The Caridean Shrimps (Crustacea: Decapoda) of the *Albatross* Philippine Expedition, 1907–1910, Part 2: Families Glyphocrangonidae and Crangonidae

FENNER A. CHACE, JR.

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ABSTRACT

Chace, Fenner A., Jr. The Caridean Shrimps (Crustacea: Decapoda) of the *Albatross* Philippine Expedition, 1907–1910, Part 2: Families Glyphocrangonidae and Crangonidae. *Smithsonian Contributions to Zoology*, number 397, 63 pages, 24 figures, 1984.—A provisional key to the 38 known species of *Glyphocrangon* is offered and particulars are given of the 14 species recognized from the Philippines and Indonesia, including two new species: *G. juxtaculeata* from the Banda Sea, Indonesia, and, possibly, the Sulu Sea, Philippines, and *G. stenolepis* from the South China Sea southeast of Hong Kong and southern Tablas Strait off northwestern Panay, Philippines. The crangonid genus *Parapontocaris* Alcock, 1901, is reestablished for the more elongate species that have customarily been assigned to *Pontocaris* Bate, 1888, and *Philocheras* Stebbing, 1900, is treated as a genus distinct from *Pontophilus* Leach, 1817. Keys are included to (1) the six crangonid genera known from the Philippines and Indonesia; (2) the six species of *Parapontocaris*, including two new Philippine species (*P. aspera* and *P. levigata*); (3) the six Philippine-Indonesian species of *Philocheras*; (4) the seven species of *Pontocaris*; (5) the 11 species of *Pontophilus*, including one new species (*P. demani* from the Lesser Sunda Islands, Indonesia); (6) the four species of *Prionocrangon*; and (7) the five species of *Sabinea*.

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Contents

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Fenner A. Chace, Jr.

Introduction

General considerations about the *Albatross* Philippine Expedition and its collections have been presented in Part 1 of this series (Chace, 1983). Repeated below are those format particulars that apply to each of the parts.

The genera and species itemized following the keys are those known from the Philippines and Indonesia, whether or not they are represented in the *Albatross* collections; those taken by that Expedition are indicated by an asterisk (*). The genera and species are arranged alphabetically, and the latter are numbered sequentially by order of appearance in the taxonomic portion of the report. The generic entries comprise at least the original reference followed by designation of the type-species and of the gender of the generic name, a diagnosis, and the geographic and bathymetric ranges of the genus. The original reference and range are given in the keys for each extraterritorial species or subspecies cited. There has been no attempt to list all references or even all synonyms under the taxa headings in the text. Usually the species and subspecies entries are limited to: (1) the original reference and type-locality of both senior and junior synonyms mentioned; (2) a reference to a published illustration, if possible; (3) a diagnosis; and (4) the range of the taxon. Under "Material" of species and subspecies represented in the *Albatross* collections are listed the following particulars when known: (1) general locality; (2) station number; (3) latitude and longitude; (4) depth in meters (in brackets when estimated); (5) character of the bottom; (6) bottom temperature in degrees Celsius; (7) date and astronomical time intervals (hours between midnight and midnight) that the gear operated at the indicated depth; (8) gear used; and (9) the number and sex of the specimens, with minimum and maximum postorbital carapace lengths in millimeters, in brackets (the numbers and size ranges of ovigerous females are included in the female totals, as well as separately). Additional station data may be available in Anonymous (1910).

ACKNOWLEDGMENTS.—For assistance with this second, crangonoid part of the series, I am indebted to Michael R. Dardeau of the Dauphin Island Sea Lab, Alabama, for permitting me to examine the then unpublished manuscript by him and Richard W. Heard, Jr. (1983) on western Atlantic crangonids and for reviewing, with

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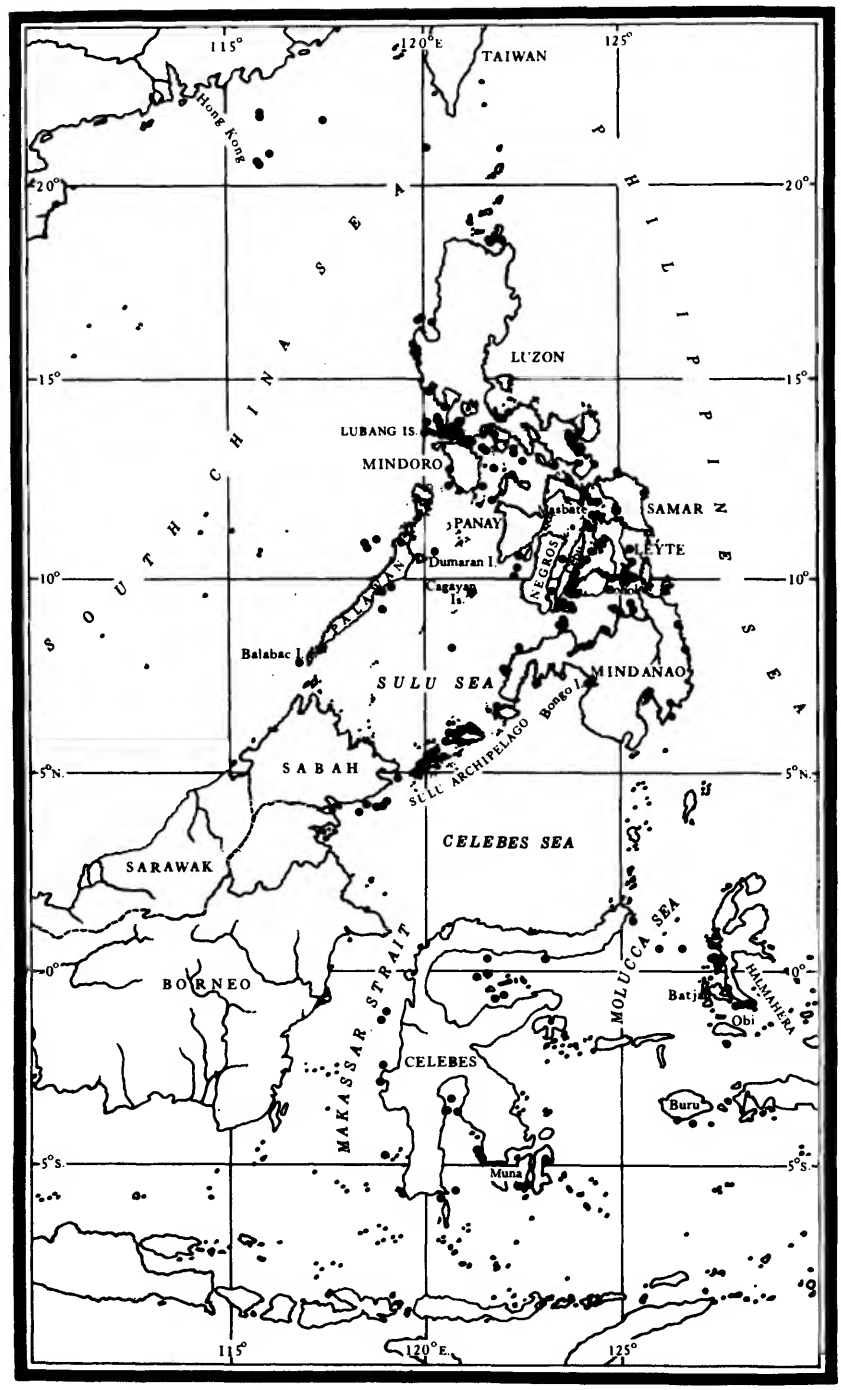

FIGURE 1.—The Philippines and central Indonesia, showing locations of 332 *Albatross* offshore stations at which caridean shrimps were collected.

unusual skill, a penultimate draft of this report; to A.A. Fincham of the British Museum (Natural History), London, for the loan of type specimens of *Pontophilus gracilis* Bate, *P. junceus*, and *P. profundus*; to L.B. Holthuis of the Rijksmuseum van Natuurlijke Historie, Leiden, for reviewing the manuscript; to Ms. A.E. Louw of the South African Museum, Cape Town, for the loan of representative series of South African species of *Glyphocrangon*; to Michèle de Saint Laurent for painstakingly and critically checking my conclusions against collections in the Muséum National d'Histoire Naturelle, Paris, even though it was not always expedient to follow her welcome suggestions; and, finally, to my Smithsonian colleagues F.M. Bayer and C.W. Hart, Jr., for transporting the *Challenger* type-material to and from the British Museum, Brian Kensley for reviewing the manuscript, and Lilly King Manning for preparing review copies of the illustrations. To these and others who contributed to the study in various ways goes my sincere gratitude; their comments and advice have been much appreciated even when seemingly disregarded.

*Glyphocrangonidae Smith, 1884

Glyphocrangonidae Smith, 1884:364.

Diagnosis.—Integument unusually firm, rigid; rostrum immovably attached to remainder of carapace, dorsally and ventrally flattened or concave, armed laterally with 2–7 pairs of teeth; carapace strongly sculptured with ridges, grooves, spines, and tubercles; antennular flagella simple, without accessory branch; mandible without incisor process or palp; 2nd maxilliped with terminal segment applied as broad strip to penultimate segment; 3rd maxilliped with exopod; pereopods without exopods, 1st pair imperfectly subchelate, 2nd pair with multiarticulate carpus.

Range.—Eastern Africa from Zanzibar to South Africa, the Arabian Sea, Bay of Bengal, southwestern Indian Ocean in the Roaring Forties, Indonesia, Philippines, South China Sea, southern Japan, Bismarck Sea, Fiji Islands; the eastern Pacific from southern California and the Galapagos Islands to Chile and Juan Fernandez; and the Atlantic Ocean from Iceland to the Argentine Basin and South Africa; 258–6364 meters.

The representation of *Glyphocrangon* in the *Albatross* Philippine collections suggests that populations of that genus may be considerably less plentiful in the Philippines and Indonesia than they are in certain areas of the western Atlantic and eastern Pacific. On the other hand, no less than 14 species are herein recognized from the Philippine-Indonesian region, indicating a diversity that compares very favorably with that in the two other parts of the world where the genus is well represented taxonomically: the Indian and the Atlantic oceans, each of which is inhabited by 12 known species. The comparison is especially remarkable when one realizes that the Indian Ocean is about 33 times and the Atlantic Ocean about 37 times as large as the area occupied by the Philippines and Indonesia.

Only one genus is recognized.

*Glyphocrangon A. Milne-Edwards, 1881

Glyphocrangon A. Milne-Edwards, 1881:3 [type-species, by original designation: *Glyphocrangon spinicauda* A. Milne-Edwards, 1881:3; gender: feminine].—Holthuis, 1971: 269 [synonymy].

Diagnosis.—See family "Diagnosis," above.

Range.—See family "Range," above.

Remarks.—As there has been an opportunity to examine material of 28 of the 38 species recognized herein, I have attempted to devise a key to all of the known species, for what it may be worth. A majority of the described species are reasonably well defined, but several display a variability that becomes evident only when rather extensive series of specimens are available for study. The following key should therefore be used with caution, especially in regard to those species that have not been fully described and of which only a few examples have been collected. If the key proves to be as useful as the one

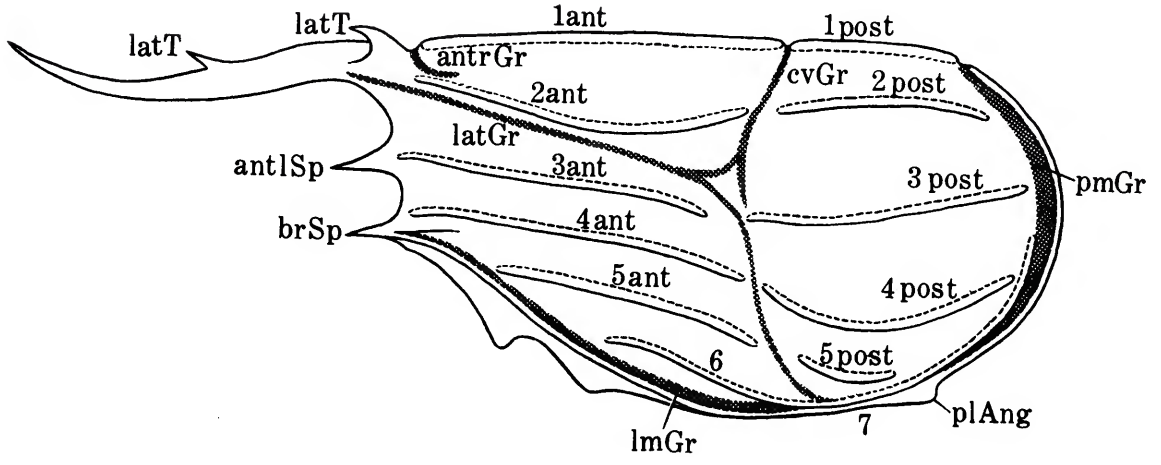

FIGURE 2.—Diagrammatic left aspect of carapace of *Glyphocrangon*, indicating terminology used for morphological features:- 1 ant, 1 post = anterior and posterior submedian carinae; 2 ant, 2 post = anterior and posterior intermediate carinae; 3 ant, 3 post = anterior and posterior antennal carinae; 4 ant, 4 post = anterior and posterior lateral carinae; 5 ant, 5 post = anterior and posterior sublateral carinae; 6 = submarginal carina; 7 = marginal carina; plAng = posterolateral angle; antrGr = anterior groove; cvGr = cervical groove; latGr = lateral groove; lmGr = lateromarginal groove; pmGr = posteromarginal groove; antlSp = antennal spine; brSp = branchiostegal spine; latT = lateral rostral tooth. (Modified from Holthuis, 1971:272, fig. 1.)

published more than six decades ago by De Man (1920:216), the effort will have been worthwhile.

The terminology adopted herein (Figure 2) is based largely on that defined and illustrated by Holthuis (1971) in his excellent review of the Atlantic species of the genus.

Key to Species of *Glyphocrangon*

1. Anterior 3rd (antennal) carina continuous with antennal spine . . . 2
   Anterior 3rd (antennal) carina, if present, not continuous with antennal spine 5
2. Abdominal somites 2–4 without trace of median dorsal carina . . . 3
   All abdominal somites with median dorsal carina 4
3. Posterior 3rd (antennal) carina diverging strongly anteroventrad from plane of dorsal surface of carapace; anterior 4th (lateral) carina not continuous with branchiostegal spine . . . . . ***G. acuminata*** Bate, 1888:522
   (Near Fiji Islands: 2468 meters)
   Posterior 3rd (antennal) carina subparallel with plane of dorsal surface of carapace; anterior 4th (lateral) carina continuous with branchiostegal spine . . . . . ***G. neglecta*** Faxon, 1896:159
   (Southern Caribbean Sea and northern South America; 365–1050 meters)

4. Posterior 1st (submedian) carina entire, not tuberculate; branchial region without tubercules in intercarinal spaces . . . . . *6. ***G. hastacauda***

   Posterior 1st (submedian) carina irregularly tuberculate, uneven; branchial region with rows of tubercles in intercarinal spaces . . . . . *10. ***G. pugnax***

5. Three or more pairs of lateral rostral teeth anterior to anterior groove on carapace 6

   Two pairs of lateral rostral teeth anterior to anterior groove on carapace 10

6. Anterior 4th (lateral) carina expanded into large, vertically compressed, acute lamina directed anterolaterally beyond level of posterior margin of orbit 7

   Anterior 4th (lateral) carina not expanded into unusually outstanding acute lamina extending beyond orbital margin 8

7. Four to 6 pairs of lateral rostral teeth; anterior 4th (lateral) carina dentate posteriorly near lateral groove; major carinae of carapace subserrate, somewhat obscured by numerous rows of tubercles in intercarinal spaces . . . . . ***G. alata*** Faxon, 1893:201
   (Eastern Pacific from Mexico to Chile; 600–1335 meters)

   Three pairs of lateral rostral teeth; anterior 4th (lateral) carina entire, not dentate posteriorly; major carinae of carapace entire or uneven, not serrate, not obscured by sparse tubercles in intercarinal spaces . . . . . ***G. loricata*** Faxon, 1895:140
   (Galapagos Islands; 605–770 meters)

8. Six or 7 pairs of lateral rostral teeth; antennal spine spinulose posterolaterally . . . . . ***G. spinulosa*** Faxon, 1893:202
   (Southern California to Colombia; 1097–1875 meters)

   Three pairs of lateral rostral teeth; antennal spine unarmed posterolaterally 9

9. Antennal scale more than twice as long as wide, with lateral tooth; dactyl of 5th pereopod simple . . . . . ***G. caecescens*** Wood-Mason and Alcock, 1891b:357
   (Bay of Bengal; 3197 meters)

   Antennal scale about 1¾ times as long as wide, without lateral tooth; dactyl of 5th pereopod bifid . . . . . ***G. rimapes*** Bate, 1888:523
   (Off Japan, 3429 meters; eastern Pacific off Juan Fernandez, 2514 meters; and (type-locality) South Atlantic between Buenos Aires and Tristan da Cunha, 3136 meters)

10. Fifth abdominal somite with pleuron armed with either 1 or 3 marginal teeth 11

    Fifth abdominal somite with pleuron armed with 2 marginal teeth 12

11. Anterior 4th (lateral) carina expanded into very large, vertically compressed, acute lamina overreaching posterior margin of orbit; 2nd and 3rd abdominal pleura smooth, without trace of median dorsal carina; 5th abdominal somite with 1 marginal tooth on pleuron; eye unpigmented ..... ***G. cerea*** Alcock and Anderson, 1894:151
(Southern Laccadive Sea; 1315 meters)

Anterior 4th (lateral) carina not greatly expanded or overreaching orbital margin; all abdominal somites carinate in dorsal midline; 5th abdominal somite with 3 marginal teeth on pleuron; eye pigmented ..... ***G. sculpta*** (Smith, 1882: 49)
(Iceland to southeastern West Indies in western Atlantic and to South Africa in eastern Atlantic; 1645–3219 meters)

12. Anterior 4th (lateral) carina expanded into wide, undivided, vertically compressed acute lamina usually overreaching posterior margin of orbit 13

Anterior 4th (lateral) carina either divided into 2 teeth or lobes or not nearly reaching level of orbital margin 18

13. Posterior 3rd (antennal) carina armed anteriorly with large, sharp tooth approaching salience of anterior 4th (lateral) lamina in dorsal view 14

Posterior 3rd (antennal) carina bearing small, inconspicuous tooth anteriorly or none at all 15

14. Rostrum without transverse septa on anterior part of dorsal surface; posterior 3rd (antennal) carina entire, not bilobate..... ***G. aculeata*** A. Milne-Edwards, 1881:5
(Western Atlantic from North Carolina to northeastern Brazil; 707–1760 meters)

Rostrum with incomplete transverse septa on anterior part of dorsal surface; posterior 3rd (antennal) carina divided into 2 lobes ..... *8. ***G. juxtaculeata***

15. Intercarinal spaces on carapace nearly devoid of granules or tubercles; median dorsal carina obsolescent on 2nd and 3rd abdominal somites, without dividing notch on 6th somite; eyes unpigmented ..... 2. ***G. caeca***

Intercarinal spaces on carapace granulate or tuberculate; median dorsal carina well developed on all abdominal somites, with notch on 6th somite; eyes pigmented 16

16. Posterior 3rd (antennal) carina usually armed anteriorly with distinct acute tooth .... ***G. smithii*** Wood-Mason and Alcock, 1891b:357
(Indian Ocean; 344–1026 meters)

Posterior 3rd (antennal) carina usually terminating anteriorly in right angle, at most 17

17. Integument naked, glabrous; intercarinal spaces of carapace densely covered with linearly arranged, sharply defined tubercles ..... *7. ***G. investigatoris***

Integument covered with scurfy pubescence; intercarinal spaces of carapace sparsely and rather obscurely granulate . *11. ***G. regalis***

18. Anterior 4th (lateral) carina divided into 2 teeth or lobes, sometimes obscurely so 19
Anterior 4th (lateral) carina entire, not divided 32
19. Dactyl of 5th pereopod cylindrical and abruptly terminating in 2 small points ..... ***G. podager*** Bate, 1888:516
(Southern Indian Ocean between Prince Edward and Crozet islands; 2514 meters)
Dactyl of 5th pereopod simple, acuminate 20
20. Integument pubescent 21
Integument naked, glabrous 26
21. Anterior tubercle of anterior 2nd (intermediate) carina blunt, not at all dentiform 22
Anterior tubercle of anterior 2nd (intermediate) carina usually distinctly dentiform 23
22. Antennal spines widely divergent, fully as long as branchiostegal spines ..... ***G. aurantiaca*** Holthuis, 1971:303
(Western Atlantic off northeast coast of South America; 410–733 meters)
Antennal spines subparallel, shorter than branchiostegal spines ..... ***G. longleyi*** Schmitt, 1931:393
(Western Atlantic from Florida to Colombia; 300–837 meters)
23. Posterior 3rd (antennal) carina dentate anteriorly 24
Posterior 3rd (antennal) carina blunt anteriorly 25
24. Anterior 3rd (antennal) carina completely absent; 1st abdominal somite usually with single transverse row of tubercles along posterior margin of tergum .... ***G. haematonotus*** Holthuis, 1971:315
(Western Atlantic from off South Carolina to Colombia; 247–966 meters)
Anterior 3rd (antennal) carina represented by row of tubercles; 1st abdominal somite with 2 transverse rows of tubercles on tergum ..... ***G. spinicauda*** A. Milne-Edwards, 1881:3
(Western Atlantic from Florida to Barbados and Nicaragua; 256–692 meters)
25. Rostrum usually without trace of transverse septa on dorsal surface; anterior 4th (lateral) carina shallowly and indistinctly divided into 2 parts ..... *9. ***G. megalophthalma***
Rostrum transversely septate on dorsal surface anterior to anterior pair of lateral teeth; anterior 4th (lateral) carina usually distinctly and deeply divided into 2 parts ..... *12. ***G. sibogae***
26. Rostrum transversely septate on dorsal surface anterior to anterior pair of lateral teeth; branchiostegal spine considerably more than twice as long as antennal spine 27
Rostrum not transversely septate on dorsal surface; branchiostegal spine less than twice as long as antennal spine 28

27. Anterior 4th (lateral) carina with 2 divisions not in line with each other ..... *3. ***G. faxoni***
Anterior 4th (lateral) carina with 2 divisions in line with each other ..... *13. ***G. stenolepis***
28. Anterior 4th (lateral) carina with posterior division obtuse anteriorly 29
Anterior 4th (lateral) carina with posterior division acute anteriorly 31
29. Posterior 4th (lateral) carina bluntly serrate ..... ***G. atlantica*** Chace, 1939:40 (Caribbean Sea and Bay of Biscay: 3885–6364 meters)
Posterior 4th (lateral) carina nearly entire, not serrate 30
30. Anterior 2nd (intermediate) carina composed of blunt tubercles; antennal spines subparallel with each other, little if any more divergent than branchiostegal spines ..... ***G. sicaria*** Faxon, 1893:202 (Eastern Pacific off Costa Rica and Panama; 1454–3279 meters)
Anterior 2nd (intermediate) carina composed of spines and tubercles; antennal spines outstanding, much more divergent than branchiostegal spines ..... ***G. vicaria*** Faxon, 1896:159 (Southern California to equator; 938–3880 meters)
31. Posterior 3rd (antennal) carina terminating anteriorly in acute or subrectangular tooth; intercarinal spaces bearing numerous prominent tubercles ..... *5. ***G. granulosis***
Posterior 3rd (antennal) carina not dentate anteriorly; intercarinal spaces bearing scattered granules ..... ***G. prionotata*** Wood-Mason, in Wood-Mason and Alcock, 1891a:192 (Arabian Sea and Gulf of Aden; 1582–1849 meters)
32. Anterior 3rd (antennal) carina absent or represented by inconspicuous tubercles 33
Anterior 3rd (antennal) carina distinct 36
33. Integument naked, glabrous; rostrum transversely septate on dorsal surface anterior to anterior pair of lateral teeth ..... ***G. longirostris*** (Smith, 1882:51) (Western Atlantic from off Massachusetts to Suriname (?) and eastern Atlantic from southwest of Ireland to South Africa; 1280–2500 meters)
Integument pubescent; rostrum not septate on dorsal surface ... 34
34. Dactyls of 4th and 5th pereopods appearing bifid, terminating in curved spine and distal lobe ..... *14. ***G. unguiculata***

Dactyls of 4th and 5th pereopods simple, acuminate 35

35. Antennal spines usually diverging more noticeably than branchiostegal spines; posterior 3rd (antennal) carina acute anteriorly .... ***G. alispina*** Chace, 1939:39 (Western Atlantic from Florida Straits to Guyana; 548–1865 meters)

Antennal spines hardly more divergent than branchiostegal spines; posterior 3rd (antennal) carina terminating anteriorly in subrectangular tooth ..... ***G. nobilis*** A. Milne-Edwards, 1881:5 (Western Atlantic from off South Carolina to Suriname; 410–2150 meters)

36. Rostrum longer than carapace in adults; posterior 3rd (antennal) carina usually terminating anteriorly in acute tooth .... ***G. dentata*** Barnard, 1926:128 (Indian Ocean off eastern Africa from Zanzibar to Natal; 490–800 meters)

Rostrum about ¾ as long as carapace in adults; posterior 3rd (antennal) carina usually not acute anteriorly 37

37. Posterior 2nd (intermediate) carina tuberculate .... 1. ***G. assimilis***

Posterior 2nd (intermediate) carina entire, not tuberculate .... *4. ***G. gilesii***

1. *Glyphocrangon assimilis* De Man, 1918

Glyphocrangon assimilis De Man, 1918b:294 [type-locality: Bali Sea; 7°19′24″S, 116°49′30″E; 538 meters]; 1920:227, pl. 19: fig. 57, a–h.

