f,g, N. gibbosus,* male [50.0 mm], *Albatross* sta 2381, Gulf of Mexico; *h,i, N. japonicus,* male [31.9 mm], *Brown Bear* sta 199-74, northeastern Pacific West of Vancouver; *j,k, N. robustus,* male syntype [46.0 mm], *Albatross* sta 2042, western North Atlantic east of New Jersey): *a,* endopod of right 1st pleopod; *b,* right appendices interna and masculina; *c,* endopod of right 1st pleopod; *d,* right appendices inderna and masculina; *e,* left appendices interna and masculina; *f,* endopod of right 1st pleopod; *g,* right appendices interna and masculina; *h,* endopod of right 1st pleopod; *i,* right appendices interna and masculina; *j,* endopod of right 1st pleopod; *k,* right appendices interna and masculina.

*23. *Notostomus elegans* A. Milne-Edwards, 1881

FIGURES 28*d–f*, 29*c–e*, 30

Notostomus elegans A. Milne-Edwards, 1881b:8 [type-locality: southeastern Gulf of Mexico; 24°36′N, 84°05′W, 1746 m].—Crosnier and Forest, 1973:56, figs. 15, 16*a,b*.

Notostomus patentissimus Bate, 1888:826, pl. 133: figs. 1, 1*a–c*, 2 [type-locality: eastern Celebes Sea west of Kepulauan Sangi, Indonesia; 2°55′N, 124°53′E, 3931 m; trawled].

Notostomus longirostris Bate, 1888:833, pl. 135: fig. 4 [type-locality: Banda Sea south of Ceram, Indonesia; 4°21′S, 129°07′E, 3006 m; trawled].

Notostomus westergreni Faxon, 1893:208 [type-locality; off northern Ecuador; 1°07′N, 81°04′W, 3182 m].

Notostomus atlanticus Lenz and Strunck, 1914:330 [type-locality: North Atlantic northwest of Cape Verde Islands; 20°41′N, 31°53′W, 3000 m].

DIAGNOSIS.—Rostrum with 2 lateral carinae at base, upper one not extending posteriorly beyond orbital margin, lower one not continuous with dorsal longitudinal lateral (gastro-orbital) carina, dorsal basal teeth not noticeably enlarged; carapace with dorsal margin nearly straight on central part in adults, no carina extending posterodorsad from midlength of dorsal longitudinal lateral (gastro-orbital) carina, 2 longitudinal carinae ventral to subhepatic carina supporting branchiostegal spine, latter extending posteriorly nearly to posterior margin of carapace; abdomen with median dorsal carina on anterior somite more than ½ as long as tergite, measured laterally; stylocerite not reaching 3rd segment of antennular peduncle; basal antennal segment armed with spine of moderate size, not very long; maximum carapace length 45 mm.

MATERIAL.—PHILIPPINES. *Off Panaon Island, south of Leyte:* sta 5203; 9°58′N, 125°07′40″E; 1417 m; green mud; 11.6°C; 10 Apr 1908 (1421–1547); 12′ Agassiz beam trawl, 3 mud bags: 2 juv [17.0, 20.0].

RANGE.—If the synonymy suggested above is valid, *N. elegans* has an extensive distribution in the Philippines and Indonesia, the eastern tropical Pacific off Ecuador, and the western and eastern North Atlantic; mesopelagic.

REMARKS.—The important examination by Crosnier and Forest (1973:59–64) of type-specimens of the nominal species of *Notostomus* having five longitudinal carinae on the posterior half of the carapace, coupled with the description of *N. crosnieri* by Macpherson (1984:54), fixes the number of species of this group at three: *N. auriculatus* from off the Cape of Good Hope and

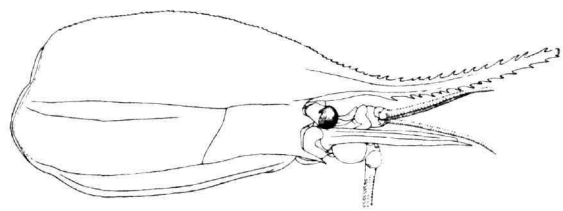

FIGURE 30.—*Notostomus elegans*, juvenile [20.0 mm], *Albatross* sta 5203, off Panaon Island.