DIAGNOSIS.—Integument naked, not pubescent; rostrum shorter than carapace in adults, armed with 2 pairs of lateral teeth, without transverse septa on anterior part of dorsal surface; posterior 1st (submedian) carina tuberculate; anterior 2nd (intermediate) carina with anterior tubercle dentiform; posterior 2nd (intermediate) carina tuberculate; anterior 3rd (antennal) carina not continuous with antennal spine, entire anteriorly; posterior 3rd (antennal) carina not dentate anteriorly, sometimes obscurely divided into 2 indistinct lobes, subparallel with plane of dorsal surface of carapace; anterior 4th (lateral) carina not continuous with branchiostegal spine, not divided into 2 parts, not expanded into outstanding acute lamina overreaching orbital margin; posterior 4th (lateral) carina entire, not uneven or dentate; branchial region without tubercles in intercarinal spaces; antennal spines not noticeably divergent, smooth—not spinulose—posterolaterally, fully as long as branchiostegal spines; abdomen with median dorsal carina on all somites, notched on 6th somite; 1st somite with suggestion of 2 transverse rows of tubercles on tergum; 5th somite with 2 marginal spines on pleuron; eye pigmented; antennal scale with lateral tooth in adults; 5th pereopod with dactyl simple, acuminate; maximum carapace length at least 18 mm.

RANGE.—Known with certainty only from the type-locality in the Bali Sea, from a depth of 538 meters. Recorded "with considerable doubt"

from the Zanzibar area (1789 meters) by Calman (1939:217).

2. *Glyphocrangon caeca* Wood-Mason and Alcock, 1891

Glyphocrangon caeca Wood-Mason and Alcock, 1891b:358 [type-locality: Bay of Bengal west of Andaman Islands; 13°47′30″N, 92°36′E; 1026 meters]; 1894, pl. 7: fig. 1.
Glyphocrangon (*Plastocrangon*) *caeca*.—Alcock, 1901:135.—De Man, 1920:241, pl. 20: fig. 61.

DIAGNOSIS.—Integument naked, without pubescence; rostrum shorter than carapace in adults, armed with 2 pairs of lateral teeth, with incomplete transverse septa on anterior part of dorsal surface; posterior 1st (submedian) carina composed of 2 separate tubercles; anterior 2nd (intermediate) carina with anterior tubercle dentiform; posterior 2nd (intermediate) carina composed of 3 denticles; anterior 3rd (antennal) carina absent; posterior 3rd (antennal) carina armed anteriorly with small, inconspicuous tooth, virtually entire, not clearly divided into lobes, subparallel with plane of dorsal surface of carapace; anterior 4th (lateral) carina not continuous with branchiostegal spine, expanded into undivided, large, vertically compressed, acute lamina directed anterolaterally beyond level of posterior margin of orbit; posterior 4th (lateral) carina nearly entire, not dentate; branchial region without conspicuous tubercles in intercarinal spaces; antennal spines not especially divergent, smooth—not spinulose—posterolaterally, less than ½ as long as branchiostegal spines; abdomen with median dorsal carina on all somites, entire—not notched—on 6th somite with suggestion of 2 transverse rows of tubercles on tergum; 5th somite with 2 marginal spines on pleuron; eye unpigmented; antennal scale with lateral tooth in adults; 5th pereopod with dactyl simple, acuminate; maximum carapace length at least 15 mm.

RANGE.—This species seems to have been taken only once in addition to the type-locality in the Bay of Bengal in 1026 meters; that is the single male cited by De Man (1920) from the eastern Ceram Sea in 924 meters.

*3. *Glyphocrangon faxoni* De Man, 1918

Glyphocrangon (*Plastocrangon*) *Faxoni* De Man, 1918b:298 [type-locality: southeast of Selat Roti, off western Timor, Indonesia; 10°39′S, 123°40′E; 520 meters; soft, gray mud with brown upper layer]; 1920:243, pl. 20: fig. 62, a–c.

DIAGNOSIS.—Integument naked, not pubescent; rostrum usually shorter than carapace in adults, armed with 2 pairs of lateral teeth (posterior pair reduced, sometimes barely discernible), usually with incomplete transverse septa on anterior part of dorsal surface; posterior 1st (submedian) carina composed of 2 separate tubercles; anterior 2nd (intermediate) carina with anterior tubercle usually blunt, rarely subdentiform; posterior 2nd (intermediate) carina composed of 3 or 4 elongate tubercles; anterior 3rd (antennal) carina not continuous with antennal spine, usually reduced to elongate tubercle at most; posterior 3rd (antennal) carina usually unarmed anteriorly, rarely with small, inconspicuous tooth, divided into 3 lobes, subparallel with plane of dorsal surface of carapace; anterior 4th (lateral) carina not continuous with branchiostegal spine, not expanded into outstanding acute lamina, composed of 2 divisions not in line with each other, anterior division anteriorly dentate, often overreaching posterior margin of orbit, posterior division anteriorly dentate or not; posterior 4th (lateral) carina uneven or entire; branchial region without conspicuous tubercles in intercarinal spaces; antennal spines subparallel, not divergent, smooth—not spinulose—posterolaterally, less than ½ as long as branchiostegal spines; abdomen with median dorsal carina on all somites, carina indistinctly notched on 6th somite; 1st somite with or without 2 or 3 tubercles near posterior margin of tergum only; 5th somite with 2 marginal spines on pleuron; eye little pigmented; antennal scale with lateral tooth in adults; 5th pereopod with dactyl simple, acuminate; maximum carapace length fully 15 mm.

MATERIAL.—PHILIPPINES. Southwest of Lubang Islands: sta 5265; 13°41′15″N, 120°00′-50″E; 247 m; sand, mud; 6 Jun 1908 (1109–1129); 12′ Agassiz beam trawl, mud bag: 1♂

[12.0]. Balayan Bay, southern Luzon: sta 5118; 13°48′45″N, 120°41′51″E; 291 m; dark green mud; 21 Jan 1908 (1100–1130); 12′ Tanner beam trawl, mud bag; 3 ovig ♀ [11.8–13.2]. Tayabas Bay, southern Luzon: sta 5368; 13°35′-30″N, 121°48′E; 331 m; gray mud; 23 Feb 1909 (1445–1522); 12′ Agassiz beam trawl, mud bag: 1♂ [7.8]. Tablas Strait, east of Mindoro: sta 5124; 12°52′N, 121°48′30″E; 514 m; soft green mud; 2 Feb 1908 (1738–1755); 12′ Tanner beam trawl, mud bag: 2♂ [13.9, 14.6]; sta 5260; 12°25′35″N, 121°31′35″E; 428 m; green mud, sand; 10.8°C; 3 Jun 1908 (1532–1552); 12′ Agassiz beam trawl, mud bag: 5♂ [8.6–11.0], 8♀ [9.4–11.7]. 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: 1♂ [14.1]. 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 ovig ♀ [11.0. 13.6]. Panay Gulf, south of Panay: sta 5421; 10°33′30″N, 122°26′E; 251 m; green mud; 14.7°C; 30 Mar 1909 (1810–1829); 12′ Agassiz beam trawl, mud bag: 2♂ [10.0, 10.1]. Between Bohol and Siquijor Island: sta 5527; 9°22′30″N, 123°42′40″E; 719 m; globigerina ooze; 11.8°C; 11 Aug 1909 (1338–1358); 12′ Tanner beam trawl: 2 ovig ♀ [13.2, 14.9]. Macajalar Bay, northern Mindanao: sta 5504, 5505; 8°35′30″ to 8°37′15″N, 124°36′E; 366-[402] m; green mud ?; 12.4°C ?; 5 Aug 1909 (0615–0635, 0725–0749); 12′ Tanner beam trawl: 1♂ [10.0] 2♀ [9.1, 9.4] fragments. Southwest of Jolo Island, Sulu Archipelago: sta 5565; 5°51′42″N, 120°30′30″E; 444 m; sand, pteropod shells; 11.3°C; 21 Sep 1909 (1100–1121); 9′ Tanner beam trawl, mud bag: 2 ovig ♀ [11.1, 12.0]. Off Tawitawi Island, Sulu Archipelago: sta 5577; 5°20′36″N, 119°58′51″E; 439 m; coarse sand; 12.4°C; 23 Sep 1909 (1501–1519); 9′ Tanner beam trawl, mud bag: 1♀ [10.0].

INDONESIA. West of Halmahera: 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♂ [12.3–14.0], 8♀ [10.2–15.0], 3 ovig [13.7–14.2], 2 with branchial bopyrid [10.2, 13.9]; sta 5623; 0°16′30″N, 127°30′00″E; 497 m; fine sand, mud; 29 Nov 1909 (0922–0942); 12′ Agassiz beam trawl: 2♂ [13.0, 13.8], 1 with branchial bopyrid [13.0], 3 ovig ♀ [12.2–15.2].

RANGE.—Known previously only from the *Siboga* localities in the Bali Sea (289 meters) and the type-locality in Selat Roti (520 meters). The *Albatross* material extends the recognized geographic distribution to the Philippines and the bathymetric range to 247–719 meters.

REMARKS.—There seems to be considerable variation in the surface sculpture and the length of the rostrum in this species and some indication that the differences may be correlated with depth. In specimens from less than 500 meters, the sculpture is usually low and obtuse, and the rostrum from 0.70 to 0.94 (average 0.85) as long as the postorbital carapace length; in those from 500 meters and deeper, the sculpture is high and crisp, and the rostrum 0.83 to 1.18 (average 0.95) as long as the carapace. In individuals from the deepest station (719 meters), the spination on the carapace is so much sharper than it is in those from less than 500 meters that the possibility of specific differentiation is suggested, but the placement of the bosses is the same in both, and there seems to be a gradual transition from low to high sculpture with increasing depth. *Glyphocrangon faxoni*, however, is readily distinguishable from congenerics by the unaligned components of the fourth (lateral) carina of the carapace.

*4. *Glyphocrangon gilesii* Wood-Mason, 1891

Glyphocrangon Gilesii Wood-Mason, in Wood-Mason and Alcock, 1891a:193 [type-locality: Andaman Sea 8 miles (12.8 km) southeast of Cinque Island; 914 meters; green mud].—Alcock, 1901:132.

Glyphocrangon gilesii.—Wood-Mason and Alcock, 1894, pl. 7: fig. 4.

DIAGNOSIS.—Integument naked, not pubescent; rostrum shorter than or subequal to carapace in adults, armed with 2 pairs of lateral teeth, without transverse septa on anterior part of dor-

sal surface; posterior 1st (submedian) carina nearly entire, not tuberculate; anterior 2nd (intermediate) carina with anterior element dentiform; posterior 2nd (intermediate) carina entire; anterior 3rd (antennal) carina not continuous with antennal spine, entire; posterior 3rd (antennal) carina unarmed anteriorly, entire (not subdivided), subparallel with plane of dorsal surface of carapace; anterior 4th (lateral) carina not continuous with branchiostegal spine (occasionally connected with base of latter by faint line), not expanded into outstanding acute lamina, entire, not divided, anterior tooth often obtuse, not reaching level of posterior margin of orbit; posterior 4th (lateral) carina entire; branchial region without tubercles or granules in intercarinal spaces; antennal spines diverging slightly more than branchiostegals, smooth—not spinulose—posterolaterally, nearly as long as or overreaching branchiostegal spines; abdomen with median dorsal carina on all somites, carina notched on 6th somite; 1st somite with or without indication of 2 transverse rows of tubercles on tergum; 5th somite with 2 marginal spines on pleuron; eye pigmented; antennal scale with lateral tooth in adults; 5th pereopod with dactyl simple, acuminate; maximum carapace length about 18 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 (0614–0635); 12′ Agassiz beam trawl: 2 ovig ♀ [16.0, 16.8]. 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: 1♂ [13.7], 4♀ [12.4–15.6], 2 ovig [15.0,15.2];sta5445;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: 4 ovig ♀ [13.7–16.6]. Sogod Bay, southern Leyte: sta 5488; 10°N, 125°06′45″E; 1412 m; green mud; 11.3°C; 31 Jul 1909 (1652–1738); 12′ Agassiz beam trawl: 1♂ [10.8], 1♀ [11.2]. Mindanao Sea: sta 5491; 9°24′N, 125°12′E; 1 346 m; green mud, coral; 11.3°C; 1 Aug 1909 (1012–1043); 12′ Agassiz beam trawl: 1♂ [10.1]. Cagayan Islands, Sulu Sea: sta 5424; 9°37′N, 121°12′37″E; 622 m; coral sand; 10.2°C; 31 Mar 1909 (1324–1344); 12′ Agassiz beam trawl, mud bag: 1 ovig ♀ [14.8]. Sulu Sea east of Palawan: sta 5428; 9°13′N, 118°51′15″E; 2021 m; gray mud; 9.8°C; 3 Apr 1909 (1123–1144); 12′ Agassiz beam trawl, mud bag: 1 ovig ♀ [11.2]. Northern Palawan Passage: sta 5348; 10°57′45″N, 118°38′15″E; 686 m; coral, sand; 13.6°C; 27 Dec 1908 (1009–1029); 12′ Tanner beam trawl, mud bag: 1 ovig ♀ [14.3].

RANGE.—Known previously only from the Andaman Sea in 741 and 914 meters. The *Albatross* records extend the geographic range to the Philippines and the bathymetric range upward to 564 meters and perhaps downward to 2021 meters.

REMARKS.—The four smallest specimens (carapace lengths 10.1–11.2 mm) from the deepest water (1346–2021 m) are assigned to *G. gilesii* with some reservations. All have the rostrum nearly or quite as long as the carapace, the first (submedian) carina sharp, and the anterior fourth (lateral) carina indistinctly separate from the branchiostegal spine. There is some indication from the smallest of the remaining specimens that all three of these characters vary with size; that explanation of the differences has been tentatively adopted, even though one of the questionable specimens is ovigerous.

*5. *Glyphocrangon granulosis* Bate, 1888

Glyphocrangon granulosis Bate, 1888:507, pls. 92, 93: fig. 1 [type-locality: western entrance to Bismarck Sea, north of New Guinea; 2°33′S, 144°04′E; 1957 meters; blue mud].—De Man, 1920:230, pl. 19: fig. 58, a–f.

DIAGNOSIS.—Integument naked, not pubescent; rostrum shorter than carapace in adults, armed with 2 pairs of lateral teeth, without transverse septa on anterior part of dorsal surface; posterior 1st (submedian) carina composed of several tubercles or teeth; anterior 2nd (intermediate) carina with anterior element dentiform, large; posterior 2nd (intermediate) carina composed of several teeth or tubercles; anterior 3rd

(antennal) carina not continuous with antennal spine, not clearly evident in rows of sharp tubercles on hepatic region; posterior 3rd (antennal) carina with or without anterior tooth, entire or obscurely notched, subparallel with plane of dorsal surface of carapace; anterior 4th (lateral) carina not continuous with branchiostegal spine, only moderately expanded into 2 acute, aligned teeth, anterior tooth not overreaching posterior margin of orbit; posterior 4th (lateral) carina subserrate posteriorly; branchial region with 1 or more rows of distinct, sharp tubercles in intercarinal spaces; antennal spines more or less divergent than branchiostegals, smooth—not spinulose—posterolaterally, more than ½ as long as branchiostegal spines; abdomen with median dorsal carina on all somites, carina deeply notched on 6th somite; numerous tubercles on tergum of 1st somite; 5th somite with 2 marginal spines on pleuron; eye pigmented; antennal scale with suggestion of lateral tooth in adults; 5th pereopod with dactyl simple, acuminate; maximum carapace length about 40 mm.

MATERIAL.—PHILIPPINES. South China Sea off western Luzon: sta 5439; 15°58′15″N, 119°40′-20″E; 1719 m; green mud; 2.6°C; 9 May 1909 (1049–1103); 12′ Agassiz beam trawl, mud bag: 1♂ [29.0].

INDONESIA. Off southern Buru: sta 5637; 3°53′20″S, 126°48′00″E; 1280 m; gray mud; 10 Dec 1909 (0757–0809); 12′ Agassiz beam trawl (net fouled on bottom): 1♀ [23.0].

RANGE.—Known previously—in addition to the type-locality in 1957 meters in the Bismarck Sea—from the *Siboga* record from Makassar Strait in 1301 meters.

REMARKS.—There is little doubt that the *Albatross* specimens belong to the same species as the one recorded and illustrated from Makassar Strait by De Man (1920), but reexamination of Bate's specimen from north of New Guinea would be desirable in order to make certain that De Man's determination is correct. The two specimens collected by the *Albatross* almost surely are conspecific, but the smaller one from the Banda Sea has the tubercles on the dorsal surface of the carapace more outstanding and dentiform and the antennal spines much more divergent than in the larger male from west of Luzon. In the latter specimen, the antennal spines are subparallel, even less divergent than they are in the *Siboga* specimen figured by De Man.

*6. *Glyphocrangon hastacauda* Bate, 1888

Glyphocrangon hastacauda Bate, 1888:519, pl. 93: fig. 5 [type-locality: Sagami Nada, Japan; 35°11′N, 139°28′E; 631 meters; green mud; bottom temperature 5.1°C].—De Man, 1920:224.

DIAGNOSIS.—Integument pubescent; rostrum usually shorter than carapace in adults, armed with 2 pairs of lateral teeth, usually without trace of transverse septa on anterior part of dorsal surface; posterior 1st (submedian) carina irregularly tuberculate; anterior 2nd (intermediate) carina acutely dentiform anteriorly; posterior 2nd (intermediate) carina entire, not tuberculate; anterior 3rd (antennal) carina continuous with antennal spine, entire; posterior 3rd (antennal) carina usually unarmed, occasionally with inconspicuous anterior tooth, entire, subparallel with plane of dorsal surface of carapace; anterior 4th (lateral) carina not continuous with branchiostegal spine, not expanded into outstanding acute lamina, entire, undivided, not reaching level of posterior margin of orbit; posterior 4th (lateral) carina entire; branchial region without tubercles or granules in intercarinal spaces; antennal spines usually slightly more divergent than branchiostegal, smooth—not spinulose—posterolaterally, fully as long as branchiostegal spines; abdomen with median dorsal carina on all somites, entire on 4th somite, notched on 6th; 1st somite with indication of only posterior transverse row of tubercles on tergum; 5th somite with 2 marginal spines on pleuron; eye somewhat pigmented; antennal scale without lateral tooth in adults; 5th pereopod with dactyl simple, acuminate; maximum carapace length at least 26 mm.

MATERIAL.—PHILIPPINES. Western end of Verde Island Passage, east of Lubang Islands: sta 5119; 13°45′05″N, 120°30′30″E; 720 m; green

mud, sand; 6.5°C; 21 Jan 1908 (1356–1405); 12′ Tanner beam trawl, mud bag: 1♂ [20.2]. 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♂ [20.6]. Verde Island Passage, north of Mindoro: sta 5114; 13°36′11″N, 120°45′26″E; 622 m; fine sand; 20 Jan 1908 (1117–1137); 12′ Tanner beam trawl, mud bag: 1♂ [15.3]. 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: 4♀ [16.5–20.0], 3 ovig [18.6–20.0].

INDONESIA. West of Halmahera: sta 5619; 0°35′00″N, 127°14′40″E; 795 m; fine gray sand, mud; 27 Nov 1909 (1612–1641); 12′ Agassiz beam trawl: 2♂ [18.0, 19.0], 2♀ [11.7, 18.7]; sta 5620; 0°21′30″N, 127°16′45″E; 655 m; gray mud; 28 Nov 1909 (0624–0645); 12′ Agassiz beam trawl: 1 ovig ♀ [24.2].

RANGE.—Known previously from the Bay of Bengal off Sri Lanka, Indonesia, and Japan, in 631 to 1114 meters. The *Albatross* collections record the species from the Philippines for the first time.

REMARKS.—The *Albatross* series displays characters previously associated with this species with reasonable consistency, except for the presence or absence of a small tooth at the anterior extremity of the third or antennal carina and the indication of a lateral tooth on the antennal scale in small specimens. The specimens from the Molucca Passage, however, have the antennal spines somewhat less divergent than the branchiostegal, except in the smallest specimen, in which the antennal spines are just about as divergent as they are in the Philippine examples.

The largest individual examined, the ovigerous female from west of Halmahera (sta 5620), had recently molted, as indicated by the "paper-shell" integument, and there is a jagged opening in the right branchiostegite, partially exposing the gills; the margin of the gaping hole shows evidence of healing, suggesting that the injury must have occurred before molting began.

*7. *Glyphocrangon investigatoris* Wood-Mason, 1891

Glyphocrangon investigatoris Wood-Mason, in Wood-Mason and Alcock, 1891a:191 [type-locality: Bay of Bengal west of Hunter's Bay, Burma; 19°35′N, 92°24′E; 497 meters]; 1894, pl. 6: fig. 3.—Alcock, 1901:127.—Calman, 1939:216.

Glyphocrangon investigatoris var. *andamanensis* Wood-Mason and Alcock, 1891b:356 [type-locality: off South Andaman Island; 11°31′40″N, 92°46′06″E; 344–402 meters]; 1894, pl. 6: fig. 2.

DIAGNOSIS.—Integument naked, not pubescent; rostrum shorter than carapace in adults, armed with 2 pairs of lateral teeth, usually with incomplete septa on anterior part of dorsal surface; posterior 1st (submedian) carina composed of 3 or 4 elongate, subacute tubercles; anterior 2nd (intermediate) carina with anterior element dentiform; posterior 2nd (intermediate) carina usually broken into segments; anterior 3rd (antennal) carina not discernible among numerous tubercles on hepatic region; posterior 3rd (antennal) carina usually unarmed anteriorly, rarely with inconspicuous tooth, subdivided or entire, subparallel with plane of dorsal surface of carapace; anterior 4th (lateral) carina not continuous with branchiostegal spine, expanded into vertically compressed, entire (undivided), anteriorly acute lamina directed anteriorly beyond level of posterior margin of orbit; posterior 4th (lateral) carina nearly entire, not serrate; branchial region with rows of conspicuous tubercles in intercarinal spaces; antennal spines not noticeably divergent, smooth—not spinulose—posterolaterally, more than ½ as long as branchiostegal spines; abdomen with median dorsal carina on all somites, carina notched on 6th somite; 1st somite with numerous tubercles on tergum; 5th somite with 2 marginal spines on pleuron; eye pigmented; antennal scale without lateral tooth in adults; 5th pereopod with dactyl simple, acuminate; maximum carapace length at least 32 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♂

[24.4]. Northern Palawan Passage: sta 5348; 10°57′45″N, 118°38′15″E; 686 m; coral, sand; 13.6°C; 27 Dec 1908 (1009–1029); 12′ Tanner beam trawl, mud bag: 2 ovig ♀ [29.9, 30.2].

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 ovig ♀ [30.0]. 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 ovig ♀ [32.0].

RANGE.—Known previously from the Arabian Sea, the Bay of Bengal, and the Andaman Sea; 258–1087 meters. The *Albatross* collections extend the known geographic limits to Indonesia and the Philippines.

REMARKS.—No doubt Calman (1939:216) was correct in disagreeing with De Man (1920:222) about the synonymy of this magnificent species with *G. regalis*. The adult specimens of *G. investigatoris* collected by the *Albatross*—like an immature specimen from the Bay of Bengal received from the Indian Museum—display a multitude of elongate, prominent, linearly arranged tubercles on the completely glabrous carapace that are in marked contrast to the scattered enlarged granules partially obscured by scurfy pubescence in *G. regalis*.

Although only five specimens of *G. investigatoris* were collected by the *Albatross*, even those few suggest that the species is subject to considerable variation. Perhaps the most nearly "typical" of the *Albatross* specimens is the largest one, the ovigerous female from station 5664 in Makassar Strait. The other four specimens differ from this one in varying degrees. The male from off the Lubang Islands (station 5274) disagrees with it most strikingly in having the posterior second (intermediate) carina entire, rather than broken into elongate segments, and in lacking any distinct subdivision of the posterior third (antennal) carina into two parts. The two ovigerous specimens from Palawan Passage (station 5348) are most distinct from the Makassar Strait specimen in that each of them has a strong spine at the anterior end of the posterior third (antennal) carina, as in *G. smithii*, with which species these two specimens were at first identified. These specimens differ from each other, however; the larger one shows little indication of the transverse septa that are quite apparent on the anterior part of the dorsal surface of the rostrum in the other four specimens, the posterior third (antennal) carina is more clearly subdivided than in the others, and there is only one, rather than the usual three, rows of tubercles between the posterior third (antennal) and fourth (lateral) carinae. The ovigerous female from the Celebes Sea (station 5586) agrees with the male from off the Lubang Islands in having the posterior third (antennal) carina entire over most of its length, without any clear indication of the midlength sinus that characterizes the other three specimens.

The specimen last mentioned, from the Celebes Sea, is accompanied by the following color note: "Anterior spines, antennae, legs, lower edge of thorax shield, tubercles and spines of abdomen & swimmerets, & tips of thoracic tubercles, & edges & tips of tubercles of telson bright scarlet. Telson plates, ground of thorax translucent greenish white." This description does not correspond exactly with those mentioned for the species in the Indian Ocean, where the color has been recorded as "old ivory white, with orange-white markings on tips of spines, &c" and magenta eyes, and Alcock (1901:128) recorded the color of the variety *andamanensis* as pink with pea-green eggs.

The larger ovigerous female from Palawan Passage bears an elongate, subcylindrical, reddish brown sponge attached to the midline of the carapace between the cervical groove and the base of the rostrum.

*8. *Glyphocrangon juxtaculeata*, new species

FIGURES 3, 4

DIAGNOSIS.—Integument naked, not pubescent; rostrum shorter than carapace in adults, armed with 2 pairs of lateral teeth, indistinctly

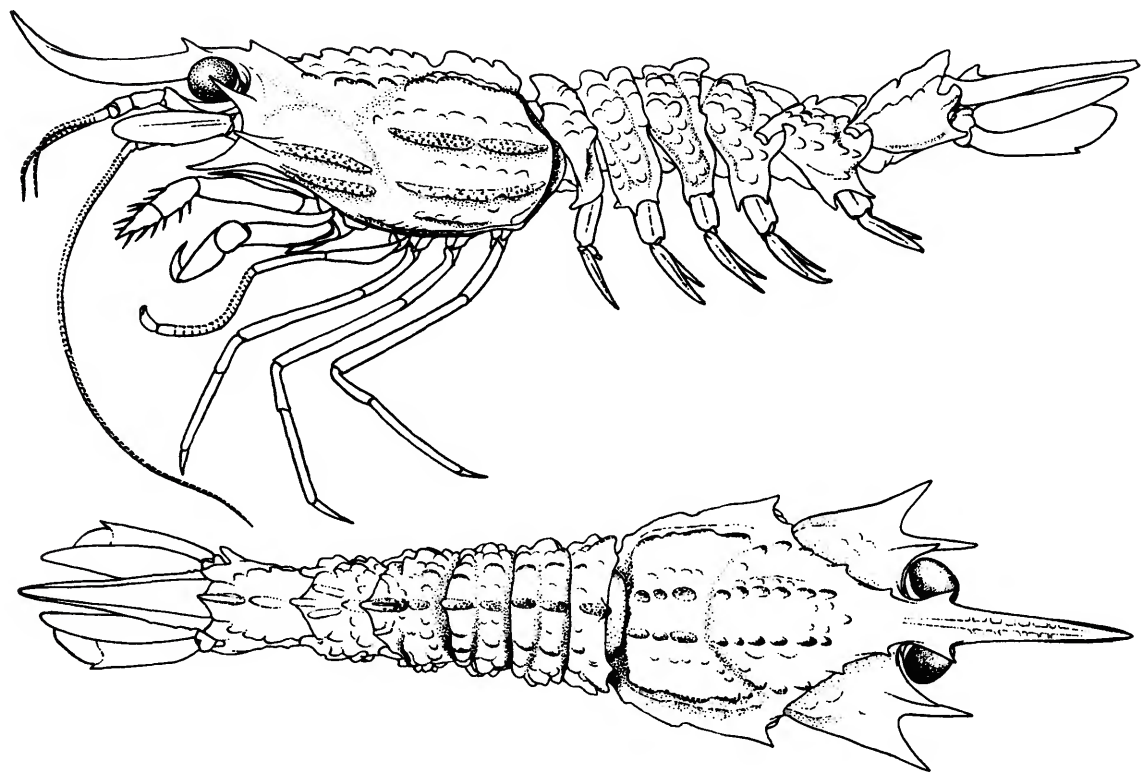

FIGURE 3.—*Glyphocrangon juxtaculeata*, new species, female holotype from *Albatross* sta 5638, carapace length 9.5 mm, lateral and dorsal aspects. (Magnification: × 4.2.)

transversely septate on anterior part of dorsal surface; posterior 1st (submedian) carina composed of 3 dentate tubercles; anterior 2nd (intermediate) carina with anterior tubercle dentiform; posterior 2nd (intermediate) carina uneven, not entire; anterior 3rd (antennal) carina absent except for few indistinct granules; posterior 3rd (antennal) carina armed with prominent tooth anteriorly, divided into 3 lobes, subparallel with plane of dorsal surface of carapace; anterior 4th (lateral) carina not continuous with branchiostegal spine, expanded into single, large, vertically compressed acute lamina overreaching posterior margin of orbit; posterior 4th (lateral) carina composed of 3 lobes; branchial region with single row of tubercles in each intercarinal space; antennal spines very slightly divergent, smooth—not spinulose—posterolaterally, slightly more than ½ as long as branchiostegal spines; abdomen with median dorsal carina on all somites, carina distinctly notched on 6th somite; 1st somite with posterior row of elongate tubercles and few isolated anterior tubercles on tergum; 5th somite with 2 marginal spines on pleuron; eye pigmented; antennal scale with lateral tooth; 5th pereopod with dactyl simple, acuminate; maximum carapace length undetermined.

DESCRIPTION.—Integument glabrous, without pubescence. Rostrum armed with 2 pairs of sharp teeth posteriorly, median carina displaying series of incomplete lateral extensions forming rudimentary transverse septa on anterior part. First (submedian) carina of carapace composed typically of forwardly directed, dorsally erose, blunt

teeth, 6 anterior to cervical groove, 3 posterior thereto; median area between submedian carinae smooth except for few low tubercles in extreme anterior area. Anterior 2nd (intermediate) carina composed of 4 tubercles, anteriormost acute; posterior 2nd (intermediate) carina uneven, not entire, margin faintly erose. Hepatic region with few very obscure tubercles but no trace of anterior 3rd (antennal) carina; posterior 3rd (antennal) carina trilobate, margins of lobes faintly erose, anterior lobe with large, sharp tooth at anterior end. Anterior 4th (lateral) carina forming large, undivided, wing-like expansion with somewhat erose margin, terminating anteriorly in sharp point, independent of branchiostegal spine, overreaching posterior margin of orbit; posterior 4th (lateral) carina slightly uneven, with faintly erose margin. Anterior 5th (sublateral) carina prominent, with erose margin; posterior 5th (sublateral) carina less distinct, sinuous. Anterior 6th (submarginal) carina also more distinct than posterior, sinuous part of same. Spaces between posterior parts of 4 dorsal carinae, each with single row of low tubercles. Antennal spines unarmed marginally, about ⅔ as long as and not diverging more than branchiostegal spines.

Abdomen with teeth and tubercles blunt, rounded, and thick, larger ones with indistinctly erose margins. First somite with posterior row of elongate tubercles and 2 or 3 faint tubercles anteriorly on tergum. Carinae in dorsal midline divided into anterior and posterior sections on each somite posterior to 1st. Second somite with pleuron armed with 3 short marginal teeth, that of 5th somite with 2 longer and sharper teeth.

Eye moderately large, with pigmented cornea.

Antennal scale typically with small lateral tooth, marginal setae confined to blade distal to tooth.

Second pereopods with right member of pair slightly longer and with more (22) carpal articles than left (19); chela of each short, barely as long as distal article of carpus, and with very short fingers. Third pereopod with dactyl oval, simple, barely ¼ as long as propodus. Fourth pereopod with dactyl simple, about ½ as long as propodus. Fifth pereopod with dactyl simple, less than ⅓ as long as propodus.

SIZE.—Carapace length of female or juvenile holotype, 9.5 mm.

MATERIAL.—PHILIPPINES. Cagayan Islands, Sulu Sea; sta 5423; 9°38′30″N, 121°11′E; 929 m; gray mud, coral sand; 9.9°C; 31 Mar 1909 (0955–1022); 12′ Agassiz beam trawl, mud bag: 1♂ [11.5] (identification uncertain).

INDONESIA. Off southern Buru: sta 5638; 3°47′15″S, 126°23′40″E; 946 m; fine gray sand; 10 Dec 1909 (1436–1456); 12′ Agassiz beam trawl: 1♀ or juvenile [9.5], holotype, USNM 205090.

TYPE-LOCALITY.—Off south coast of Buru, Indonesia; 3°47′15″S, 126°23′40″E; 946 meters.

RANGE.—Known for sure only from the type-locality in the Banda Sea off southern Buru, Indonesia; 946 meters.

REMARKS.—There is little doubt that *G. juxtaculeata* is closely related to the western Atlantic *G. aculeata*. It differs from that species only in having incomplete transverse septa on the anterior part of the dorsal surface of the rostrum, a few indistinct tubercles on the hepatic region, and the posterior 3rd (antennal) carina divided into two large and one small lobes. Basing a species on a single, possibly immature specimen may be improper, but comparison of this specimen with several specimens of *G. aculeata* of similar size seems to confirm the significance of the differences.

The specimen (Figure 4) from the Cagayan Islands, Sulu Sea, Philippines, tentatively identified with this species, differs from the holotype most noticeably in having the teeth and tubercles of the carapace and abdomen sharper and more numerous. Although this Philippine male differs considerably from the Indonesian female or juvenile in general appearance—a difference much greater than that observed between specimens of *G. aculeata* from the western Atlantic—I hesitate to propose a separate taxon for it because it agrees with the holotype in most characters that seem to be of taxonomic importance.

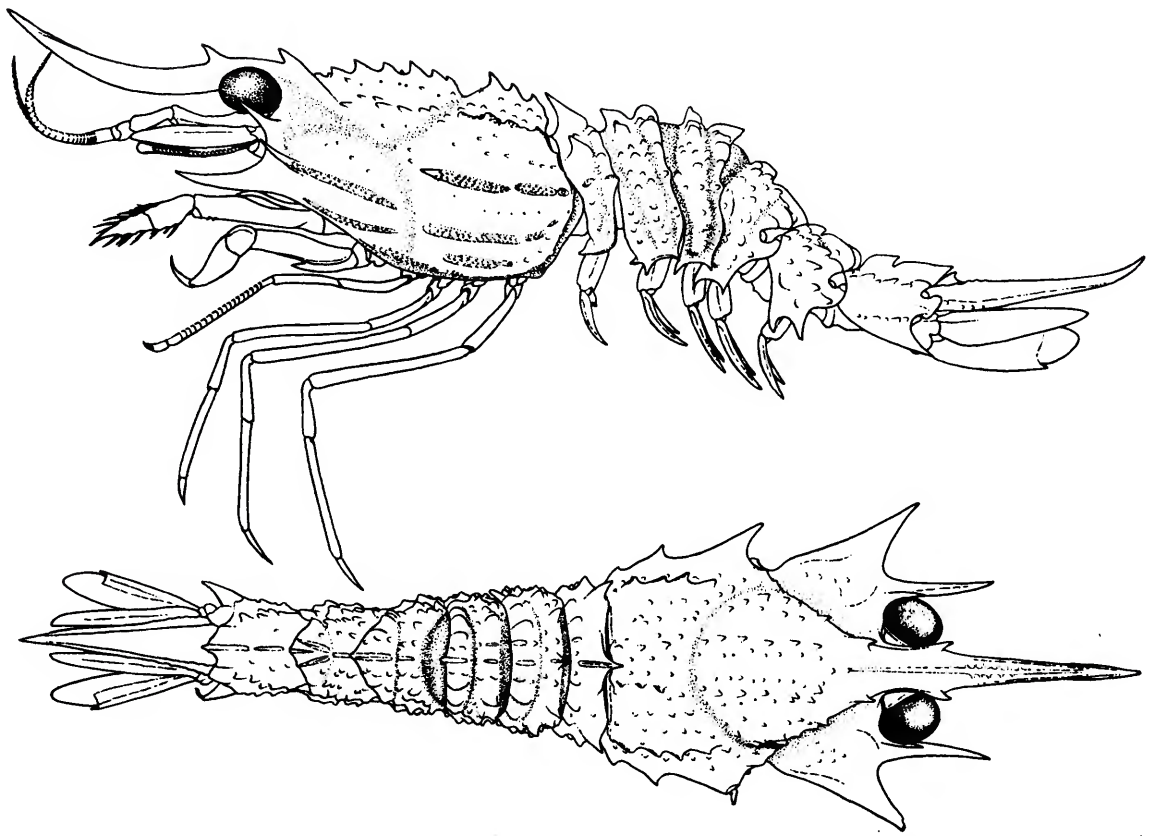

FIGURE 4.—*Glyphocrangon juxtaculeata*?, male from *Albatross* sta 5423, carapace length 11.5 mm, lateral and dorsal aspects. (Magnification: × 3.5.)

ETYMOLOGY.—The Latin *juxta* (near, close) plus *aculeata* reflects the apparent similarity of this species to the one described from the western Atlantic by A. Milne-Edwards (1881:5).

*9. *Glyphocrangon megalophthalma* De Man, 1918

Glyphocrangon megalophthalma De Man, 1918b:296 [type-locality: the type series came from three Indonesian localities: Makassar Strait (2029 m); south of Muna Island, Celebes (1886 m); and north of Sumbawa, lesser Sunda Islands (2060 m)]; 1920:237, pl. 20: fig. 60, a–f.

DIAGNOSIS.—Integument pubescent; rostrum shorter than carapace in adults, armed with 2 pairs of lateral teeth, without transverse septa on anterior part of dorsal surface; posterior 1st (submedian) carina composed of 3 or 4 tubercles; anterior 2nd (intermediate) carina with anterior tubercle dentiform; posterior 2nd (intermediate) carina tuberculate; anterior 3rd (antennal) carina not continuous with antennal spine, represented by few tubercles, at most; posterior 3rd (antennal) carina unarmed anteriorly, entire (at most sinuous), sloping somewhat ventrad anteriorly; anterior 4th (lateral) carina not continuous with branchiostegal spine, not expanded into outstanding acute lamina, obscurely divided into 2 aligned divisions, anterior division anteriorly dentate but not reaching level of posterior mar-

gin of orbit, posterior division unarmed; posterior 4th (lateral) carina virtually entire; branchial region with few tubercles in intercarinal spaces, especially between 1st (submedian) and 2nd (intermediate) carinae; antennal spines not very divergent, nearly subparallel, smooth—not spinulose—posterolaterally, more than ½ as long as branchiostegal spines; abdomen with medial dorsal carina on all somites, carina notched on 6th somite; 1st somite usually with indication of at least 2 transverse rows of tubercles on tergum; 5th somite with 2 marginal spines on pleuron; eye lightly pigmented; antennal scale without indication of lateral tooth; 5th pereopod with dactyl simple, acuminate; maximum carapace length about 29 mm.

MATERIAL.—PHILIPPINES. South China Sea off western Luzon: sta 5439; 15°58′15″N, 119°40′20″E; 1719 m; green mud; 2.6°C; 9 May 1909 (1049–1103); 12′ Agassiz beam trawl, mud bag: 1♂ [19.0], 3♀ [22.0–23.9], 2 ovig [22.0, 23.9].

INDONESIA. Makassar Strait west of Celebes: 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: 3♀ [10.7–20.2], 2 ovig [19.1, 20.2]. Teluk Tomini, Celebes: sta 5609; 0°11′-00″S, 121°16′00″E; 1997 m; green mud; 2.4°C; 18 Nov 1909 (1651–1724); 12′ Agassiz beam trawl: 2 ovig ♀ [26.2, 28.6].

RANGE.—Known previously only from the Indonesian localities mentioned above in 1886 to 2060 meters. The *Albatross* collections extend the recorded geographic range northward to the South China Sea off Luzon at a latitude of about 16° north.

REMARKS.—The apparently immature female from Makassar Strait differs from the other specimens in having the rostrum slightly longer than the carapace, the ridges on the carapace somewhat more noticeably dentate or uneven, except for the anterior 4th (lateral) carina, which is merely sinuous and without the obtuse prominence that marks the anterior end of the posterior portion of the carina in the adults, and the antennal scale with a distinct tooth on the lateral margin, the latter being without setae proximal thereto.

*10. *Glyphocrangon pugnax* De Man, 1918

Glyphocrangon pugnax De Man, 1918b:293 [type-locality: Selat Roti, west of Timor, Indonesia; 10°39′S, 123°40′E; 520 meters; soft, gray mud with brown upper layer]; 1920:225, pls. 18: fig. 56; pl. 19: fig. 56a–c.

DIAGNOSIS.—Integument naked, not pubescent; rostrum usually shorter than carapace in adults, but occasionally slightly longer, armed with 2 pairs of lateral teeth, without transverse septa on anterior part of dorsal surface; posterior 1st (submedian) carina tuberculate; anterior 2nd (intermediate) carina with anterior tubercle dentiform; posterior 2nd (intermediate) carina usually tuberculate; anterior 3rd (antennal) carina continuous with antennal spine, entire; posterior 3rd (antennal) carina unarmed anteriorly, entire, subparallel with plane of dorsal surface of carapace; anterior 4th (lateral) carina entire; branchial region with tubercles, mostly aligned in a row, in intercarinal spaces; antennal spines usually subparallel, sometimes divergent, smooth—not spinulose—posterolaterally, nearly or quite as long as branchiostegal spines; abdomen with median dorsal carina on all somites, carina indistinctly notched on 6th somite; 1st somite usually with indication of 2 or more transverse rows of tubercles on tergum; 5th somite with 2 marginal spines on pleuron; eye pigmented; antennal scale usually without trace of lateral tooth in adults; 5th pereopod with dactyl simple, acuminate; maximum carapace length about 25 mm.

MATERIAL.—PHILIPPINES. Balayan Bay, southern Luzon: sta 5112; 13°48′22″N, 120°47′-25″E; 324 m; dark green mud; 11.3°C; 17 Jan 1908 (1433–1503); 12′ Tanner beam trawl, mud bag: 1 ovig ♀ [19.2]; sta 5364 or 5365; 13°48′30″N, 120°43′45″E or 13°44′24″N, 120°45′30″E; [293 or 391 m]; 20 or 22 Feb 1909 (1440–1523 or 0904–0940); 25′ Agassiz beam trawl: 4♂ [18.0–21.5], 2 ovig ♀ [20.8, 24.7]; sta 5365; 13°44′24″N, 120°45′30″E; [391 m]; 22 Feb 1909 (0904–1940); 25′ Agassiz

beam trawl: 1♂ [18.9]. Northeast of Mindoro: sta 5122; 13°21′30″N, 120° [probably 121°] 30′33″E; 402 m; green mud; 2 Feb 1908 (1059–1119); 12′ Tanner beam trawl, mud bag: 1 ovig ♀ [24.8]. Tablas Strait east of Mindoro: sta 5124; 12°52′N, 121°48′30″E; 514m; soft green mud; 2 Feb 1908 (1738–1755); 12′ Tanner beam trawl, mud bag: 3 ovig ♀ [21.3–24.0]; sta 5260; 12°25′35″N, 121°31′35″E; 428 m; green mud, sand; 10.8°C; 3 Jun 1908 (1532–1552); 12′ Agassiz beam trawl, mud bag: 2♀ [14.2, 18.6]. 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: 1 ovig ♀ [20.0]. Sogod Bay, southern Leyte: sta 5201; 10°10′N, 125°04′15″E; 1 013 m; gray sand, mud; 11.6°C; 10 Apr 1908 (0913–0933); 12′ Agassiz beam trawl, 3 mud bags (veered 205 m cable during haul): 1♀ [8.0]. Southern end of Bohol Strait southeast of Cebu: sta 5533; 9°27′15″N, 123°-31′48″E; 790 m; green mud, sand; 11.8°C; 19 Aug 1909 (0608–0631); 12′ Tanner beam trawl: 2♀ [10.9, 15.0]. 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 ♀ [19.7]. Macajalar Bay, northern Mindanao: sta 5502 or 5503; 8°37′37″N, 124°35′E or 8°36′26″N, 124°36′-08″E; 391 or 413 m; fine sand, gray mud, and green mud; 12.4°C; or 11.8°C; 4 Aug 1909 (1528–1548 or 1638–1658); 12′ Tanner beam trawl: 1 ovig ♀ [22.3]; sta 5504 or 5505; 8°35′30″ or 8°37′15″N, 124°36′E; 366 [or 402] m; green mud; 12.4°C; 5 Aug 1909 (0615–0635 or 0725–0749); 12′ Tanner beam trawl: 4♂ [18.0–22.0], 1♀ [16.8, with branchial bopyrid]. 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♀ [17.0].

INDONESIA. Celebes Sea off Sabah (north Borneo): sta 5592; 4°12′44″N, 118°27′44″E; 558 m; green mud; 6.3°C; 29 Sep 1909 (1600–1610); 9′ Tanner beam trawl: 1♂ [20.8]; sta 5593; 4°02′40″N, 118°11′20″E; 70 m; fine sand; 29 Sep 1909 (1934–1949); 9′ Tanner beam trawl (frame badly bent): 1 ovig ♀ [23.0] [the depth cited at this station is suspiciously shallow].

RANGE.—Known previously only from the type-locality in Selat Roti (520 meters). The species seems to be considerably more abundant in the Philippines, in depths of 293 to 1013 meters, than it is in Indonesia.

REMARKS.—In the *Albatross* series, the posterior 2nd (intermediate) carina on the carapace is unusually uneven, consisting of indistinctly separated subdivisions, but it is virtually entire in a few specimens. Although the antennal spines are usually less divergent than the branchiostegals, they are occasionally strongly divergent, especially in the smallest specimens. There is also some variation in the number of tubercles on the tergum of the 1st abdominal somite, and young specimens have a small but distinct lateral tooth on the antennal scale, whereas there is no trace of this denticle in most mature specimens.

A label with the ovigerous female taken at station 5528, north of Siquijor Island, indicates that it was "gray the spines orange tipped, eggs pale green."

The specimen with a branchial bopyrid from station 5504 or 5505, Macajalar Bay, northern Mindanao, bears a long appendix interna, like that in females, and a slightly shorter, obviously reduced, appendix masculina.

*11. *Glyphocrangon regalis* Bate, 1888

Glyphocrangon regalis Bate, 1888:517, pl. 93: figs. 3, 4 [type-locality: "off Banda Island," Indonesia, 4°34′S, 129°57′-30″E; 366 meters; volcanic mud].—De Man, 1920:220, pl. 18: fig. 54, a–k.

DIAGNOSIS.—Integument pubescent; rostrum considerably shorter than carapace in adults, armed with 2 pairs of lateral teeth, usually with transverse septa on anterior part of dorsal surface; posterior 1st (submedian) carina composed of 3 or 4 discrete tubercles; anterior 2nd (intermediate) carina with anterior tubercle usually subdentiform; posterior 2nd (intermediate) carina tuberculate; anterior 3rd (antennal) carina

absent; posterior 3rd (antennal) carina usually unarmed anteriorly, rarely with small, inconspicuous tooth, usually obscurely divided into 2 parts, subparallel with plane of dorsal surface of carapace; anterior 4th (lateral) carina not continuous with branchiostegal spine, expanded into large, vertically compressed, entire, acute lamina directed almost anteriorly beyond level of posterior margin of orbit; posterior 4th (lateral) carina entire; branchial region with tubercles in intercarinal spaces; antennal spines curved mesially, smooth—not spinulose—posterolaterally, more than ½ as long as branchiostegal spines; abdomen with median dorsal carina on all somites, carina notched on 6th somite; 1st somite with tubercles on tergum in addition to row near posterior margin; 5th somite with 2 marginal spines on pleuron; eye pigmented; antennal scale usually without indication of lateral tooth in adults; 5th pereopod with dactyl simple, acuminate; maximum carapace length about 30 mm.

MATERIAL.—PHILIPPINES. 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: 1♂ [19.5], 1♀ [20.0]; 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: 1♂ [22.2].

INDONESIA. 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: 5♀ [13.9–25.8], 3 ovig [23.8–25.8]; 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 ♀ [29.0].

RANGE.—Known previously from several localities in Indonesia (366–724 m). Bate also assigned to this species material taken by the *Challenger* in the Fiji Islands in 576 meters and north of the Kermadec Islands in 1097 meters, and Kensley (1977:40) recorded it from off the Natal coast of South Africa (see "Remarks").

REMARKS.—This species usually has transverse septa on each side of the median carina in the anterior part of the dorsal surface of the rostrum, but in two of the ovigerous females from station 5621, west of Halmahera, these septa are indistinct or absent. Also, the posterior pair of rostral teeth and the tooth at the anterior end of the anterior second (intermediate) carina are often little more than dentiform tubercles. The posterior third (antennal) carina is usually divided into two parts, but the posterior part is marked anteriorly by no more than a broadly obtuse angle that is sometimes barely discernible.

There is no doubt that *G. investigatoris* is quite distinct from *G. regalis*, contrary to De Man's tentative conclusion, but there is a possibility that *G. smithii* will prove to fall within the limits of variation of *G. regalis*. The only apparent constant difference between the latter two, from the description of Alcock (1901:129), is the presence of a small tooth at the anterior end of the posterior third (antennal) carina in *G. smithii*; the importance of this disparity is modified by the presence of a small, acute tooth in this location in the female from *Albatross* station 5444, north of Samar, and by a less acute tooth in the male from the same station, as well as in the smallest specimen from station 5621, west of Halmahera. On the other hand, eight of nine specimens from southeast Africa—assigned to *G. regalis* by Kensley (1977) and made available for examination through the kind cooperation of Ms. E.M. Louw of the South African Museum—have an acute tooth at the anterior end of this carina. If, therefore, *G. smithii* proves to be distinguishable—either specifically or subspecifically—by this character, the South African population should probably be assigned to that taxon.

* 12. *Glyphocrangon sibogae* De Man, 1918

Glyphocrangon Sibogae De Man, 1918b:295 [type-locality: the type series came from two localities in southern Indonesia: Bali Sea (1018 m) and Flores Sea (794 m)]; 1920:233, pl. 19: fig 59; pl. 20: fig. 59a–e.