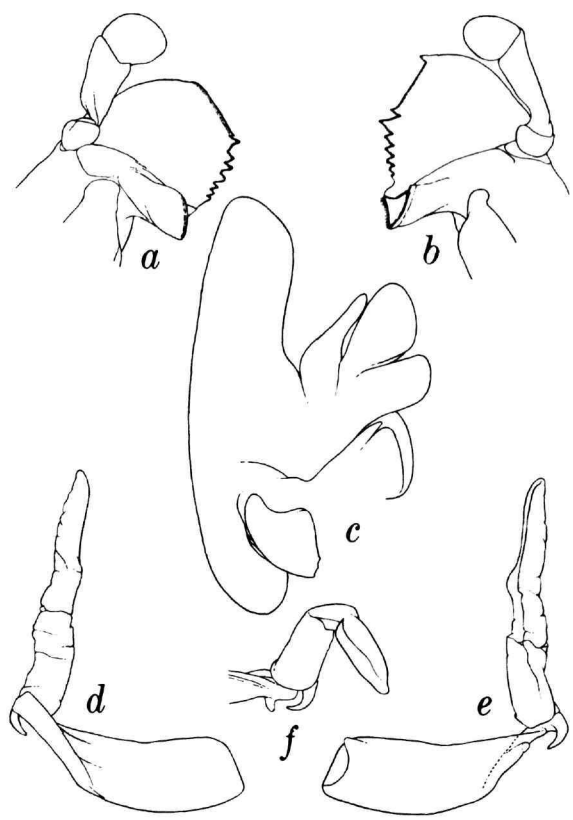

FIGURE 31.—*Notostomus gibbosus*, male [50.0 mm], *Albatross* sta 2381, Gulf of Mexico: *a*, left mandible (flexor or dorsal surface); *b*, right mandible; *c*, right 2nd maxilla; *d*, epipod (lateral aspect) from right 2nd pereopod; *e*, same (mesial aspect); *f*, same, mesial teeth (dorsal aspect).

the Atlantic south of 25°S latitude; *N. crosnieri* from the eastern Atlantic between 25°N and 19°S latitude; and *N. elegans*, with the distribution indicated above.

24. *Notostomus gibbosus* A. Milne-Edwards, 1881

FIGURES 28*g–i*, 29*f,g*, 31

Notostomus gibbosus A. Milne-Edwards, 1881b:7 [type-locality: off Grenada, Lesser Antilles; 12°04′50″N, 61°51′25″W, 1147 m].—Crosnier and Forest, 1973:49, fig. 13.

Notostomus perlatus Bate, 1888:831, pl. 135: fig. 2 [type-locality: eastern Celebes Sea west of Kepulauan Sangi, Indonesia; 2°55′N, 124°53′E, 3931 m; trawled].

Notostomus brevirostris Bate, 1888:832, pl. 135: fig. 3 [type-locality: off Recife, Brazil; 8°37′S, 34°28′W, 1234 m; trawled].

DIAGNOSIS.—Rostrum without 2nd lateral carina at midheight of base, remaining one continuous with dorsal longitudinal lateral (gastro-orbital) carina, dorsal basal teeth not noticeably enlarged; carapace with dorsal margin rather regularly convex in adults, no carina extending posterodorsad from midlength of dorsal longitudinal lateral (gastro-orbital) carina, only 1 longitudinal carina ventral to subhepatic carina supporting branchiostegal spine, latter extending nearly to posterior margin of carapace; abdomen with median dorsal carina on 1st somite more than ½ as long as tergite, measured laterally; stylocerite not reaching 3rd segment of antennular peduncle; basal antennal segment armed with spine of moderate size, not very long; maximum carapace length 60 mm.

RANGE.—Off east coast of Africa, Indonesia, Marquesas Islands, and western and eastern North and equatorial Atlantic; mesopelagic.

**Oplophorus* H. Milne Edwards, 1837

FIGURES 32, 33

Oplophorus H. Milne Edwards, 1837:423. [Type-species, by monotypy: *Oplophorus typus* H. Milne Edwards, 1837:424; gender: masculine.]

DIAGNOSIS.—Integument unusually firm and polished; rostrum with as many or more teeth in dorsal series as in ventral; carapace not denticulate dorsally, without lateral carina extending from near orbit to near posterior margin, without hepatic spine, hepatic furrow not abruptly delimited posteriorly by oblique carina; abdomen with strong posteromesial tooth on 3rd, 4th, and 5th somites, 6th somite shorter than 5th; telson acute posteriorly but not terminating in spinose endpiece; eye large, cornea at least as wide as eyestalk; antennal scale with lateral teeth proximal to distolateral spine, except in *O. novaezeelandiae;* 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 but without distinct 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 broadly compressed and rigid; pereopods with neither ischium nor merus broadly compressed, 3rd pair with dactyl shorter than propodus, 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 except extreme eastern North Pacific off America; mesopelagic.

Key to the Species of *Oplophorus*

1. Carapace with sharp tooth near posterior end of ventral margin in adults 2
   Carapace with ventral margin unarmed 3
2. Rostrum distinctly overreaching antennal scale; posterior extensions of upper lateral rostral carinae on carapace subparallel in dorsal aspect;