DIAGNOSIS.—Integument pubescent; rostrum shorter than carapace in adults, armed with 2

pairs of lateral teeth (posterior pair reduced), with transverse septa on anterior part of dorsal surface; posterior 1st (submedian) carina irregularly tuberculate; anterior 2nd (intermediate) carina with anterior tubercle usually dentiform; posterior 2nd (intermediate) carina tuberculate; anterior 3rd (antennal) carina absent; posterior 3rd (antennal) carina unarmed anteriorly, entire, subparallel with plane of dorsal surface of carapace or sloping slightly ventrad anteriorly; anterior 4th (lateral) carina not continuous with branchiostegal spine, not expanded into outstanding acute lamina, composed of 2 anteriorly dentate and frequently somewhat misaligned lobes, anterior division not reaching level of posterior margin of orbit; posterior 4th (lateral) carina entire; branchial region without tubercles in intercarinal spaces; antennal spines subparallel, not noticeably divergent, smooth—not spinulose—posterolaterally, usually more than ½ as long as branchiostegal spines; abdomen with median dorsal carina hardly distinguishable on 2nd somite, distinct only on posterior lobes of 4 posterior somites, carina indistinctly notched on 6th somite; 1st somite with slight indication of more than 1 transverse row of tubercles on tergum; 5th somite with 2 marginal spines on pleuron; eye pigmented; antennal scale without trace of lateral tooth in adults; 5th pereopod with dactyl simple, acuminate; maximum carapace length 29 mm.

MATERIAL.—INDONESIA. 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♂ [20.0]; sta 5656; 3°17′40″S, 120°36′45″E; 885 m; gray mud; 5.1°C; 19 Dec 1909 (0837–0842); 12′ Agassiz beam trawl: 3♀ [17.2–28.2], 2 ovig [22.0, 28.2]; 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♂ [22.8], 2♀ [17.2, 20.0]; 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 ♀ [27.3].

RANGE.—It may be significant that all eight *Albatross* specimens were taken at four consecutive stations in Teluk Bone, Celebes, little more than 500 kilometers from the locality in the Flores Sea where the *Siboga* took six of the eight syntypes of the species. A bathymetric range of 794 to 1112 meters is now recognized.

REMARKS.—It is quite apparent that De Man considered the six females, two of them ovigerous, from the Flores Sea as the primary lot of the type series, but he did not select a holotype in his original description or a lectotype in the final report on the collection.

* 13. *Glyphocrangon stenolepis*, new species

FIGURES 5, 6

DIAGNOSIS.—Integument naked, not pubescent; rostrum slightly shorter than carapace in adults, armed with 2 pairs of lateral teeth (posterior pair reduced, barely discernible), with transverse septa on anterior part of dorsal surface; posterior 1st (submedian) carina composed of 2 elongate ridges; anterior 2nd (intermediate) carina with anterior tubercle dentiform; posterior 2nd (intermediate) carina composed of 3 rather obscure, elongate ridges; anterior 3rd (antennal) carina not continuous with antennal spine, reduced to 1 or 2 obscure tubercles; posterior 3rd (antennal) carina unarmed anteriorly, bilobate, subparallel with plane of dorsal surface of carapace; anterior 4th (lateral) carina not continuous with branchiostegal spine, expanded into vertically compressed, bilobate lamina acutely directed anterolaterally beyond level of posterior margin of orbit, 2 lobes in line with each other, posterior division broadly obtuse; posterior 4th (lateral) carina nearly entire; branchial region without tubercles or granules in intercarinal spaces; antennal spines nearly parallel, little divergent, smooth—not spinulose—posterolaterally, less than ½ as long as branchiostegal spines; abdomen without distinct dorsal carina on 2nd and 3rd somites, carina indistinctly notched on 6th somite; 1st somite virtually devoid of tubercles on tergum; 5th somite with 2 marginal spines on pleuron; eye not pigmented; antennal scale with lateral tooth; 5th pereopod

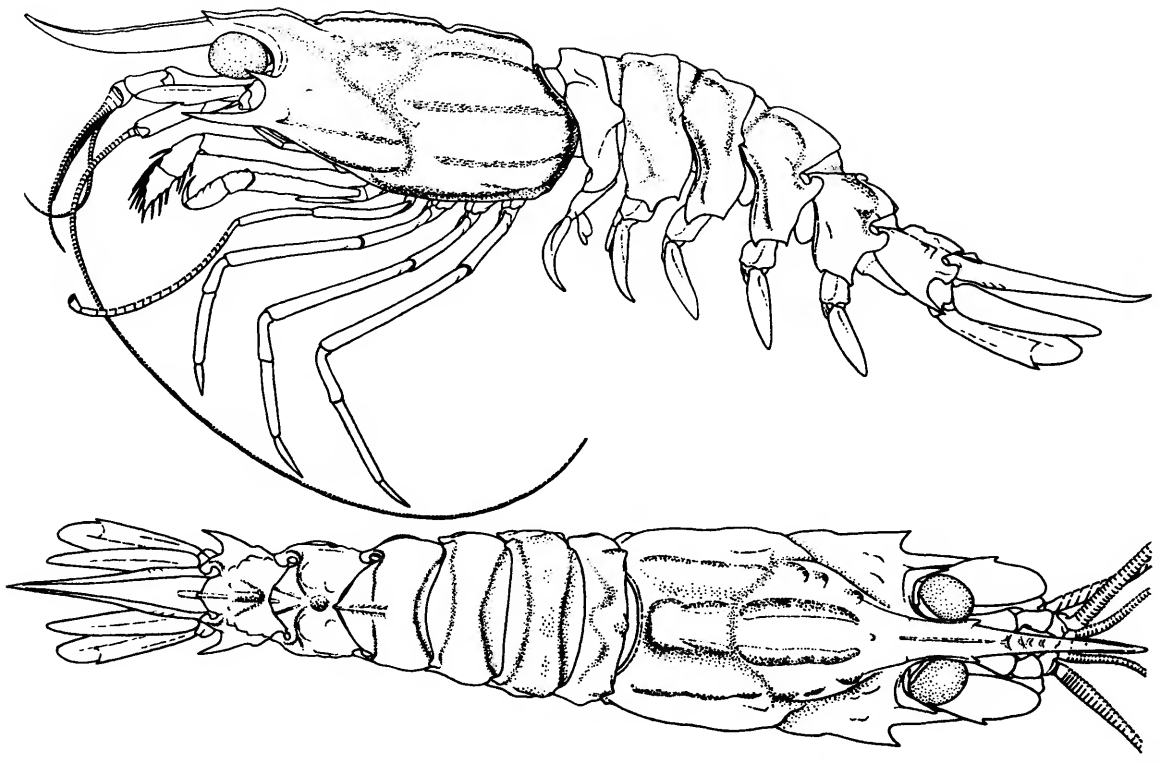

FIGURE 5.—*Glyphocrangon stenolepis*, new species, male holotype from *Albatross* sta 5300, carapace length 11.2 mm, lateral and dorsal aspects. (Magnification: × 3.5.)

with dactyl simple, acuminate; maximum carapace length undetermined.

DESCRIPTION.—Integument glabrous, without pubescence. Rostrum armed with 2 pairs of lateral teeth, but posterior pair (posterior to level of posterior margin of orbit) vestigial and barely visible; series of distinct transverse septa on dorsal surface of anterior portion; median carina restricted to posterior portion between eyes. First (submedian) carina of carapace uneven; median area anterior to submedian carina with single tubercle in midline. Anterior 2nd (intermediate) carina composed of 3 obtuse lobes; posterior 2nd (intermediate) carina also trilobate. Hepatic region with 2 or 3 very obscure tubercles; posterior 3rd (antennal) carina trilobate, margins of lobes faintly erose but none dentate. Anterior 4th (lateral) carina forming bilobate, wing-like expansion with slightly erose margins, terminating anteriorly in sharp point independent of branchiostegal spine at about level of posterior margin of orbit, posterior lobe in line with anterior portion but not dentate, obscure in adult; posterior 4th (lateral) carina entire, neither dentate nor lobate. Anterior 5th (sublateral) carina not prominent, linear, sinuous; posterior 5th (sublateral) carina similar but very short. Sixth (submarginal) carina absent anteriorly, indistinct posteriorly. No tubercles in intercarinal spaces. Antennal spines unarmed marginally, less than ½ as long as and diverging little more than branchiostegal spines.

Abdomen with teeth and tubercles blunt, rounded, and thick, larger ones with somewhat

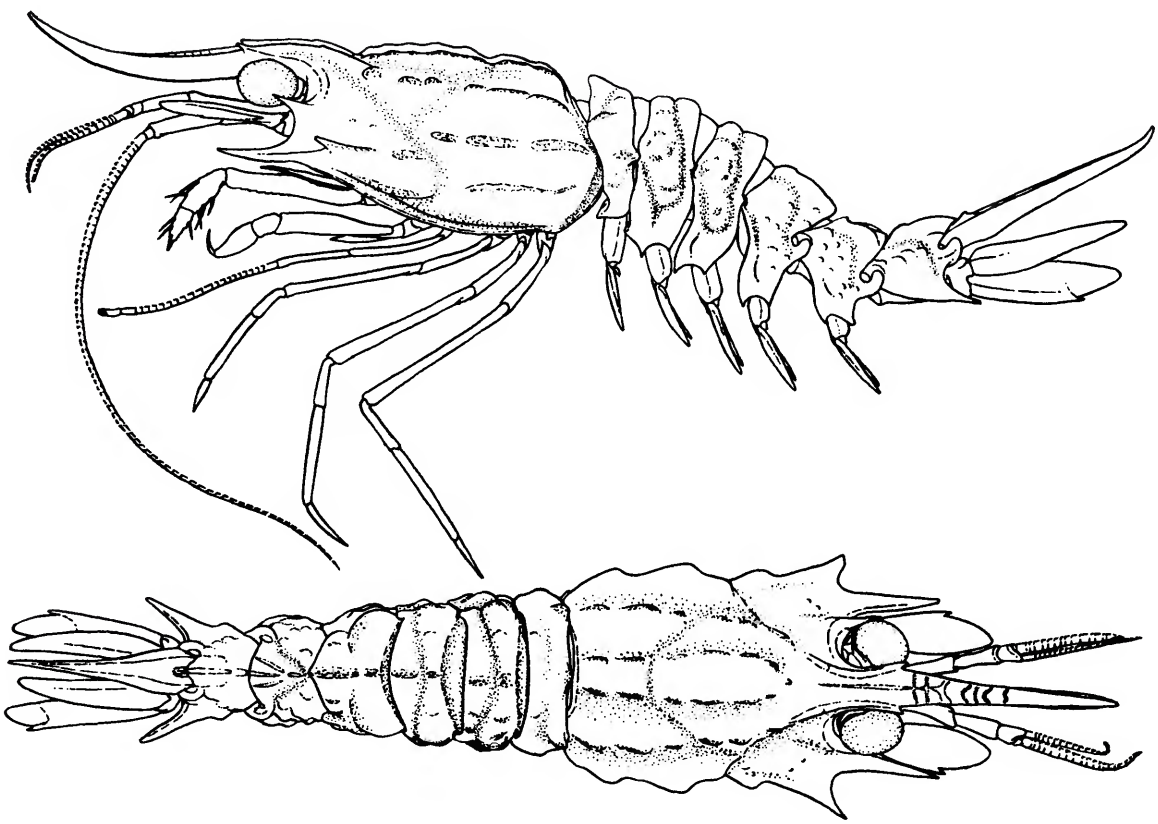

FIGURE 6.—*Glyphocrangon stenolepis*, new species, female or juvenile paratype from *Albatross* sta 5259, carapace length 8.0 mm, lateral and dorsal aspects. (Magnification: × 4.7.)

erose surfaces. First somite without distinct tubercles on tergum. Two rounded lobes, in midline of both 2nd and 3rd somites in young only; median carina on 4th somite nearly or quite entire; 5th somite with anterior tooth and sharp carina posteriorly in midline, latter flanked by posteriorly divergent sharp carinae; 6th somite with median carina divided in 2 by shallow notch near anterior end. Second somite with pleuron armed with 2 short marginal teeth and inconspicuous anterior lobe, pleura of 3rd, 4th, and 5th somites each armed with 2 short marginal teeth.

Eyes not large for genus, cornea unpigmented in preservative.

Antennal scale 2⅕ to 2¾ times as long as wide, with well-marked lateral tooth, marginal setae sometimes confined to blade distal to tooth.

Second pereopods slightly unequal, right member of pair slightly shorter and stouter than left, with 21–23 carpal articles; chela in both short, barely as long as distal article of carpus, with very short fixed finger, subchelate. Dactyl of 3rd pereopod slightly shorter and broader than that of 4th and 5th, simple in all 3 pairs.

SIZE.—Carapace length of male holotype, 11.2 mm; of female or juvenile paratype, 8.0 mm.

MATERIAL.—SOUTH CHINA SEA. Southeast of Hong Kong: sta 5300; 20°31′N, 115°49′E; 485 m; gray mud, sand; 8 Aug 1908 (1429–1449);

12′ Agassiz beam trawl, mud bag: 1♂ [11.2], holotype, USNM 205091.

PHILIPPINES. 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: 1♀ or juv [8.0].

TYPE-LOCALITY.—Northern South China Sea west of Tungsha Tao (Pratas Island); 20°31′N, 115°49′E; 485 meters.

RANGE.—Northern South China Sea and Tablas Strait, Philippines; 485–571 meters.

REMARKS.—The form of the anterior fourth (lateral) carina seems to distinguish the male holotype of *P. stenolepis* (Figure 5) from most of the species of the genus previously described. In this apparently otherwise unique configuration of the hepatic region, this specimen and, especially, the female or juvenile paratype (Figure 6) resemble *G. cerea* from 1315 meters in the Laccadive Sea. The *Albatross* specimens seem to differ from *G. cerea*, however, in the distinctly septate anterior part of the dorsal surface of the rostrum, the longer branchiostegal spine, and the much more elongate antennal scale (more than twice, rather than 1⅓, times as long as wide). Although the antennal scale is usually narrower in juveniles than in adults of most species of *Glyphocrangon*, I have not encountered any other specimens with an antennal scale as elongate as it is in the paratype of *G. stenolepis*. That the differences mentioned are not related to growth is indicated by the similar sizes of the specimens concerned; the carapace and rostrum of the paratype of *G. stenolepis* measures slightly more than 16 mm, compared with 18 mm in the larger of the two syntypes of *G. cerea*, according to Alcock (1901:136).

There may be some question about the conspecificity of the two specimens herein assigned to *G. stenolepis*, because of the more outstanding anterior tooth on the anterior fourth (lateral) carina, the more strongly lobate posterior first, second, and third carinae, and the more strongly sculptured abdomen of the smaller Philippine specimen. The characters shared by the two specimens—the greatly reduced posterior pair of lateral rostral teeth, the transversely septate dorsal surface of the rostrum, the elongate branchiostegal spine, the lack of pigment in the eye, and the elongate antennal scale—suggest that the differences may be associated with growth.

ETYMOLOGY.—The Greek *stenos* (narrow) plus *lepis* (scale) refers to the elongate antennal scale in this species.

* 14. *Glyphocrangon unguiculata* Wood-Mason, 1891

FIGURES 7, 8

Glyphocrangon unguiculata Wood-Mason, in Wood-Mason and Alcock, 1891a:193 [type-locality: Arabian Sea west of Western Ghats, India; 15°02′N, 72°34′E; 1353 meters; gray ooze with 12.5% globigerina; 6.7°C]; 1894, pl. 7: fig. 2.—Alcock, 1901:130.

DIAGNOSIS.—Integument pubescent; rostrum distinctly shorter than carapace in adults, armed with 2 pairs of lateral teeth, without transverse septa on anterior part of dorsal surface; posterior 1st (submedian) carina composed of subdentiform tubercles; anterior 2nd (intermediate) carina with anterior tubercle dentiform; posterior 2nd (intermediate) carina usually entire; anterior 3rd (antennal) carina usually absent; posterior 3rd (antennal) carina unarmed anteriorly, entire, nearly subparallel with plane of dorsal surface of carapace; anterior 4th (lateral) carina not continuous with branchiostegal spine, not expanded into outstanding acute lamina, entire, not subdivided, anterior tooth not reaching level of posterior margin of orbit; posterior 4th (lateral) carina entire; branchial region without tubercles in intercarinal spaces; antennal spines variably divergent, smooth—not spinulose—posterolaterally, more than ½ as long as branchiostegal spines; abdomen with median dorsal carina on all somites, carina notched on 6th somite; 1st somite usually with single transverse row of tubercles near posterior margin of tergum; 5th somite with 2 marginal spines on pleuron; eye pigmented; antennal scale usually with indication of lateral tooth; 5th pereopod with dactyl terminating in curved spines opposing blunt lobe,

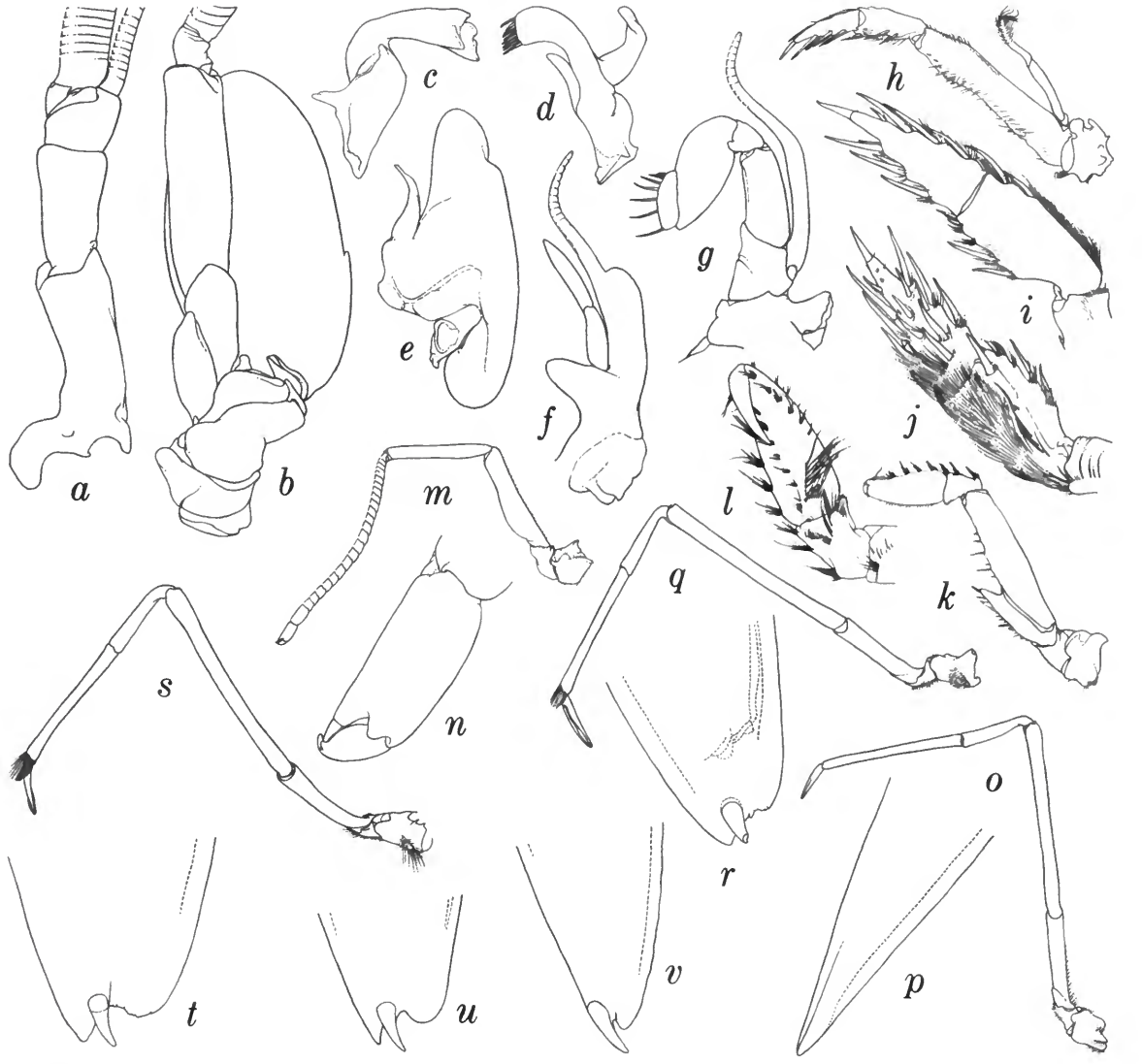

FIGURE 7.—*Glyphocrangon unguiculata* (*a–t*, male from *Albatross* sta 5630 (Halmahera), carapace length 21.9 mm; *u*, male from *Albatross* sta 5655 (Celebes), carapace length 16.3 mm; *v*, male collected by *Investigator* in Arabian Sea, carapace length 17.1 mm): *a*, left antennule, dorsal aspect; *b*, left antenna, ventral aspect; *c*, left mandible; *d*, left 1st maxillae; *e*, left 2nd maxilla; *f*, left 1st maxilliped; *g*, left 2nd maxilliped; *h*, left 3rd maxilliped, lateral aspect; *i*, same, 2 distal segments, extensor aspect; *j*, same, flexor aspect; *k*, left 1st pereopod; *l*, same, chela and carpus, flexor aspect; *m*, left 2nd pereopod; *n*, same, chela; *o*, left 3rd pereopod; *p*, tip of dactyl of right 3rd pereopod; *q*, left 4th pereopod; *r*, tip of dactyl of right 4th pereopod, extensor aspect; *s*, left 5th pereopod; *t*, tip of dactyl of right 5th pereopod, extensor aspect; *u*, tip of dactyl of right 4th pereopod, extensor aspect; *v*, tip of dactyl of right 4th pereopod, extensor aspect. (Magnifications: *h*, *k*, *m*, *o*, *q*, *s*, × 2.6; *a–g*, *i*, *j*, *l* × 5.2; *n*, × 21.5; *p*, *r*, *t–v*, × 53.8.)

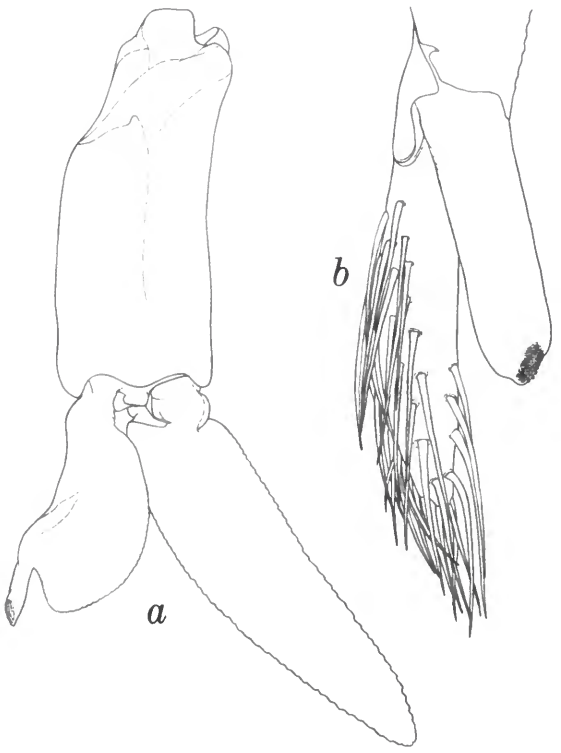

FIGURE 8.—*Glyphocrangon unguiculata*, male from *Albatross* sta 5630 (Halmahera), carapace length 21.9 mm: *a*, right 1st pleopod, posterior aspect; *b*, right appendix masculina and appendix interna, mesial aspect. (Magnifications: *a*, × 10.8; *b*, × 21.5.)

subunguiculate; maximum carapace length 28 mm.

MATERIAL.—PHILIPPINES. Lagonoy Gulf, east of southern Luzon: 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 ovig ♀ [25.5]; 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: 2♂ [19.7, 19.7], 6♀ [19.2–23.2], 5 ovig [21.3–23.2]; sta 5468; 13°35′39″N, 123°40′28″E; [1041 m]; green mud; 18 Jun 1909 (0958–1031); 12′ Agassiz beam trawl: 2♀ [18.0, 21.2], 1 ovig [21.2]; sta 5470; 13°37′30″N, 123°41′09″E [1024 m]; [mud]; 18 Jun 1909 (1526–1600); 12′ Agassiz beam trawl: 1 ovig ♀ [21.2].

INDONESIA. Makassar Strait west of Celebes: sta 5668; 2°28′15″S, 118°49′00″E; 1648 mm; gray mud; 3.4°C; 29 Dec 1909 (1645–1704); 12′ Agassiz beam trawl: 1♂ [19.0], 1♀ [18.8]. Teluk Tomini, Celebes: sta 5610; 0°36′00″S, 122°-01′00″E; 1240 m; gray mud; 19 Nov 1909 (1650–1717); 12′ Agassiz beam trawl: 1 ovig ♀ [21.8]; sta 5613; 0°42′00″S, 121°44′00″E; 1376 m; gray mud; 20 Nov 1909 (1114–1133); 12′ Agassiz beam trawl: 2 ovig ♀ [21.0, 22.0]. 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♂ [16.3]. Selat Butung, Celebes: sta 5648; 5°35′00″S, 122°20′00″E; 1023 m; green mud; 4.0°C; 16 Dec 1909 (1629–1652); 12′ Agassiz beam trawl: 1 ovig ♀ [28.0]. 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♂ [21.9].

RANGE.—Known previously only from the eastern Arabian Sea in 1353 to 1732 meters. The *Albatross* series extends the known geographic distribution to Indonesia and to Lagonoy Gulf in the Philippines and the bathymetric range upward to an estimated 878 meters.

REMARKS.—The Philippine and Indonesian specimens collected by the *Albatross*, aside from the usual reduction of comparative rostral length in larger specimens, display little variability in most diagnostic characters, but the posterior second (intermediate) carina is occasionally uneven rather than entire, rarely distinctly so; the anterior third (antennal) carina is sometimes represented by an indistinct, elongate tubercle or two rather than being completely lacking; the antennal spines are sometimes more divergent than the branchiostegals; the dorsal surface of the first abdominal somite occasionally bears a few tubercles in addition to those in the obscure row near the posterior margin; and the antennal scale rarely has a distinct tooth on the lateral margin.

The *Albatross* examples agree well with a small male (carapace length 17 mm) from the Arabian

Sea, received from the Indian Museum, except for the conformation of the distal end of the dactyls of the fourth and fifth pereopods. In all of the Philippine and Indonesian specimens, the dactyl terminates in two lobes: a rounded one mesial to the distal spine and a subacute one lateral to it (Figure 7*r,t,u*). Whether or not the absence of the distolateral lobe in the specimen from the Arabian Sea (Figure 7*v*) is of taxonomic importance can be determined only by examination of additional material from the Indian Ocean. Also, if the species is indeed absent from the eastern part of that region, a discontinuous distribution and the existence of two distinct species may be indicated.

* Crangonidae Haworth, 1825

Crangonidae Haworth, 1825:184.

Diagnosis.—Rostrum variable, usually short, depressed, immovably attached to remainder of carapace; carapace often sculptured with carinae, spines, or both; antennular flagella simple, without accessory branches; mandible without incisor process or palp; 2nd maxilliped with terminal segment semicircular, attached diagonally to penultimate segment; 1st pair of pereopods subchelate, 2nd pair—if present—with undivided carpus.

Range.—Virtually cosmopolitan; littoral to at least 5852 meters.

Remarks.—Study of the *Albatross* Philippine material and of comparative specimens in the Smithsonian collections has prompted me to propose the restoration of *Parapontocaris* Alcock, 1901, for the usually more elongate species that have been assigned to *Pontocaris* Bate, 1888, almost invariably for nearly 70 years. I am also proposing that *Philocheras* Stebbing, 1900, be treated as a distinct genus, even though several of my respected carcinological colleagues have relegated it to the synonymy of *Pontophilus* Leach, 1817, in recent years.

These proposed restorations bring to 17 the number of crangonid genera currently recognized; six of them are represented in the Philippine-Indonesian region. Dardeau and Heard (1983:6) offered a key to the 15 genera accepted heretofore.

Key to Philippine-Indonesian Genera of Crangonidae

1. Second pereopod chelate 2
   Second pereopod simple, not chelate 5
2. Six or 7 gills in each gill chamber, each with ventral apex directed posteriorly 3
   Eight gills in each gill chamber, each with ventral apex directed anteriorly 4
3. Rostrum without lateral teeth in posterior half; carapace without longitudinal suture extending from orbital margin to branchial region; 1st pereopod without trace of exopod . . . . . * ***Philocheras***
   Rostrum armed with 1 or 2 pairs of lateral teeth in posterior half of length; carapace with longitudinal suture extending from orbital margin to branchial region; 1st pereopod with rudimentary exopod . . . . . * ***Pontophilus***
4. Rostrum simple, not cleft apically, with 2 pairs of lateral teeth; carapace with 4 or 5 teeth on 1st lateral carina; abdominal sterna unarmed . . . . . * ***Parapontocaris***

Rostrum cleft apically, with no more than 1 pair of lateral teeth, if any; carapace with 7–12 teeth on 1st lateral carina; abdominal sterna armed with median spines ..... * ***Pontocaris***

5. Eye without cornea; antennal scale spine-like, blade much reduced; 2nd pereopod strong, overreaching merus of preceding pair ..... * ***Prionocrangon***

Eye with cornea well developed; antennal scale with well-formed blade; 2nd pereopod weak, not nearly reaching distal end of merus of preceding pair ..... * ***Sabinea***

* *Parapontocaris* Alcock, 1901

Parapontocaris Alcock, 1901:114, 120 [type-species, selected by Holthuis, 1955:139: *Crangon bengalensis* Wood-Mason, in Wood-Mason and Alcock, 1891b:360; gender: feminine].

DIAGNOSIS.—Rostrum simple, not cleft apically, with 2 pairs of lateral teeth; carapace with 4 or 5 teeth on 1st lateral carina, with short postorbital longitudinal suture; abdominal sterna unarmed; eye with cornea well-developed, pigmented; antennal scale with well-developed blade; 1st pereopod with well-developed exopod; 2nd pereopod chelate, overreaching merus of anteriorly extended 1st pereopod; 8 pairs of gills, each curving anteriorly at ventral end.

RANGE.—Indian Ocean, Philippines, and western Atlantic; 247–885 meters.

REMARKS.—This taxon was proposed by Alcock as a subgenus of *Aegeon* (= *Pontocaris*) for two species—*Crangon andamanensis* and *C. bengalensis*—which were believed to differ from the typical members of *Aegeon* in the somewhat thinner integument, the abdominal pleura "produced anteroposteriorly and ... rounded, instead of being produced in a vertical direction," the abdominal sterna unarmed, the eyes "larger and blacker," the antennal scale "much longer than broad," and the exopod of the first pereopod longer. Kemp (1916:375), after examining all of the species of "*Aegeon*" then known, recommended rejection of Alcock's proposal because three of the species (*A. orientalis*, *A. habereri*, and *A. lacazei*) "are intermediate in character between the more typical species of the genus and those which Alcock referred to the genus *Parapontocaris*." Kemp noted particularly that *A. orientalis* "agrees with *Parapontocaris* in the complete absence of the hepatic groove and in the arrangement of the carinae on the first and second abdominal somites"—characters not mentioned in Alcock's diagnosis—while agreeing with typical members of the genus in the broad antennal scale and strong median spines on the abdominal sterna. Two years later, De Man (1918b:304) formalized Kemp's opinion that the species referred to *A. orientalis* by Rathbun (1906:911) represented a distinct taxon; the resultant species, *P. rathbuni*, proved to be an even more convincing link between the typical species of "*Aegeon*" and those assigned to *Parapontocaris* than the true *A. orientalis*.

The descriptions below of two additional comparatively large species from the Philippines brings to six the number of remarkably similar species now assignable to *Parapontocaris*, and I am, perhaps imprudently, suggesting that Alcock's name be revived, as a full genus, for this group, even though *P. rathbuni*—because of its slender appearance, lack of an hepatic furrow, and longitudinally expanded pleura—superficially resembles the species of this group more closely than it does the other species left in *Pontocaris*. It seems to me that, except for the intermediate characters of *Pontocaris rathbuni*, there is ample justification for recognizing this seemingly "natural" discontinuity, and I am inclined to attribute greater significance to the form of the rostrum and the median sternal spines on the abdomen of that aberrant species than to the proportions of the carapace, the absence of an

hepatic furrow, and the form of the abdominal pleura.

Calman (1939:221) synonymized "*A.*" *andamanensis* with "*A.*" *bengalensis* because of variability in the dentition of the carinae of the carapace, but I am reluctant to follow his lead in view of the fact that 24 of the 25 specimens that he recorded from Zanzibar disagree with the counts previously found most commonly in either of the species described by Wood-Mason and Alcock. The current study has seemingly revealed the importance of mean values in distinguishing the species of *Parapontocaris*—especially when correlated with the form of the appendix masculina—and the possibility must therefore be considered that the Zanzibar population may prove to represent a distinct species.

Key to Species of *Parapontocaris*

1. Median carina on carapace armed with 4 teeth ..... ***P. caribbaea*** (Boone, 1927:125) (Western Atlantic; 311–885 meters)
   Median carina on carapace armed with 5 teeth 2
2. Third lateral (supramarginal) carina on carapace usually armed with more than 3 teeth or denticles posterior to branchiostegal spine ..... * 15. ***P. aspera***
   Third lateral (supramarginal) carina on carapace never armed with more than 3 teeth or denticles posterior to branchiostegal spine 3
3. Second lateral carina on carapace usually armed with 5 or 6 teeth ..... ***P. andamanensis*** (Wood-Mason and Alcock, 1891b:360) (Indian Ocean; 344–463 meters)
   Second lateral carina on carapace armed with 3 teeth 4
4. Second abdominal somite armed with 1 tooth in dorsal midline ..... ***P. bengalensis*** (Wood-Mason and Alcock, 1891b:360) (Indian Ocean; 264–811 meters)
   Second abdominal somite usually armed with 2 or 3 teeth in dorsal midline 5
5. Sixth abdominal somite usually armed with 2–4 pairs of teeth in addition to posterior pair on submedian carinae ..... * 16. ***P. levigata***
   Sixth abdominal somite with 1 pair of teeth in addition to posterior pair on submedian carinae ..... ***P. vicina*** (Dardeau and Heard, 1983:10) (Western Atlantic; 366–549 meters)

* 15. *Parapontocaris aspera*, new species

FIGURES 9–11

DIAGNOSIS.—Median carina on carapace armed with 5 teeth; 2nd lateral carina armed with 3–7 teeth; 3rd lateral carina armed with 1–10 (commonly 4 or 5) teeth or denticles posterior to branchiostegal spine; 2nd abdominal somite with 2 (rarely 3) teeth in dorsal midline; 6th abdominal somite with 2 or 3 pairs of carinal teeth in advance of posterior pair; appendix masculina, not including spines, barely reaching mid-length of endopod of 2nd pleopod; maximum carapace length 23 mm.

DESCRIPTION.—Rostrum (Figure 10*a*) short and broad, armed with 2 subequal pairs of lateral

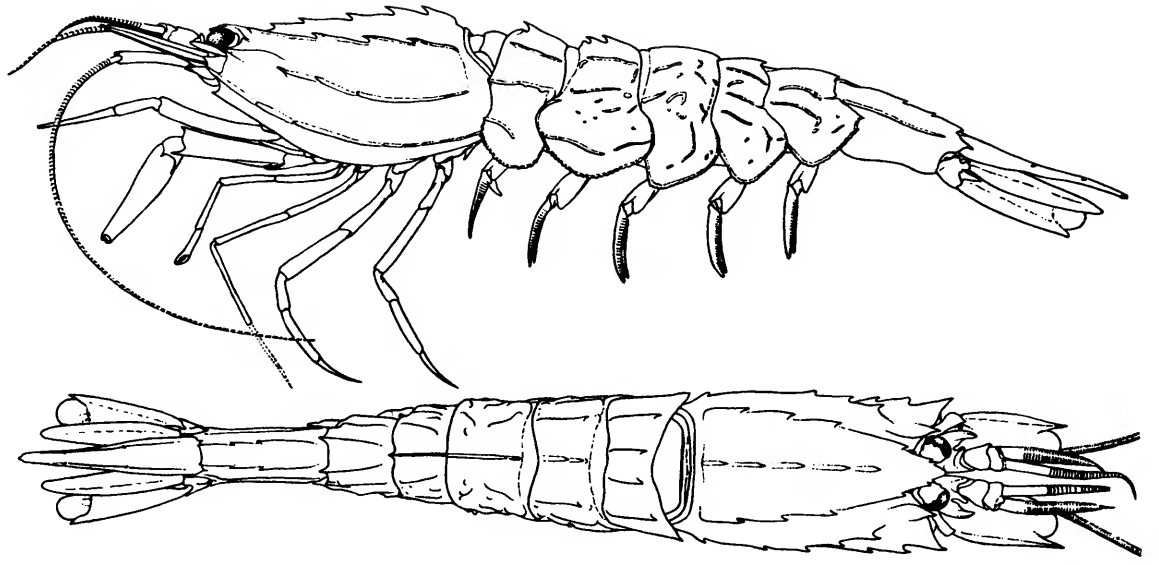

FIGURE 9.—*Parapontocaris aspera*, new species, male holotype from *Albatross* sta 5459, carapace length 17.5 mm, lateral and dorsal aspects. (Magnification: × 1.9.)

teeth. Carapace (Figure 9) without distinct hepatic furrow, varying in postorbital length from about 1½ as long as wide in smallest specimens to about 1⅓ times as long in largest. Median carina armed with 5 teeth (6 in 1 specimen out of 28), 2 anterior smaller than 3 posterior. First lateral carina armed with 4 teeth, without exception, anteriormost small, situated slightly posterior to base of rostrum. Second lateral carina armed most frequently with 3 teeth, less often with 5, 6, 4, and 7, in that order of diminishing frequency. Third lateral carina armed most frequently with 4 or 5 teeth (in diminishing frequency, 7, 6, 8, 3, 2, 1, 9, and 10), anterior 1 or 2 teeth largest, posterior ones often indistinct. Branchiostegal spines not noticeably divergent.

First abdominal somite with 3 pairs of sharp longitudinal carinae, anterior margin bearing 1, occasionally 2, very unusually 3, lateral teeth or denticles. Second abdominal somite with 2, rarely 3, teeth in dorsal midline (anterior tooth reduced to tubercle in 1 specimen). Fourth abdominal somite with 3 pairs of divergent lateral carinae. Fifth abdominal somite with pleuron sometimes truncate and bidentate posteriorly. Sixth abdominal somite with pair of dorsolateral carinae armed with 2 or 3 (exceptionally 1) pairs of teeth anterior to posterior marginal ones.

Eyes expanding distally but not especially broad.

Stylocerite (Figure 10*c*) bearing minute distal denticle and distinctly, but not greatly, overreaching basal segment of antennular peduncle.

Antennal scale (Figure 10*e*) most elongate (2⅓ times as long as wide) in immature specimens, broadest (1¾ times as long as wide) in adults, distolateral spine slightly overreaching distal margin of blade, lateral margin usually faintly convex in adults, sinuous or straight in immature.

Mouthparts as illustrated (Figure 10*f–m*). Third maxilliped overreaching antennal scale by about ¾ length of distal segment.

First pereopod (Figure 10*n*) overreaching antennal scale by about ¼ length of chela. Second pereopod (Figure 10*p*) usually overreaching anteriorly extended carpus of 1st pereopod, carpus about 1¼ times as long as chela. Third pereopod (Figure 10*r*) overreaching antennal scale by

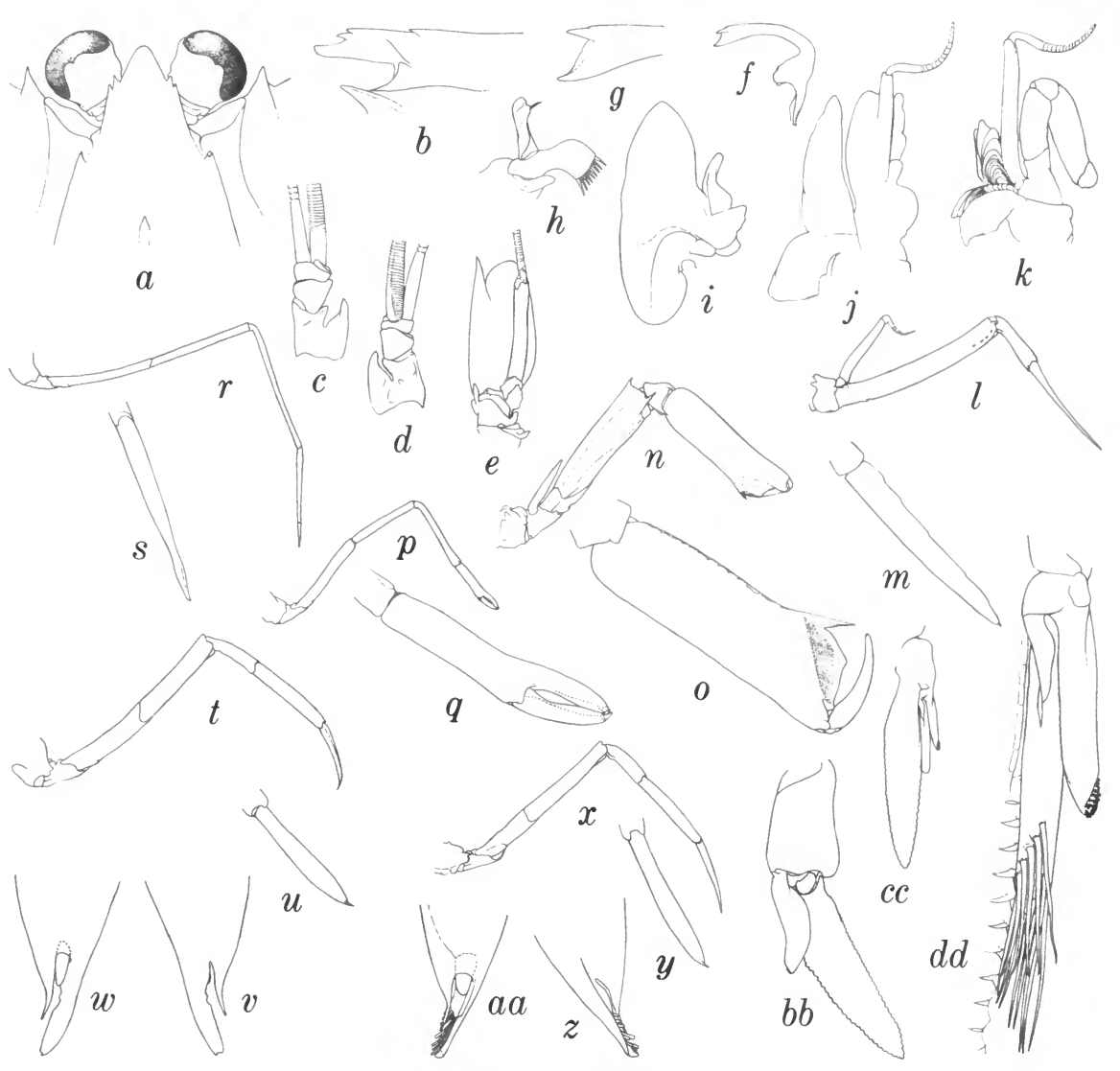

FIGURE 10.—*Parapontocaris aspera*, new species, male holotype from *Albatross* sta 5459, carapace length 17.5 mm: *a*, rostrum and orbital region, dorsal aspect; *b*, same, lateral aspect; *c*, right antennule, dorsal aspect; *d*, same, ventral aspect; *e*, right antenna, ventral aspect; *f*, right mandible; *g*, same, distal part; *h*, right 1st maxilla; *i*, right 2nd maxilla; *j*, right 1st maxilliped; *k*, right 2nd maxilliped; *l*, right 3rd maxilliped; *m*, same, distal segment, flexor (dorsal) aspect; *n*, right 1st pereopod; *o*, same, extensor aspect of chela; *p*, right 2nd pereopod; *q*, same, chela; *r*, right 3rd pereopod; *s*, same, dactyl, lateral aspect; *t*, right 4th pereopod; *u*, same, dactyl, extensor aspect; *v*, extensor aspect of tip; *w*, same, flexor aspect; *x*, right 5th pereopod; *y*, same, dactyl, extensor aspect; *z*, same, extensor aspect of tip; *aa*, same, flexor aspect; *bb*, right 1st pleopod, posterior aspect; *cc*, endopod of right 2nd pleopod, anterior aspect; *dd*, appendix masculina and appendix interna, anterior aspect. (Magnifications: *c–e*, *l*, *n*, *p*, *r*, *t*, *x*, × 2.6; *a*, *b*, *f*, *h–k*, *m*, *o*, *u*, *y*, *bb*, *cc*, × 5.2; *g*, *q*, × 10.8; *s*, *dd*, × 21.5; *v*, *w*, *z*, *aa*, × 53.8.)

length of dactyl and most of propodus. Fourth pereopod (Figure 10*t*) overreaching antennal scale by no more than ¼ length of dactyl, latter (Figure 10*u–w*) subspatulate, terminating in 2 unequal processes. Fifth pereopod (Figure 10*x*) similar to 4th and reaching midlength of antennal scale.

First pleopod of male (Figure 10*bb*) with endopod broadly acinaciform. Appendix masculina (Figures 10*cc*,*dd*, 11) provided with up to 15 or more long spines, barely reaching midlength of 2nd pleopod, not including spines. Uropods (Figure 9) distinctly shorter than telson.

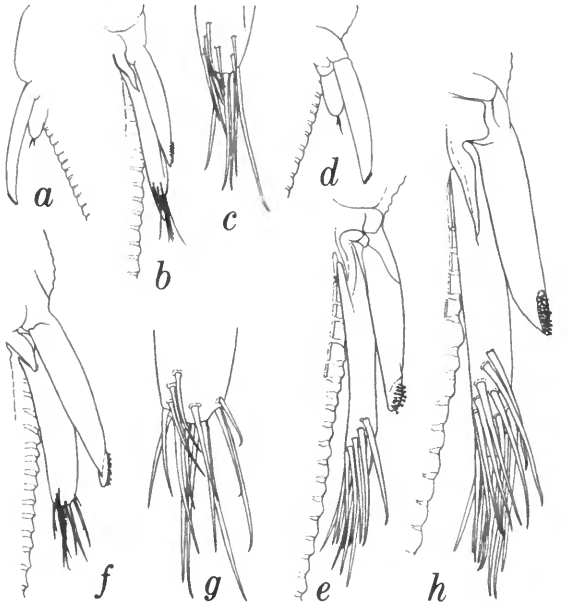

FIGURE 11.—*Parapontocaris aspera*, new species, appendices masculinae from Philippine male paratypes: *a*, left side of specimen with carapace length of 8.9 mm from *Albatross* sta 5241; *b*, right side of specimen with carapace length of 9.8 mm from *Albatross* sta 5241; *c*, same, distal end of appendix masculina; *d*, right side of specimen with carapace length of 11.2 mm from *Albatross* sta 5110; *e*, right side of specimen with carapace length of 13.3 mm from *Albatross* sta 5453; *f*, right side of specimen with carapace length of 14.0 mm from *Albatross* sta 5453; *g*, same, distal end of appendix masculina; *h*, right side of specimen with carapace length of 18.2 mm from *Albatross* sta 5459. (Magnifications: *a*, *b*, *d–f*, *h*, × 21.5; *c*, *g*, × 53.8.)

SIZE.—Carapace length of male holotype, 17.5 mm; of male paratypes, 8.9–18.2 mm; of female paratypes without eggs, 8.3–20.1 mm; of ovigerous female paratypes, 13.1–22.7 mm.

MATERIAL.—PHILIPPINES. Southwest of Manila Bay: sta 5110; 13°59′20″N, 120°75′ [sic—corrected to "25′" from *Albatross* workchart] 45″E; 247 m; dark gray mud; 15.0°C; 15 Jan 1908 (1532–1552); 12′ Tanner beam trawl, mud bag (30 m cable veered during haul): 1♂ [11.2]. Balayan Bay, southern Luzon: sta 5118; 13°48′45″N, 120°41′51″E; 291 m; dark green mud; 21 Jan 1908 (1100–1130); 12′ Tanner beam trawl, mud bag: 1♀ [20.1]. Albay Bay, east of southern Luzon: sta 5453; 13°12′N, 123°49′18″E; [267 m]; 7 June 1909 (0944–1004); 12′ Agassiz beam trawl: 2♂ [13.3, 14.0]; sta 5454; 13°12′N, 123°50′30″E; [280 m]; 7 June 1909 (1046–1107); 12′ Agassiz beam trawl: 2♀ [15.0, 22.2], 1 ovig [22.2]; sta 5459; 13°10′21″N, 123°59′54″E; [368 m]; 8 Jun 1909 (1541–1601); 12′ Agassiz beam trawl, mud bag: 2♂ [17.5, 18.2], smaller is holotype (USNM 205025). Bohol Strait east of Cebu: sta 5419; 9°58′30″N, 123°46′E; 320 m; green mud; 12.5°C; 25 Mar 1909 (1355–1415); 12′ Agassiz beam trawl: 2♀ [19.8, 20.7], 1 ovig [20.7]. Western Mindanao Sea: sta 5542; 8°48′30″N, 123°35′30″E; 366 m; fine sand, broken shells; 12.4°C; 20 Aug 1909 (0656–0716); 1 ovig ♀ [22.7]. Off Bongo Island, Illana Bay, western Mindanao: sta 5256; 7°21′45″N, 124°07′15″E; 289 m; mud; 22 May 1908 (0954–1014); 12′ Agassiz beam trawl, mud bag: 2 ovig ♀ [19.8, 12.7]. Pujada Bay, southeastern Mindanao: sta 5241; 6°50′45″N, 126°14′38″E; 393 m; soft gray mud; 14 May 1908 (1505–1525); 9′ Albatross-Blake trawl, mud bag: 2♂ [8.9, 9.8], 11♀ [8.3–16.7], 1 ovig [13.1]; sta 5243; 6°50′55″N, 126°14′35″E; 399 m; gray mud; 17.6°C; 15 May 1908 (1312–1332); 12′ Agassiz beam trawl, mud bag: 2♀ [16.0, 16.2].

TYPE-LOCALITY.—Albay Gulf, east of southern Luzon, Philippines; 13°10′21″N, 123°59′-54″E; [368 meters].

RANGE.—Known from the type series from

off the larger Philippine islands from southern Luzon to southern Mindanao; 247–399 meters.

REMARKS.—This species may usually be distinguished from its congeners by the presence of teeth, obscure though they may be, on the posterior half of the third or supramarginal carina on the carapace. In addition, it seems to differ from *P. andamanensis* and *P. bengalensis* from the Indian Ocean in having only four, rather than five, teeth on the first lateral carina. Also, it usually differs from *P. bengalensis* in having more than three teeth on the second carina and two or three teeth, rather than one, in the dorsal midline of the second abdominal somite. From the western Atlantic *P. caribbaea*, it may be readily separated by having five, rather than only four, teeth on the median carina on the carapace. From the sibling Philippine *P. levigata*, it usually differs in having the carapace slightly shorter proportionately, more numerous teeth on the second lateral carina, the antennal scale slightly shorter relative to its width, and the appendix masculina shorter.

It may be noticed from Figure 11 that there seem to be two forms of appendix masculina in this species. Those represented by Figure 11*e,h* resemble those of *P. levigata*, except for their length, and those shown in Figure 11*b,c,f,g* resemble that of *P. caribbaea* from the western Atlantic. I have been unable to associate the differences in the Philippine series with any other morphological characters, and the occurrence of both forms of appendix masculina (as well as a female of *P. levigata*) among the three specimens collected at *Albatross* station 5453 in Albay Gulf, southeastern Luzon, has dissuaded me from further attempts at "splitting" at this time.

The apparent similarity of *P. aspera* to *P. andamanensis* from the Andaman Sea, a species that I have not seen, might discourage a more conservative carcinologist from treating the Philippine series as a distinct species, but the multidentate third lateral or supramarginal carina seems sufficient to distinguish the two, and the failure of either the *Siboga* or the *Albatross* expeditions to find *Parapontocaris* in Indonesia suggests the possibility of isolation of the populations.

ETYMOLOGY.—The Latin name *asper* (rough, uneven) was suggested by the number of teeth on the second and third lateral carinae of the carapace, especially in comparison with the condition in the related Philippine species, *P. levigata*.

*16. *Parapontocaris levigata*, new species

FIGURES 12–14

DIAGNOSIS.—Median carina on carapace armed with 5 teeth; 2nd lateral carina armed with 3 teeth; 3rd lateral carina armed with 1 or 2 teeth posterior to branchiostegal spine; 2nd abdominal somite with 2 (rarely 1 or 3) teeth in dorsal midline; 6th abdominal somite with 2–4 (rarely 1) pairs of carinal teeth in advance of posterior pair; appendix masculina, not including spines, reaching well beyond midlength of endopod of 2nd pleopod; maximum carapace length 21 mm.

DESCRIPTION.—Rostrum (Figure 13*a*) moderately elongate, armed with 2 subequal pairs of lateral teeth. Carapace (Figure 12) without distinct hepatic furrow, varying in postorbital length from nearly 1⅔ as long as wide in smallest specimens to about 1⅔ in largest. Median carina armed with 5 teeth, 2 anterior smaller than 3 posterior. First lateral carina armed with 4 or 5 teeth, anteriormost small, situated slightly posterior to base of rostrum. Second lateral carina armed with 3 teeth, without exception. Third lateral carina armed with 1, less commonly 2, teeth. Branchiostegal spines not noticeably divergent.

First abdominal somite with 3 pairs of sharp longitudinal carinae, anterior margin bearing 1, uncommonly 2, lateral teeth or denticles. Second abdominal somite with 2, very rarely 1 or 3, teeth in dorsal midline. Fourth abdominal somite with 3 pairs of divergent lateral carinae. Fifth abdominal somite with pleuron neither truncate nor bidentate posteriorly. Sixth abdominal somite with pair of dorsolateral carinae armed with 1–4 pairs of teeth anterior to posterior marginal ones.

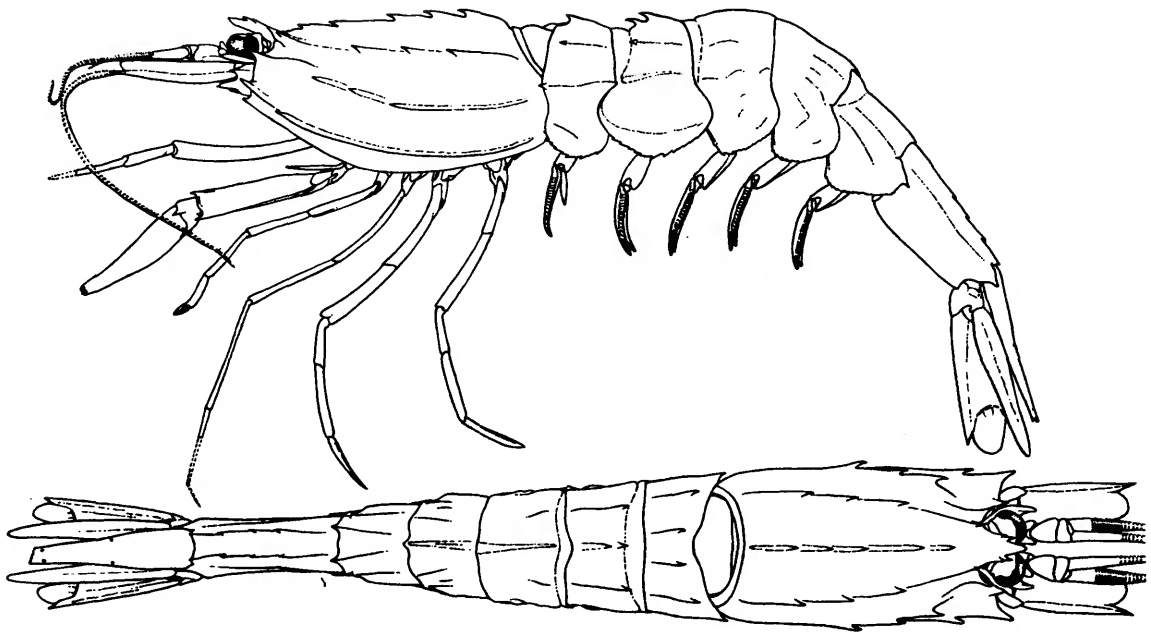

FIGURE 12.—*Parapontocaris levigata*, new species, male holotype from *Albatross* sta 5113, carapace length 12.3 mm, lateral and dorsal aspects. (Magnification: × 3.0.)

Eyes expanding distally, of moderate width.

Stylocerite (Figure 13*c*) bearing minute distal denticle and slightly overreaching basal segment of antennular peduncle.

Antennal scale (Figure 13*e*) up to more than 2½ times as long as wide, not noticeably more elongate in immature specimens, distolateral spine distinctly overreaching distal margin of blade, lateral margin faintly convex to straight, even in adults.

Mouthparts as illustrated (Figure 13*f–m*). Third maxilliped overreaching antennal scale by about ½ length of distal segment.

First pereopod (Figure 13*n*) overreaching antennal scale by about ¼ length of chela. Second pereopod (Figure 13*p*) usually overreaching anteriorly extended carpus of 1st pereopod, carpus about 1⅕ times as long as chela. Third pereopod (Figure 13*r*) overreaching antennal scale by lengths of dactyl and propodus. Fourth pereopod (Figure 13*u*) overreaching antennal scale by about ¼ of dactyl, latter (Figure 13*v–x*) subspatulate, terminating in 2 subequal processes. Fifth pereopod (Figure 13*y*) similar to 4th and reaching about midlength of antennal scale.

First pleopod of male (Figure 13*cc*) with endopod acinaciform. Appendix masculina (Figures 13*dd,ee*, 14) provided with about a dozen long spines in adult, reaching about to distal ⅕ of endopod of 2nd pleopod, not including spines. Uropods reaching nearly to posterior end of telson.

SIZE.—Carapace length of male holotype, 12.3 mm; of male paratypes, 8.1–13.0; of female paratypes without eggs, 10.2–17.8; of ovigerous female paratypes, 15.2–20.7 mm.

MATERIAL.—PHILIPPINES. South China Sea off western Luzon: sta 5440; 16°33′52″N, 119°52′-54″E; 315 m; fine gray sand, globigerina; 11.8°C; 10 May 1909 (1401–1421); 12′ Agassiz beam trawl, mud bag: 1♀ [16.1]. Balayan Bay, southern Luzon: sta 5112; 13°48′22″N,

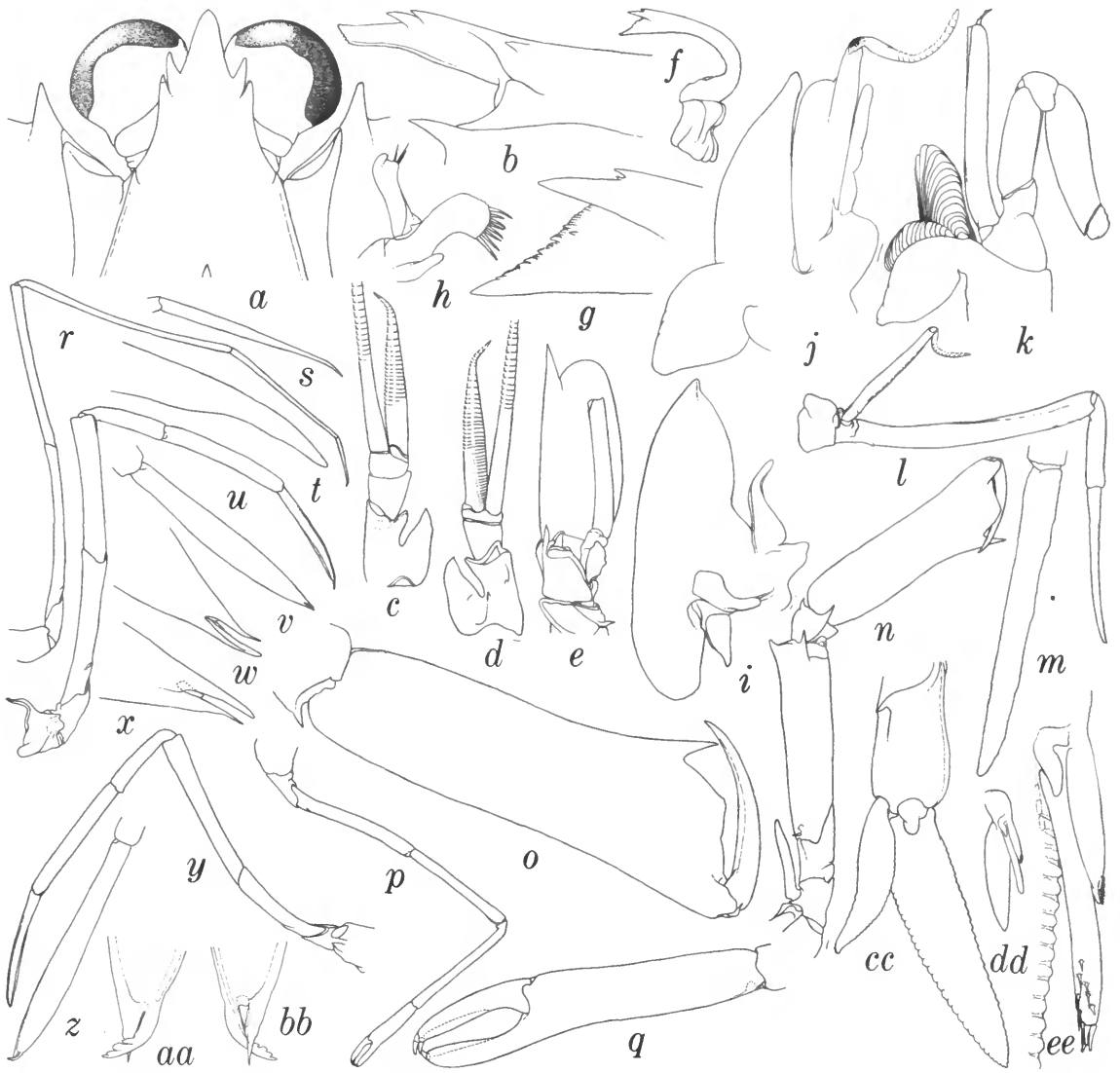

FIGURE 13.—*Parapontocaris levigata*, new species, male holotype from *Albatross* sta 5113, carapace length 12.3 mm: *a*, rostrum and orbital region, dorsal aspect; *b*, same, lateral aspect; *c*, right antennule, dorsal aspect; *d*, same, ventral aspect; *e*, right antenna, ventral aspect; *f*, right mandible; *g*, same, distal part; *h*, right 1st maxilla; *i*, right 2nd maxilla; *j*, right 1st maxilliped; *k*, right 2nd maxilliped; *l*, right 3rd maxilliped; *m*, same, distal segment, flexor (dorsal) aspect; *n*, right 1st pereopod; *o*, same, extensor aspect of chela; *p*, right 2nd pereopod; *q*, same, chela; *r*, right 3rd pereopod; *s*, same, dactyl, lateral aspect; *t*, same, tip; *u*, right 4th pereopod; *v*, same, dactyl, extensor aspect; *w*, same, extensor aspect of tip; *x*, same, flexor aspect; *y*, left 5th pereopod; *z*, same, dactyl, extensor aspect; *aa*, same, extensor aspect of tip; *bb*, same, flexor aspect; *cc*, right 1st pleopod, posterior aspect; *dd*, endopod of right 2nd pleopod, anterior aspect; *ee*, appendix masculina and appendix interna, anterior aspect. (Magnifications: *c–e*, *l*, *n*, *p*, *r*, *u*, *y*, *dd*, × 5.2; *a*, *b*, *f*, *h–k*, *m*, *o*, *v*, *z*, *cc*, × 10.8; *q*, *s*, *ee*, × 21.5; *g*, *t*, *w*, *x*, *aa*, *bb*, × 53.8.)

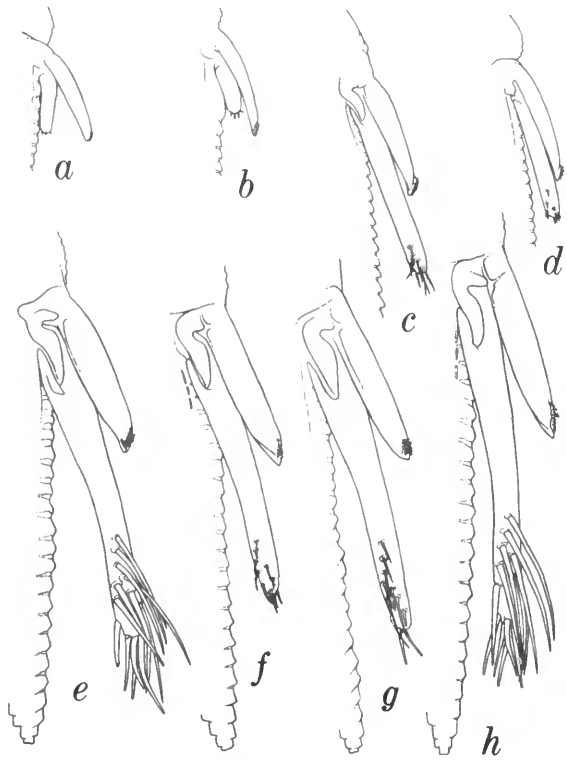

FIGURE 14.—*Parapontocaris levigata*, new species, right appendices masculinae from Philippine male paratypes collected at *Albatross* stations indicated (numbers in parentheses represent carapace lengths in mm): *a*, sta 5387 (8.1); *b*, sta 5247 (8.3); *c*, sta 5197 (9.6); *d*, sta 5222 (9.7); *e*, sta 5374 (12.0); *f*, sta 5387 (12.2); *g*, sta 5198 (12.3); *h*, sta 5387 (13.0). (Magnifications: all × 21.5.)

120°47′25″E; 324 m; dark green mud; 11.3°C; 17 Jan 1908 (1433–1503); 12′ Tanner beam trawl, mud bag: 1 ovig ♀ [20.2]; sta 5113; 13°51′30″N, 120°50′30″E; 291 m; dark green mud; 17 Jan 1908 (1602–1612); 12′ Tanner beam trawl, mud bag: 1♂ holotype [12.3] (USNM 205000); sta 5364 or 5365; 13°48′30″N, 120°43′45″E or 13°44′24″N, 120°45′30″E; [293 or 391 m]; 20 or 22 Feb 1909 (1440–1523 or 0904–0940); 15′ Agassiz beam trawl: 1♀ [15.3]. Verde Island Passage: sta 5367; 13°34′37″N, 121°07′30″E; [329 m]; 22 Feb 1909 (1710–1836); 25′ Agassiz beam trawl (rear beam broken and iron frame twisted): 1♀ [11.4]. Tayabas Bay, southern Luzon: sta 5221; 13°38′15″N, 121°48′15″E; 353 m; green mud; 11.3°C; 24 Apr 1908 (1525–1545); 12′ Agassiz beam trawl, mud bag: 1 ovig ♀ [16.0]; sta 5222; 13°38′30″N, 121°42′45″E; 357 m; green mud; 11.6°C; 24 Apr 1908 (1649–1709); 12′ Agassiz beam trawl, mud bag: 1♂ [9.7], 1♀ [14.0]; sta 5374; 13°46′45″N, 121°35′08″E; [348 m]; gray mud; 2 Mar 1909 (1157–1230); 12′ Tanner beam trawl, mud bag: 1♂ [12.0], 1 ovig ♀ [19.0]. Northeast of Mindoro: sta 5122; 13°21′30″N, 120° [probably 121°] 30′33″E; 402 m; green mud; 2 Feb 1908 (1059–1119); 12′ Tanner beam trawl, mud bag: 1♀ [14.1]. Tablas Strait, east of Mindoro: sta 5260; 12°25′35″N, 121°31′35″E; 428 m; green mud, sand; 10.8°C; 3 Jun 1908 (1532–1552); 12′ Agassiz beam trawl, mud bag: 3♀ [13.1–17.2], 1 ovig [16.2]. Burias Pass, south of eastern Luzon: 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: 3♂ [8.1–13.0], 3♀ [10.7–13.9]. Albay Gulf, east of southern Luzon: sta 5453; 13°12′N, 123°49′18″E; [267 m]; 7 Jun 1909 (0944–1004); 12′ Agassiz beam trawl: 1 ovig ♀ [20.7]. West of Leyte: sta 5194; 11°15′30″N, 124°11′E; 271 m; green mud; 13.6°C; 3 Apr 1908 (1415–1435); 12′ Agassiz beam trawl, 3 mud bags: 2♀ [10.2, 12.8]; sta 5403; 11°10′N, 124°17′15″E; 333 m; green mud; 13.2°C; 16 Mar 1909 (1514–1543); 12′ Agassiz beam trawl: 2♀ [13.3, 13.9]; sta 5404; 10°50′N, 124°26′18″E; 348 m; mud; 13.0°C; 17 Mar 1909 (0858–0924); 12′ Agassiz beam trawl: 1♀ [12.9]; sta 5409; 10°38′N, 124°13′-08″E; 346 m; green mud; 18 Mar 1909 (0951–1020); 12′ Agassiz beam trawl, mud bag: 1♀ [17.2]. Bohol Strait, east of Cebu: sta 5197; 9°52′30″N, 123°40′45″E; 318 m; green mud; 12.4°C; 9 Apr 1908 (0855–0915); 12′ Agassiz beam trawl, 3 mud bags: 1♂ [9.6]; sta 5198; 9°40′50″N, 123°39′45″E; 402 m; green mud; 12.2°C; 9 Apr 1908 (1125–1145); 12′ Agassiz beam trawl, 3 mud bags: 1♂ [12.3], 3♀ [12.0–17.0]. Between Negros and Siquijor: sta 5536;

9°15′45″N, 123°22′00″E; 510 m; green mud; 11.9°C; 19 Aug 1909 (1336–1356); 12′ Tanner beam trawl: 2♀ [13.9, 17.2], 1 ovig [17.2]; sta 5537; 9°11′00″N, 123°23′00″E; 465 m; green mud; 11.9°C; 19 Aug 1909 (1539–1559); 12′ Tanner beam trawl: 1 ovig ♀ [18.0]. Macalajar Bay, northern Mindanao: sta 5501; 8°37′37″N, 124°35′E; 391 m; fine sand, gray mud; 12.4°C; 4 Aug 1909 (1428–1448); 12′ Tanner beam trawl: 1♀ [17.8]; sta 5502; 8°37′37″N, 124°35′-E; 391 m; fine sand, gray mud; 4 Aug 1909 (1528–1548); 12′ Tanner beam trawl: 1 ovig ♀ [17.8]; sta 5504 or 5505; 8°35′30″N, 124°36′E or 8°37′15″N, 124°36′E; 366 [or 402] m; green mud; 12.4°C; 5 Aug 1909 (0615–0635 or 0725–0749); 12′ Tanner beam trawl: 4♀ [14.3–18.2], 3 ovig [15.2–18.2]; 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 ovig ♀ [17.0]. Davao Gulf, Mindanao: sta 5247; 7°02′N, 125°38′45″E; 247 m; 18 May 1908 (0908–0928); 12′ Agassiz beam trawl, mud bag: 1♂ [8.3], 1 juv [7.2].

TYPE-LOCALITY.—Balayan Bay, southern Luzon, Philippines; 13°51′30″N, 120°50′30″E; 291 meters.

RANGE.—Off the larger Philippine islands from the latitude of Lingayen Gulf, western Luzon, to southern Mindanao; 247–510 meters.

REMARKS.—This species differs from *P. andamanensis* from the Andaman Sea by having only three teeth on the second lateral carina of the carapace; from *P. aspera*, described above, by having the third lateral (supramarginal) carina entire in its posterior half, rather than obscurely dentate, the antennal scale slightly more elongate, and the appendix masculina noticeably longer; from *P. bengalensis* from the Bay of Bengal by the presence, usually, of two teeth, rather than one, in the dorsal midline of the second abominal somite; and from the western Atlantic *P. caribbaea* by having five, rather than four, teeth on the median carina of the carapace. Just as *P. aspera* seems to be close to *P. andamanensis*, *P. levigata* may be very near *P. bengalensis*; as with the preceding species, the assumption of specific distinction is based on the possibility of discontinuous ranges.

ETYMOLOGY.—The Latin name *levigatus* (smooth) was selected as descriptive of the less dentate carapace and somewhat smoother abdomen of this species, in comparison with *P. aspera*.

**Philocheras* Stebbing, 1900

Philocheras Stebbing, 1900:48 [type-species, selected by Holthuis, 1955:138: *Crangon nanus* Krøyer, 1842 (= *Pontophilus bispinosus* Hailstone, 1835:271); gender: masculine].

DIAGNOSIS.—Rostrum without lateral teeth in basal ½ of length; carapace without postorbital longitudinal suture; eye with well-developed cornea, pigmented; antennal scale with well-developed blade; 1st pereopod without trace of exopod; 2nd pereopod chelate, usually overreaching merus of anteriorly extended 1st pereopod.

RANGE.—Current records indicate that *Philocheras* occurs in South Africa, the northern part of the Indian Ocean, Indonesia and the Sulu Sea, the East China Sea and Japan, Australia, New Zealand, the western Atlantic, and the eastern Atlantic and Mediterranean. Its representation in these areas, however, is far from uniform. Species seem to be most numerous (13) in the eastern Atlantic and Mediterranean, whereas only one, somewhat atypical species is known thus far from the entire western Atlantic and Gulf of Mexico. Nine species have been described from India and the Andaman and Maldive islands. Seven are known from the vicinity of New Zealand. Although the genus is common in certain temperate regions, at least half of the known species have been recorded from tropical or subtropical waters; it is rather remarkable, therefore, that all four of the Australian species seem to be confined to the temperate coasts of Victoria and that no species have yet been recorded from the vast Pacific Ocean eastward from Japan and Australia and including the Pacific coasts of America. The greatest recorded depth for the genus seems to be that of the northeastern Atlantic *Philocheras echinulatus* (M. Sars, 1862) from 878 meters, but nearly two-thirds of the species

apparently occur in depths of less than 50 meters.

REMARKS.—Those responsible for recent faunal studies and species lists have failed to agree about the validity of *Philocheras*. Allen (1967), Christiansen (1972), Lagardère (1970), and Zariquiey (1968) recognized it as a distinct taxon, whereas Crosnier and Forest (1973), Dardeau (1980), Dardeau and Heard (1983), Fujino and Miyake (1970), Holthuis, and Heerebout (1976), Kensley (1972), and Smaldon (1979) followed Kemp (1911:5) in treating it as a synonym of *Pontophilus*; Holthuis has indicated in correspondence, however, that he now supports the acceptance of Stebbing's genus. Michèle de Saint Laurent has called my attention to the support for the separation of the two genera provided by the study of larval characters reported by Williamson (1982:93). I have been able to examine material of 11 of the approximately 43 species currently assignable to this genus and nine of the 11 species and subspecies of *Pontophilus*, and all 11 of the former are distinguishable from the latter by the absence of lateral teeth on the basal half of the rostrum, by the absence of a longitudinal suture extending from the orbital margin to the branchial region of the carapace (although there is an apparently suborbital suture in *Pontophilus gorei* Dardeau, 1980, which seems otherwise to be the only representative of *Philocheras* known from the western Atlantic), and by the absence of any trace of an exopod on the first pereopods. It seems likely that one or more of these characters will prove to be constantly different between the usually stubby species of *Philocheras* and the more slender members of the genus *Pontophilus*. Also, it seems quite possible that some of the inconstant characters displayed by the species of *Philocheras*—such as the form of the rostrum, the presence or absence of a suborbital longitudinal suture on the carapace, the lateral dentition on the antennal scale, the articulated "thumb" of the first pereopod, and the diverse development of the pleopods and of the appendix masculina—may eventually justify the subdivision of this, the largest genus in the family.

Key to Philippine-Indonesian Species of *Philocheras*

1. Antennal scale armed with 1 lateral spine proximal to distolateral spine 2
   Antennal scale laterally unarmed but sometimes denticulate proximal to distolateral spine 5
2. Carapace armed with 3 spines (2 gastric, 1 cardiac) in dorsal midline ..... 22. ***P. vanderbilti***
   Carapace armed, at most, with 1 gastric spine 3
3. First pereopod with distolateral spine ("thumb") on propodus not articulated at base ..... 20. ***P. kempii***
   First pereopod with distolateral spine ("thumb") on propodus articulated at base 4
4. Antennal scale with lateral spine near midlength . . . 17. ***P. angustirostris***
   Antennal scale with lateral spine at distal end of proximal ¼ of length ..... *18. ***P. incisus***
5. Carapace with 4 pairs of lateral carinae; antennal scale about 3 times as long as wide, lateral margin denticulate, distolateral spine far overreaching receding blade ..... 19. ***P. japonicus***
   Carapace without lateral carinae; antennal scale about twice as long as wide, lateral margin not denticulate, distolateral spine not clearly overreaching distally projecting blade ..... *21. ***P. modestus***

17. *Philochereas angustirostris* (De Man, 1918), new combination

Pontophilus angustirostris De Man, 1918a:163 [type-locality: the type series came from 4 Indonesian localities: Batjulmati, Java (reef); Labuhan Badjo, western Flores (to 40 m); between Misool and New Guinea (32 m): and Djedan, Kepulauan Aru (13 m)]; 1920:279, pl. 22: fig. 67, g,k,n,0, pl. 23: fig. 67h–j,l,m.

DIAGNOSIS.—Rostrum slender, anteriorly truncate or concave, not overreaching eyes; carapace fully as broad as long postorbitally, 1 gastric spine in midline, 5 pairs of lateral carinae, and 3 paired lateral spines; abdomen dorsally carinate on 3rd somite; antennal scale about 3 times as long as wide, with tooth near midlength of lateral margin, distolateral spine overreaching blade; 1st pereopod with distolateral spine ("thumb") on propodus articulated at base; maximum carapace length less than 4 mm.

RANGE.—Arabian Sea, Bay of Bengal, and Indonesia; to a depth of 83 meters or more.

*18. *Philocheras incisus* (Kemp, 1916), new combination

Pontophilus incisus Kemp, 1916:357, fig. 1, pl. 8: fig. 1 [type-locality: Port Blair, Andaman Islands; 4–22 meters].—Fujino and Miyake, 1970:287, fig. 18.

DIAGNOSIS.—Rostrum anteriorly truncate or concave in dorsal aspect, overreaching eyes little if at all, terminal lobe abruptly deflexed into vertical plane; carapace fully as broad as long postorbitally, 1 gastric spine in midline and 4 or 5 paired lateral spines; abdomen dorsally carinate on 3rd somite; antennal scale barely twice as long as wide, with tooth at about distal end of proximal ¼ of lateral margin, distolateral spine overreaching blade; 1st pereopod with distolateral spine ("thumb") on propodus articulated at base; maximum carapace length fully 4 mm.

MATERIAL.—PHILIPPINES. Western Basilan Strait, southwest of Zamboanga Peninsula, Mindanao: sta 5134; 6°44′45″N, 121°48′E; 46 m; fine sand; 7 Feb 1908 (0722–0742): 9′ Tanner beam trawl, mud bag: 1♂ [4.0].

RANGE.—Arabian Sea, Bay of Bengal, Indonesia, Philippines, and East China Sea to Korea Strait; 3–110 meters.

19. *Philocheras japonicus* (Doflein, 1902), new combination

Pontophilus japonicus Doflein, 1902:621, 642, fig. B, pl. 3: fig. 6 [type-locality: southern Sagami Nada, Japan].—De Man, 1920:286, pl. 23: fig. 69, a–c,e,g–i, pl. 24: fig 69d,f,j.—Fujino and Miyake, 1970:290, fig. 19.

DIAGNOSIS.—Rostrum anteriorly truncate or concave in dorsal aspect, overreaching eyes little if at all, terminal lobe abruptly deflexed into vertical plane; carapace slightly longer postorbitally than broad, 1 gastric spine in midline, 4 pairs of lateral carinae, and 2 paired lateral spines; abdomen dorsally carinate on 3rd somite; antennal scale about 3 times as long as wide, lateral margin denticulate, distolateral spine overreaching blade; 1st pereopod with distolateral spine ("thumb") on propodus not articulated basally; maximum carapace length fully 4 mm.

RANGE.—Sulu Sea and Japan; 158–522 meters.

20. *Philocheras kempii* (De Man, 1918), new combination

Pontophilus Kempii De Man, 1918a:165 [type-locality: Flores Sea between Salajar and Tanahdjampeah, Indonesia; 300–400 meters]; 1920:283, pl. 23: fig. 68, a–i.

DIAGNOSIS.—Rostrum slender, deeply incised terminally, overreaching eyes; carapace nearly as broad as long postorbitally, 1 gastric spine in midline typically, with more than 4 pairs of lateral carinae and 2 or more paired lateral spines; abdomen dorsally carinate on 3rd somite; antennal scale fully 3½ times as long as wide, with tooth at about distal end of proximal ⅓ of lateral margin, distolateral spine overreaching blade; 1st pereopod with distolateral spine ("thumb") on propodus not articulated basally; maximum carapace length more than 4 mm.

RANGE.—Known only from the type-locality

in the Flores Sea south of Celebes; 300–400 meters.

*21. *Philocheras modestus* (De Man, 1918), new combination

Pontophilus modestus De Man, 1918a:162 [type-locality: west of Kepulauan Ewab, Indonesia: 5°48′12″S, 132°13′E; 304 meters].—1920:274, pl. 22: fig. 65, a–j.

DIAGNOSIS.—Rostrum anteriorly truncate or concave, not overreaching eyes; carapace distinctly longer postorbitally than broad, 1 gastric spine in midline, no lateral carinae but 2 or 3 paired lateral spines; abdomen not dorsally carinate on 3rd somite; antennal scale about twice as long as wide, lateral margin entire, unarmed, distolateral spine barely, if at all, overreaching blade; 1st pereopod with distolateral spine ("thumb") on propodus not articulated basally; maximum carapace length more than 5 mm.

MATERIAL.—INDONESIA. Off Darvel Bay, Sabah (north Borneo): sta 5580; 4°52′45″N, 119°06′45″E; 296 m; brown sand, coral; 13.2°C; 25 Sep 1909 (0940–0957); 9′ Tanner beam trawl, mud bag: 1 ovig ♀ [4.8].

RANGE.—Maldive Islands region, Indian Ocean, and Indonesia; 296–457 meters.

REMARKS.—Although similar in size to the holotype described by De Man, the *Albatross* ovigerous female resembles the smaller paratype collected by the *Siboga* in lacking the dorsal pair of lateral spines on the carapace. Both first pereopods are missing from the *Albatross* specimen, so there is no possibility of determining whether they were stouter than those of the holotype, as in the paratype.

22. *Philocheras vanderbilti* (Boone, 1935), new combination

Pontophilus vanderbilti Boone, 1935:200, pl. 55 [type-locality: Selat Flores, near Larantuka, Flores, Lesser Sunda Islands, Indonesia; 256 meters].

DIAGNOSIS.—Rostrum anteriorly concave in dorsal aspect, slightly overreaching eyes, terminal lobe abruptly deflexed into vertical plane; carapace about as broad as long postorbitally, 2 gastric and 1 cardiac spines in midline, with 6 pairs of lateral carinae and 3 paired lateral spines; abdomen dorsally carinate on 3rd somite; antennal scale nearly 4 times as long as wide, with tooth slightly beyond proximal ¼ of lateral margin, distolateral spine overreaching blade; carapace length 4.2 mm.

RANGE.—Known only from the holotype from Selat Flores, Lesser Sunda Islands, Indonesia; 256 meters.

*Pontocaris Bate, 1888

Pontocaris Bate, 1888:495 [type-species, selected by Holthuis, 1947:320: *Pontocaris propensalata* Bate, 1888:496; gender: feminine].

DIAGNOSIS.—Rostrum cleft apically, with 1 pair of lateral teeth, at most; carapace with 7–12 teeth on lst lateral carina, with indistinct postorbital suture extending nearly to branchial region; abdominal sterna armed with median spines; eye with cornea well-developed, pigmented; antennal scale with well-developed blade; 1st pereopod with exopod; 2nd pereopod chelate, overreaching merus of anteriorly extended 1st pereopod; 8 pairs of gills, each curving anteriorly at ventral end.

RANGE.—South Africa, Indian Ocean (including Red Sea and Persian Gulf), Indonesia, Philippines, Japan, Australia, New Zealand, Hawaii, and eastern Atlantic and Mediterranean; the largest number of known species seem to be concentrated in the Indian Ocean, Indonesia, and the Philippines, with the western Atlantic and eastern Pacific devoid of *Pontocaris* records at the present time. The depth range is from 11 to 900 meters.

REMARKS.—As noted in the introduction to the genus *Parapontocaris*, the eight species of *Pontocaris* herein recognized are composed of five species that seem to conform closely to a common morphological facies; two species—*P. orientalis* and *P. rathbuni*—that differ from this norm in one or more conspicuous particulars; and

one species—*P. rugulosa* (Borradaile, 1917:411) from the Maldive Islands—so incompletely described that its true generic relationship most await reexamination of the unique, incomplete, and possibly juvenile holotype; this last species is not included in the following key.

Key to Species Positively Assigned to *Pontocaris*

1. Carapace with median carina typically armed either with 4 or with 7–11 teeth, 2nd lateral carina interrupted by oblique hepatic furrow 2
   Carapace with median carina armed with 5 teeth, no distinct hepatic furrow interrupting 2nd lateral carina 6
2. Median carina on carapace usually armed with 4 teeth 3
   Median carina on carapace armed with 7 or more teeth 4
3. Paired rows of 2–4 tubercles forming V on gastric region between median and 1st lateral carinae ..... ***P. cataphracta*** (Olivi, 1792:50) (Eastern Atlantic, Mediterranean, Indian Ocean; to a depth of 73 meters)
   No tubercles on carapace between median and 1st lateral carinae ..... *23. ***P. lacazei***
4. Third lateral (supramarginal) carina on carapace entire, not tuberculate ..... *24. ***P. pennata***
   Third lateral (supramarginal) carina on carapace tuberculate, often obscurely so 5
5. Abdominal pleura usually truncate ventrally ..... *25. ***P. propensalata***
   Abdominal pleura ventrally acute or subacute ..... *27. ***P. sibogae***
6. Carapace little longer (postorbitally) than wide, 3rd lateral (supramarginal) carina bearing 7–9 teeth; 4th abdominal somite with 1 pair of dorsolateral carinae ..... ***P. orientalis*** (Henderson, 1893:446) (Indian Ocean; to a depth of 90 meters)
   Carapace 1¼ to nearly 1½ times as long (postorbitally) as wide, 3rd lateral (supramarginal) carina bearing 4 or 5 teeth; 4th abdominal somite with 3 pairs of dorsolateral carinae ..... *26. ***P. rathbuni***

*23. *Pontocaris lacazei* (Gourret, 1887)

Crangon Lacazei Gourret, 1887:1033 [type-locality: northwestern Golfe de Marseilles, France; 70–80 meters].

Pontocaris habereri Doflein, 1902:620, fig. A, pl. 1: figs. 3, 4, [type-locality: Sagami Nada, Japan].—Fujino and Miyake, 1970:298, fig. 22.

Aegeon Lacazei.—Kemp, 1910:156, pl. 22: figs. 1–5.

DIAGNOSIS.—Rostrum with pair of small basal teeth; carapace 1⅕ to 1⅓ times as long (postorbitally) as wide, pronounced oblique hepatic furrow interrupting 2nd lateral carina, median carina armed typically with 4 teeth, no tubercles between median and 1st lateral carinae, 3rd lateral (supramarginal) carina bearing 12–20 teeth and indistinct tubercles; 4th abdominal somite with 1 pair of posteriorly divergent dorsolateral carinae, abdominal pleura with ventral margins acute or subacute; maximum carapace length about 13 mm.

MATERIAL.—PHILIPPINES. Bohol Strait, east of Cebu: sta 5412, 10°09′15″N, 123°52′E; 296 m; green mud; 12.6°C; 23 Mar 1909 (0958–1020); 12′ Agassiz beam trawl: 1♂ [6.3].

RANGES.—South Africa, eastern Africa to Japan, New Zealand, Hawaii, and eastern Atlantic and Mediterranean; 128–758 meters.

REMARKS.—Comparison of the single Philippine specimen with examples from Japan, Ha-

waii, and the Mediterranean Sea has revealed no characters by which *P. habereri* can be distinguished from *P. lacazei*, and I am therefore obliged to synonymize Doflein's species, tentatively, with the form described from the Meditarranean. Virtually all of the distinctions mentioned by Fujino and Miyake (1970:300) for recognizing *P. habereri*—the proportions and variable lateral margin of the antennal scale and the sculpture on the abdomen—are displayed by specimens available to me from the Mediterranean, and even the appendix masculina on the second pleopods seems to be identical in Philippine and Mediterranean specimens. It is possible, however, that intensive study of more abundant series from these widely dispersed populations will disclose quantitative differences that may prove to be of at least subspecific significance.

* 24. *Pontocaris pennata* Bate, 1888

Pontocaris pennata Bate, 1888:499, pl. 91 [type-locality: Arafura Sea; 8°56′S, 136°05′E; 90 meters].

Aegeon pennata.—De Man, 1920:294, pl. 24: fig. 70, a–d.

DIAGNOSIS.—Rostrum armed with pair of small, acute, lateral or basal teeth directed anteriorly; carapace 1 1/10 to 1 1/5 times as long (postorbitally) as wide, pronounced oblique hepatic furrow interrupting 2nd lateral carina, median carina armed with 8–10 teeth, no tubercles between median and 1st lateral carinae, 3rd lateral (supramarginal) carina entire, not dentate or tuberculate; 4th abdominal somite with 1 pair of posteriorly divergent dorsolateral carinae, abdominal pleura with ventral margins acute; maximum carapace length about 13 mm.

MATERIAL.—SOUTH CHINA SEA. Southeast of Hong Kong: sta 5309; 21°53′N, 115°51′E; 113 m; green mud; 22.9°C; 4 Nov 1908 (0832–0852); 12′ Tanner beam trawl: 2♀ [8,9, 9.8], 1 ovig [8.9]; sta 5302; 21°42′N, 114°50′E; 70 m; soft gray mud; 22.3°C; 9 Aug 1908 (0651–0706); 12′ Agassiz beam trawl, mud bag: 1♂ [6.0], 1 ovig ♀ [10.0], 1 juv [4.6].

PHILIPPINES. Lingayen Gulf, western Luzon: sta 5442; 16°30′36″N, 120°11′06″E; 82 m; coral sand; 10–11 May (1858–0532) 1909; 25′ Agassiz beam trawl [apparently drifted 15.5 miles (24 km) S 12° E from original position during haul]: 1 ovig ♀ [9.4]. Tayabas Bay, southern Luzon: sta 5376; 13°42′50″N, 121°-51′30″E; [165 m]; gray mud, sand; 2 Mar 1909 (1619–1641); 12′ Agassiz beam trawl, mud bag (net torn in 2 places near mouth): 1♀ [9.6]. Leyte Gulf: sta 5477; 10°44′45″N, 125°12′30″E; 88 m; gray mud; 29 Jul 1909 (1033–1053); 12′ Agassiz beam trawl: 1♀ [8.1]; sta 5480; 10°44′36″N, 125°19′E; 113 m; fine sand; 29 Jul 1909 (1412–1432); 12′ Agassiz beam trawl: 1♀ [7.0]. Sulu Sea northeast of Dumaran Island: sta 5432; 10°37′50″N, 120°12′E; 93 m; sand; 8 Apr 1909 (1534–1554); 6′ McCormick-Blake beam trawl: 1 ovig ♀ [9.5].

RANGE.—Red Sea and Persian Gulf eastward to Indonesia, Arafura Sea, Philippines, and Japan; 22 to 900 meters.

* 25. *Pontocaris propensalata* Bate, 1888

Pontocaris propensalata Bate, 1888:496, pl. 86: fig. 5; pl. 90: figs. 2, 3 [type-locality: eastern Banda Sea west of Kepulauan Kai, Indonesia; 5°49′15″S, 132°14′15″E; 256 meters].

Aegeon propensalata, var. *hilarula* De Man, 1918b:301 [type-locality: Teluk Bima, Sumbawa, Lesser Sunda Islands; near south fort; 55 meters]; 1920:296, pl. 24: fig. 71, a–f.

DIAGNOSIS.—Rostrum armed with pair of inconspicuous, acute lateral or basal teeth directed anteriorly; carapace 1 1/10 to 1 1/5 times as long (postorbitally) as wide, pronounced oblique hepatic furrow interrupting 2nd lateral carina, median carina armed with 7–9 teeth, no tubercles between median and 1st lateral carina, 3rd lateral (supramarginal) carina with 7–14 barely distinguishable tubercles, sometimes virtually entire; 4th abdominal somite with 1 pair of posteriorly divergent dorsolateral carinae, abdominal pleura with ventral margins variably truncate; maximum carapace length about 12 mm.

MATERIAL.—PHILIPPINES. Subic Bay, western Luzon: sta 5104; 14°45′48″N, 120°12′20″E; [60 m]; 8 Jan 1908 (1020–1040); 12′ Tanner

beam trawl, mud bag: 1♂ [6.2], 5♀ [5.6–8.5]. Panabutan Bay, western Mindanao: sta 5131; [7°35′N, 122°07′E]; 49 m; green mud, coral sand; 6 Feb 1908 (0914–0927); 9′ Tanner beam trawl, mud bag: 3♂ [5.9–6.7]. Off Bongo Island, western Mindanao: sta 5257; 7°22′12″N, 124°-12′15″E; 51 m; mud; 22 May 1908 (1011–1031); 12′ Agassiz beam trawl, mud bag: 1♂ [6.1]. Pujada Bay, southeastern Mindanao: sta 5242; 6°51′53″N, 126°14′10″E; 349 m; soft gray mud; 17.8°C; 15 May 1908 (1603–1623); 9′ Albatross-Blake trawl, mud bag: 1♂ [9.3].

RANGE.—Andaman Sea, Philippines, Indonesia, and New South Wales, Australia; 49–349 meters.

REMARKS.—In only one of the *Albatross* specimens—the male from Pujada Bay, Mindanao—is the tip of the rostrum entire, rather than cleft. It seems likely that the uncleft rostrum and slight differences in the abdominal sculpturing are no more than varietal differences; there seems, therefore, to be no reason to raise *P. propensalata*, var. *hirarula* (De Man, 1918b) to specific or even subspecific status.

* 26. *Pontocaris rathbuni* (De Man, 1918)

Egeon orientalis.—Rathbun, 1906:911, pl. 23: fig. 3 [not *Aegeon orientalis* Henderson, 1893:446].

Aegeon Rathbuni De Man, 1918:304 [type-locality: Pulau Kaniungan-ketjil, Borneo; [1°09′N, 118°53′E]; 11 meters; 1920:300, pl. 24: fig. 74b, pl. 25: fig. 74. a.

DIAGNOSIS.—Rostrum armed with pair of small, acute lateral or basal teeth directed anteriorly; carapace 1¼ to nearly 1½ times as long (postorbitally) as wide, no distinct hepatic furrow interrupting 2nd lateral carina, median carina armed with 5 teeth, no tubercles between median and 1st lateral carina, 3rd lateral (supramarginal) carina armed with 4 or 5 teeth; 4th abdominal somite with 3 pairs of posteriorly divergent dorsolateral carinae, abdominal pleura broadly convex; maximum carapace length about 8 mm.

MATERIAL.—INDONESIA. West of Selat Salajar, southern Celebes: sta 5661; 5°49′40″S, 120°24′-30″E; 329 m; hard bottom; 10.3°C; 20 Dec 1909 (1624–1627): 12′ Agassiz beam trawl (net torn below lead line): 1♂ [7.2].

RANGE.—Indonesia and Hawaii; 11 to more than 536 meters.

REMARKS.—Although De Man (1918b:304) referred to the proposed name for this species as a "nov. nom.", it probably should be treated as a new species. De Man's description began: "To the characters, mentioned by Miss Rathbun (l.c.), the following may be added." Inasmuch, therefore, as the description is a joint offering of the contributions of both Rathbun and De Man and inasmuch as no holotype was indicated in the original paper, the three specimens recorded from Hawaii by Rathbun and the single Bornean specimen cited by De Man should be treated as syntypes. In the legends to the illustrations in the final report on the *Siboga* collections (De Man, 1920, pls. 24, 25, legends), however, the Bornean specimen is referred as "the type." I am consequently accepting this reference as a lectotype selection, and the type-locality thus becomes Pulau Kaniungan-ketjil.

The *Albatross* specimen—found near the opposite end of Makassar Strait from the type-locality—differs from the three Hawaiian paralectotypes, as well as from De Man's description, in having the five teeth on the median carina of the carapace subequal, rather than the central one being smaller than the others; this character is clearly displayed in all three of the Hawaiian specimens but not in De Man's fig. 74*a*. Also, the distolateral tooth on the antennal scale of the *Albatross* specimen is remarkably large.

* 27. *Pontocaris sibogae* (De Man, 1918)

Aegeon Sibogae De Man, 1918b:302 [type-locality: Bali Sea south of Kepulauan Kangean; 7°2′36″S, 115°23′36″E; 100 meters]; 1920:298, pl. 24: fig. 72, a–f.

Aegeon Sibogae var. *intermedia* De Man, 1918b:303 [type-locality: Selat Roti, between Timor and Pulau Roti; 10°27.9′S, 123°28.7′E; 216 meters]; 1920:300, pl. 24: fig. 73, a.

Pontocaris sibogae.—Fujino and Miyake, 1970:301.

DIAGNOSIS.—Rostrum armed with pair of

small, acute lateral or basal teeth directed anteriorly; carapace 1 1/10 to fully 1 1/4 times as long (postorbitally) as wide, pronounced oblique furrow interrupting 2nd lateral carina, median carina armed with 8–11 teeth, no tubercles between median and 1st lateral carina, 3rd lateral (supramarginal) carina with 11–18 blunt denticles; 4th abdominal somite with 1 pair of posteriorly divergent dorsolateral carinae, abdominal pleura with ventral margins acute; maximum carapace length about 17 mm.

MATERIALS.—PHILIPPINES. Northeast of Lubang Islands: sta 5272; 14°N, 120°22′30″E; 216 m; mud, shells, coral sand; 14.1°C; 14 Jul 1908 (1005–1031); 12′ Agassiz beam trawl: 1♀ [16.8]. Balayan Bay, southern Luzon; sta 5117; 13°52′22″N, 120°46′22″E; 216 m; 21 Jan 1908 (0927–0947); 12′ Tanner beam trawl, mud bag: 3♂ [13.2–14.1]. Tayabas Bay, southern Luzon: sta 5369; 13°48′N, 121°43′E; 194 m; black sand; 24 Feb 1909 (0830–0850); 12′ Agassiz beam trawl, mud bag: 1♂ [11.8]. Samar Sea east of Masbate: sta 5393; 12°03′30″N, 124°03′-36″E; 249 m; hard sand; 13 Mar 1909 (1404–1412); 12′ Agassiz beam trawl, mud bag: 2♀ [11.6, 13.0]; sta 5394; 12°00′30″N, 124°05′-36″E; 280 m; green mud; 13 Mar 1909 (1513–1522); 12′ Agassiz beam trawl, mud bag: 1♂ [10.8]; sta 5396; 11°57′N, 124°12′24″E; 251 m; green mud; 15 Mar 1909 (0945–1005); 12′ Agassiz beam trawl, mud bag: 4♂ [12.9–14.2]; sta 5397; 11°57′27″N, 124°10′42″E; 245 m; green mud; 15 Mar 1909 (1036–1052); 12′ Agassiz beam trawl, mud bag: 1♂ [10.7], 1♀ [13.3]. West of Leyte: sta 5194; 11°15′30″N, 124°11′E; 271 m; green mud; 13.6°C; 3 Apr 1908 (1415–1435); 12′ Agassiz beam trawl, 3 mud bags: 1♀ [13.7]. Panay Gulf south of Panay: sta 5183; 10°32′48″N, 122°26′E; 176 m; soft green mud; 17.4°C; 30 Mar 1908 (1051–1111); 12′ Agassiz beam trawl, 3 mud bags (veered from 351 to 457 m [cable?] during haul): 1♂ [12.1]. Pujada Bay, southeastern Mindanao: sta 5241; 6°50′45″N, 126°14′38″E; 393 m; soft gray mud; 14 May 1908 (1505–1525); 9′ Albatross-Blake trawl, mud bag: 1♂ [9.8], 1 ovig ♀ [12.0]; sta 5242; 6°51′53″N, 126°14′10″E; 349 m; soft gray mud; 17.8°C; 15 May 1908 (1603–1623); 9′ Albatross-Blake trawl, mud bag: 1♂ [8.0], 1 ovig ♀ [10.8]. Davao Gulf, Mindanao: sta 5247; 7°02′N, 125° 38′45″E; 247 m; mud; 18 May 1908 (0908–0928); 12′ Agassiz beam trawl, mud bag: 5♂ [12.1–13.0], 10♀ [11.1–16.2], 3 ovig [15.0–16.2]; sta 5255; 7°03′N, 125°39′E; 183 m; soft mud; 18 May 1908 (1813–1833); 12′ Agassiz beam trawl, mud bag (made after dark): 1 ovig ♀ [15.1].

RANGE.—Indonesia, Philippines, and East China Sea; 100 to 393 meters.

REMARKS.—As suggested by Fujino and Miyake (1970:302) and supported by the variability observed in the *Albatross* series, the differences in the two specimens collected by the *Siboga* that prompted De Man to treat them as separate varieties do not seem sufficient to justify taxonomic distinction. Curiously, the specimens taken at the early stations of the *Albatross* Expedition show no cleft in the tip of the rostrum, whereas virtually all of those collected after mid-May 1908 were apically cleft, though sometimes obscurely so. There is also considerable variation in the divergence of the branchiostegal spines, a few of those taken early showing very little divergence, while two of the specimens taken at different stations in the Samar Sea east of Masbate have these spines turned laterad to a remarkable degree. The carapace is usually narrower proportionately in males than in females, especially ovigerous specimens of the latter, and there is some indication that the postorbital carapace length becomes proportionately greater with age in both sexes.

* *Pontophilus* Leach, 1817

Pontophilus Leach, 1817, pl. 37A [type-species, by monotypy: *Crangon spinosus* Leach, 1815:346; gender: masculine].

DIAGNOSIS.—Rostrum armed with 1 or 2 pairs of lateral teeth in basal ½ of length; carapace with postorbital longitudinal suture; eye with

cornea well-developed, pigmented; antennal scale with well-developed blade; 1st pereopod with rudimentary exopod; 2nd pereopod chelate, usually not reaching distal end of merus of anteriorly extended 1st pereopod.

RANGE.—Probably all tropical and temperate seas; 13–5852 meters.

REMARKS.—Perhaps the most significant difference between the genus and *Philocheras* is the presence in *Pontophilus* of a longitudinal suture extending posteriorly from the orbital margin near the antennal spine to the dorsal part of the branchial region. This suture, which has been mentioned by several authors, is often obscure, especially when it coincides with a strong longitudinal ridge on the carapace, but it always seems to be discernible with optimum lighting, at least anteriorly and posteriorly; I have found it in all seven members of the genus that I have been able to examine from the Smithsonian collections, as well as in type-material of Bate's species from the *Challenger* collections (Indonesian paratypes of "*P. gracilis*" and holotypes of *P. junceus* and *P. profundus*).

For a time, I conjectured that *Pontophilus* might be divisible into three parts: one consisting of the type-species, *P. spinosus*, and the two closely related species, *P. brevirostris* and *P. norvegicus*, all of which have two spines in the dorsal midline on the posterior half of the carapace, three or more pairs of prominent lateral spines, and an elongate appendix masculina; a second composed of *P. gracilis* and the five closely related forms, *P. abyssi*, *P. junceus*, *P. occidentalis*, *P. profundus*, and *P. talismani*, with only one spine in the dorsal midline on the posterior half of the carapace, two pairs of prominent lateral spines, and a shorter and broader appendix masculina; and a third group made up of *P. modumanuensis* and the Indonesian species misidentified with that species by De Man, in which there are no dorsal spines on the carapace posterior to the gastric region and only one pair of prominent lateral spines. All attempts to construct a key to the species related to *P. gracilis* were ineffectual, however, because of the variability involved. I therefore decided to adopt the suggestion made by Faxon (1895:132), and alluded to by others, to treat the *P. gracilis* group as a single species composed of geographical races, even though some of the resultant subspecies are sympatric geographically if not bathymetrically. This compromise permits retention of the earlier concept of *Pontophilus* and the employment of firm distinctions between the six full species represented. The proposal of subspecies from the study of less extensive series of specimens than is usually desirable is made with considerable hesitation however; the accumulation of additional collections may eventually lead to an alternative conclusion, but the solution suggested seems tenable from the evidence currently available.

Key to Species of *Pontophilus*

1. Two spines in dorsal midline on posterior ½ of carapace and 3 or 5 prominent spines (other than marginal spines) on lateral surface . . . 2
   At most, 1 median dorsal spine on posterior ½ of carapace and 1 or 2 prominent spines (other than marginal spines) on lateral surface . . . 4
2. Five prominent spines (other than marginal spines) on lateral surface of carapace; antennal scale with distolateral spine overreaching blade . . . . . ***P. spinosus*** (Leach, 1815:346)
   (Eastern North Atlantic Ocean from Iceland and northern Norway to Mediterranean Sea; 18–1554 meters)

Three prominent spines (other than marginal spines) on lateral surface of carapace; antennal scale with blade overreaching distolateral spines 3

3. Rostrum less than 1/7 as long as rest of carapace, acumen extending little beyond lateral teeth; no spine above orbital cleft ..... ***P. brevirostris*** (Smith, 1881:435 (Western Atlantic Ocean from Gulf of Maine to eastern Gulf of Mexico; 7–426 meters)

Rostrum more than 1/7 as long as rest of carapace, acumen extending far beyond lateral teeth; small spine on carapace above orbital cleft .... ***P. norvegicus*** (M. Sars, 1861:248) (North Atlantic Ocean from Greenland, Iceland, and Spitzbergen south to Virginia and Bay of Biscay; 55–1450 meters)

4. One median dorsal spine on posterior ½ of carapace and 2 prominent spines (other than marginal spines) on lateral surface (***P. gracilis***) . . 5

No median dorsal spines on posterior ½ of carapace and only 1 prominent lateral spine (other than marginal spines) 10

5. Two well-developed spines in dorsal midline of carapace (anterior gastric spine(s) minute or reduced to granules) 6

Three well-developed spines in dorsal midline of carapace (anterior gastric spine distinct even if small) 7

6. Rostrum more than ¼ as long as rest of carapace; usually without spine above orbital cleft; major diameter of eye usually more than ¼ carapace length ..... ***P. gracilis gracilis*** Smith, 1882:36 (Western Atlantic Ocean from east of New Jersey to Gulf of Mexico and off St. Lucia, Lesser Antilles; eastern Atlantic off nearly entire west coast of Africa; 412–1435 meters)

Rostrum 1/10 to ¼ as long as rest of carapace; inconspicuous spine above orbital cleft; major diameter of eye usually less than ¼ carapace length ..... *30. ***P. gracilis junceus***

7. Rostrum long, nearly ⅓ as long as rest of carapace; eye unusually large, major diameter nearly ¼ carapace length; antennal scale long, ¾ as long as carapace, 5 times as long as wide, and markedly concave laterally ..... ***P. gracilis profundus*** Bate, 1888:490 (Tasman Sea off New South Wales, Australia; 4755 meters)

Rostrum less than ¼ as long as rest of carapace; eye with major diameter no more than ⅕ as long as carapace; antennal scale less than ¾ as long as carapace, seldom more than 4 times as long as wide, most very concave laterally 8

8. Rostrum reaching nearly to or beyond level of distal margins of extended eyes, rostral length rarely contained more than 5½ times in carapace length ..... *29. ***P. gracilis abyssi***

Rostrum short, not nearly reaching level of distal margins of extended eyes, rostral length contained more than 5½ times in carapace length 9

9. Rostrum usually armed with 2 pairs of lateral teeth . . . . . ***P. gracilis occidentalis*** Faxon, 1893:200
(Eastern Pacific Ocean from off Guatemala to off Ecuador; 1789–4082 meters)

Rostrum armed with I pair of lateral teeth . . . . . ***P. gracilis talismani*** Crosnier and Forest, 1973:245
(Gulf of Mexico; eastern Atlantic between Senegal and Cape Verde Islands; 2366–3731 meters)

10. Rostrum not overreaching eyes, anterior pair of lateral teeth arising in anterior ½ of length; minute spine above orbital cleft; antennal scale slightly longer or shorter than ½ carapace length, 2½ to fully 3 times as long as wide, blade overreaching distolateral spine . . 28. ***P. demani***

Rostrum far overreaching eyes, both pairs of lateral teeth arising in posterior ½ of length; no spine above orbital cleft; antennal scale 7/10 as long as carapace, nearly 5 times as long as wide, distolateral spine overreaching blade . . . . . ***P. modumanuensis*** Rathbun, 1906:910
(Hawaii; 536–1463 meters)

28. *Pontophilus demani*, new species

Pontophilus modumanuensis.—De Man, 1920:270, pl. 21: fig. 64, a–e, g–j, pl. 22: fig. 64f [not *P. modumanuensis* Rathbun, 1906:910, fig. 63].

DIAGNOSIS.—Rostrum not overreaching eyes, slightly more than ⅕ length of carapace, armed with 2 pairs of lateral teeth, anterior pair arising from anterior ½ of rostrum, acumen extending beyond anterior pair; carapace without median dorsal spines on posterior ½, anterior median gastric spine well developed but smaller than posterior one, only 1 pair of conspicuous lateral spines (other than marginal spines), minute, inconspicuous spine above orbital cleft; major diameter of eye fully ⅙ carapace length; antennal scale slightly more or less than ½ carapace length, 2½ to fully 3 times as long as wide, lateral margin slightly concave, blade overreaching distolateral spine; maximum carapace length about 6 mm.

DESCRIPTION.—See De Man (1920:270).

SIZE.—Carapace length of ovigerous female holotype, about 5.2 mm; of ovigerous female paratypes, about 5.8 and 6.0 mm.

MATERIAL.—On the basis of De Man's detailed description, I have selected, as the holotype of this species, the ovigerous female from *Siboga* station 297.

TYPE-LOCALITY.—Selat Roti between Timor and Pulau Roti, Lesser Sunda Islands, Indonesia; 10°39′S, 123°40′E; 520 meters.

RANGE.—Possibly known only from the type-locality in Selat Roti, Lesser Sunda Islands, Indonesia (see "Remarks").

REMARKS.—The incomplete female holotype of *P. modumanuensis* (Figure 15) collected near the island of Nihoa (Modu Manu), Hawaii, from a bottom of coral sand, foraminiferans, and rock, steeply sloping from 536 to about 1463 meters—when compared with De Man's description and illustrations of the Indonesian specimens that he tentatively assigned to that species—leaves little doubt that the two forms are distinct. In *P. demani*, the rostrum is much shorter and of quite different configuration, there is a minute spine above the orbital cleft, and the antennal scale is proportionately shorter and much wider, with

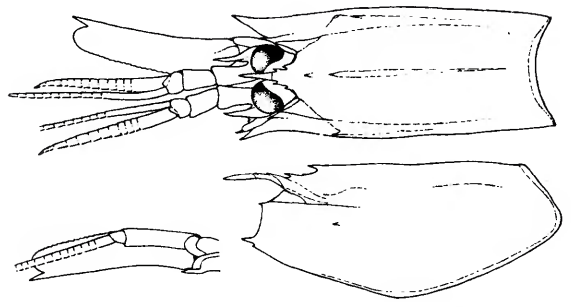

FIGURE 15.—*Pontophilus modumanuensis*, female holotype from *Albatross* sta 4166 (Hawaii), carapace length 4.0 mm; carapace and anterior appendages, dorsal aspect; carapace, lateral aspect; and right antenna, ventral aspect. (Magnification: × 8.6.)

the distolateral spine falling short of the distal margin of the blade. The differences noted by De Man (1920:270) between his specimens and Rathbun's description are not quite as great, however, as indicated by the latter. In the holotype of *P. modumanuensis*, the antennal peduncle reaches just about to the level of the distal end of the antennular peduncle, rather than "to the middle of second antennular segment," as described by Rathbun, but it fails to reach the midlength of the antennal scale, as opposed to reaching "to the distal fourth of the scale" in the holotype of *P. demani*. The apparent discrepancy in size noted by De Man between the Hawaiian and Indonesian specimens is not quite as great as suggested by Rathbun's measurements, for the specimen described by her lacks both the telson and the 6th abdominal somite, rather than just the telson, as she noted.

In selecting as the holotype of *P. demani* the ovigerous female from *Siboga* station 297 that De Man described in detail, I have purposely excluded from the type series the two larger ovigerous females from *Siboga* station 89, not only because they apparently differ in having shorter rostra, shorter and broader antennal scales, and dorsally rounded rather than longitudinally sulcate sixth abdominal somites and telsons, but also because they were collected in the Celebes Sea, some 1400 kilometers from the type-locality on the edge of the Timor Sea, in a depth of only 11 meters, as opposed to 520 meters.

ETYMOLOGY.—It is satisfying to be able to name this species for Johannes Govertus de Man, who is largely responsible for the firm and exemplary foundation established more than half a century ago for all subsequent research on the decapod crustaceans of the East Indian islands.

*29. *Pontophilus gracilis abyssi* Smith, 1884

FIGURES 16–18

Pontophilus abyssi Smith, 1884:363 [type-locality: east of Chesapeake Bay, U.S.A.; 37°56′20″N, 70°57′30″W and 37°40′30″N, 70°37′30″W, 3506 and 4060 meters]; 1886:49, pl. 11: fig. 3, 3a [not 4, 5].

Pontophilus gracilis Bate, 1888:487, pl. 87 [part; type-locality: South Atlantic Ocean about 900 km west-northwest of Tristan da Cunha; 35°41′S, 20°55′W; 3475 meters; not *P. gracilis* Smith, 1882:36].

Pontophilus challengeri Ortmann, (July) 1893:49 [substitute name for *P. gracilis* Bate, 1888]; 1895:185.—Crosnier and Forest, 1973:248, 249, fig. 80e–g.

Pontophilus batei Faxon, (August) 1893:200 [substitute name for *P. gracilis* Bate, 1888; not *Crangon batei* Kingsley 1882]; 1895:131.

DIAGNOSIS.—Rostrum typically but not constantly overreaching eyes, more or less than ⅕ length of carapace, armed usually with 2 pairs of lateral teeth, anterior pair arising near midlength of rostrum, acumen extending well beyond anterior pair; carapace with 1 median dorsal spine on posterior ½, anterior median gastric spine well developed even if smaller than posterior one, 2 pairs of conspicuous lateral spines (other than marginal spines), inconspicuous spine above orbital cleft; major diameter of eye varying from about 1/9 to barely 1/6 of carapace length; antennal scale about 1/7 to 1/6 carapace length, 3 or 4 times as long as wide, lateral margin not very concave, distolateral spine rarely overreaching blade; maximum carapace length about 16 mm.

MATERIAL.—INDONESIA. 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♀ [9.2, 11.0]; sta 5615; 0°32′30″N, 126°31′30″E, 1867

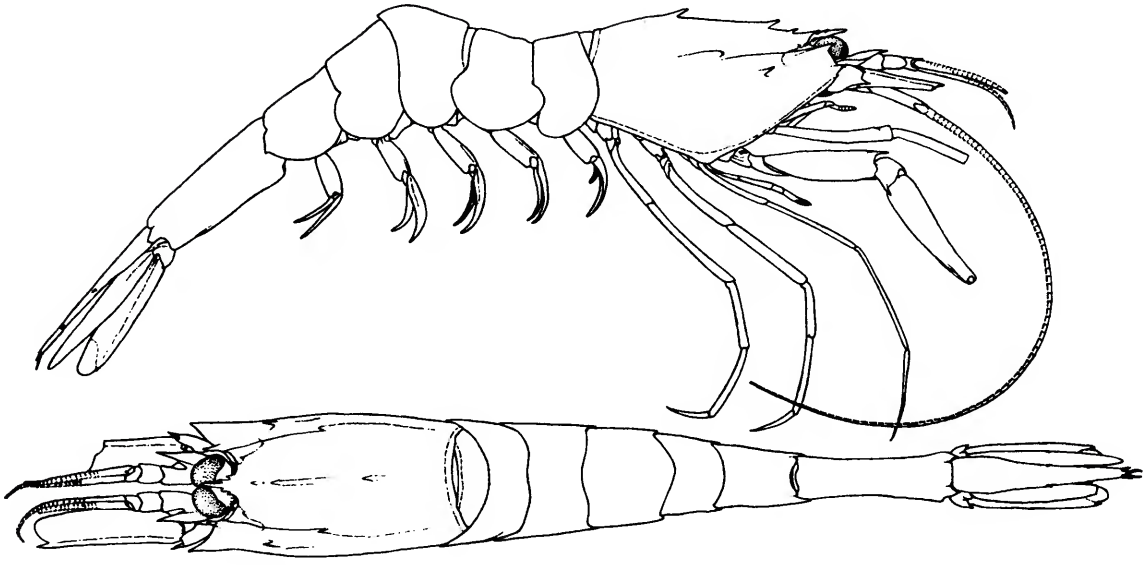

FIGURE 16.—*Pontophilus gracilis abyssi*, female from *Albatross* sta 5601 (Molucca Sea), carapace length 9.2 mm, lateral and dorsal aspects. (Magnification: × 3.5.)

m; gravel; 22 Nov 1909 (1437–1457); 12′ Agassiz beam trawl: 1♀ [10.0].

RANGE.—Possibly all tropical and temperate seas, except the eastern Pacific Ocean; 1400 to more than 5852 meters.

REMARKS.—The possibility that a single member of the genus occurs in deep water throughout the Indo-Pacific and Atlantic regions and that virtually sympatric geographic races of the same species frequent shallower depths of each of those two major parts of the world seems remote, but I have been unable to separate samples of populations available to me that might be assigned to the North Atlantic *P. gracilis abyssi*, the South Atlantic *P. g. challengeri*, and the Indonesian specimens called "*P. gracilis*" by Bate (1888). To be sure, the rostrum appears different in the illustration of the holotype of Bate's *P. gracilis* published by Crosnier and Forest (1973: fig. 80e–g), but I suspect that the specimen may be slightly deformed, for it seems to deviate in no other way from *P. abyssi* or Bate's Indonesian specimens (Figure 18). If, incidentally, Bate's holotype should prove to represent a distinct taxon, it should probably bear the replacement name *Pontophilus challengeri* proposed by Ortmann (1893) and not *P. batei* of Faxon (1893). I was originally misled into believing that Faxon's name had priority, because of the indication in the synonymy in Ortmann (1895:185) that the latter's report in volume 2Gb of the Plankton-Expedition did not appear until September 1893, whereas Faxon's name was published in August of that year. L.B. Holthuis, however, has called my attention to the note on the cover of Ortmann's 1893 report that "Die unterstrichenen Theile [one of which is Volume 2Gb] sind bis jetzt (Juli 1893) erschienen." Also, M.R. Dardeau has reminded me of the footnote in Stebbing (1905:94) noting that Faxon's name was preoccupied by *Crangon batei* Kingsley, 1882, proposed as a substitute name for *Crangon intermedius* Bate, 1863 (not *Crangon intermedius* Stimpson, 1860), which Stebbing considered to be a member of the genus *Pontophilus*. I am inclined to believe—from the remarks of Crosnier and Forest (1973:248) about the type series of Bate's "*P. gracilis*" (I have seen only the paratypes from

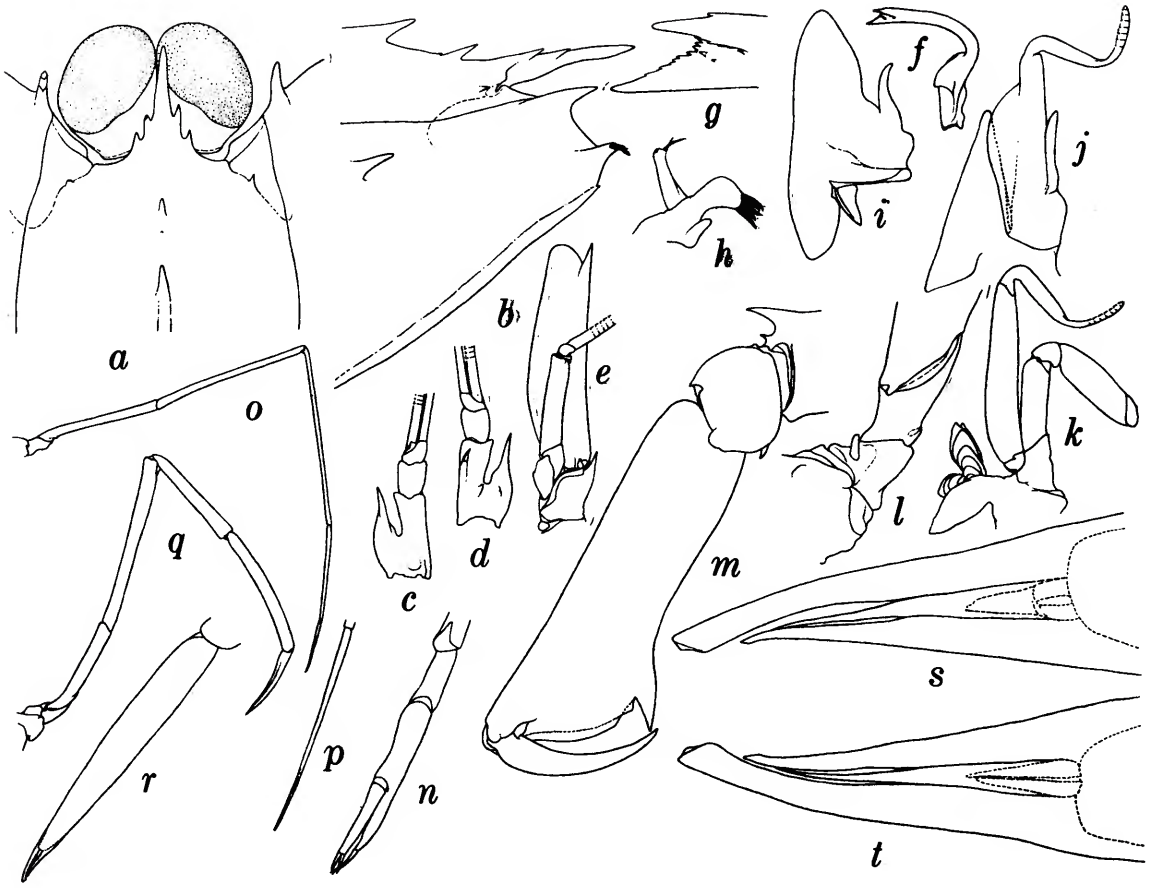

FIGURE 17.—*Pontophilus gracilis abyssi*, female from *Albatross* sta 5601 (Molucca Sea), carapace length 9.2 mm: *a*, rostrum and orbital region, dorsal aspect; *b*, same, lateral aspect; *c*, left antennule, dorsal aspect; *d*, same, ventral aspect; *e*, left antenna, ventral aspect; *f*, right mandible; *g*, same, distal part; *h*, right 1st maxilla; *i*, right 2nd maxilla; *j*, right 1st maxilliped; *k*, right 2nd maxilliped; *l*, right 1st pereopod, coxa and basis; *m*, same, chela and carpus; *n*, right 2nd pereopod, chela and carpus, flexor aspect; *o*, right 3rd pereopod; *p*, same, dactyl; *q*, right 5th pereopod; *r*, same, dactyl, extensor aspect; *s*, same, tip of dactyl, extensor aspect; *t*, same, flexor aspect. (Magnifications: *c–e*, *o*, *q*, × 5.2; *a*, *b*, *f*, *h–m*, × 10.8; *n*, *p*. *r*, × 21.5; *g*, × 53.8; *s*, *t*, × 223.6.)

Challenger station 198)—that all of the specimens examined by Bate belong to *P. g. abyssi*, except the six specimens from station 168 off New Zealand; the smaller, nearly spherical eyes and the more salient blade of the antennal scale suggest that this population belongs to another taxon.

Pontophilus g. abyssi seems to differ, at least subspecifically, from the other deeper water forms. *Pontophilus g. profundus* (Figure 19) has a similarly long or even longer rostrum, but the eyes are much larger (as large as any other congeneric specimens examined even though *P. g. profundus* was found in about the maximum depth recorded for the genus), and the antennal scales have the lateral margins unusually concave. Both *P. g. occidentalis* and *P. g. talismani* have the

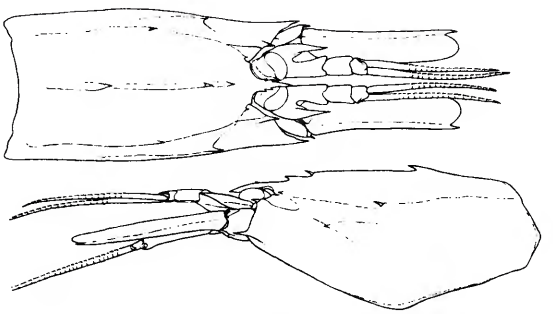

FIGURE 18.—*Pontophilus gracilis abyssi*, female paratype of *P. gracilis* Bate (not Smith) from *Challenger* sta 198 (Celebes Sea), carapace length 10.8 mm; carapace and anterior appendages, dorsal and lateral aspects. (Magnification: × 3.1.)

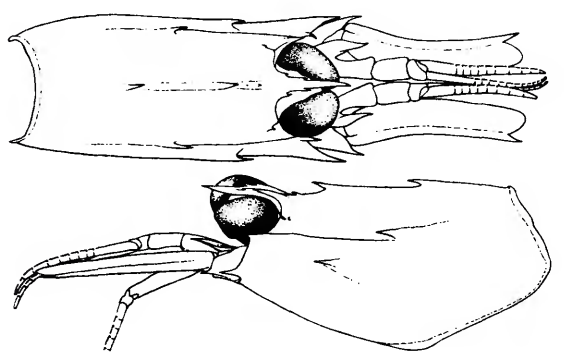

FIGURE 19.—*Pontophilus gracilis profundus*, female holotype of *P. profundus* from *Challenger* sta 165 (Tasman Sea), carapace length 3.1 mm; carapace and anterior appendages, dorsal and lateral aspects. (Magnification: × 11.2.)

rostrum much shorter than it is in *P. g. abyssi*; the definitive determination that these two forms are distinct from each other must await additional material of the Atlantic population to make certain that a single pair of lateral rostral teeth is prevalent in that form.

Curiously enough, I have been unable to separate the Hawaiian material recorded as *P. gracilis* by Rathbun (1906: 910) from *P. g. abyssi*, although 10 of the 16 Hawaiian specimens examined came from depths of less than 870 meters. Is it possible that this population, in the absence of competition from a form like *P. g. junceus*, has been able to occupy shallower depths in that area?

* 30. *Pontophilus gracilis junceus* Bate, 1888

FIGURES 20–22

Pontophilus junceus Bate, 1888:491, pl. 88: figs. 2–4 [type-locality: Moro Gulf east of Basilan Strait, Mindanao, Philippines; 6°47′N, 122°28′E; 457 meters].

Pontophilus occidentalis var. *indica* De Man, 1918a:161; 1920:264, pls. 20: fig. 63, a; 21: fig. 63 b–v. [type-locality (restricted): Bali Sea; 7°19′24″S, 116°49′30″E; 538 meters].

DIAGNOSIS.—Rostrum not overreaching eyes, 1/7 to more than 1/4 length of carapace, armed typically with 2 pairs of lateral teeth, anterior pair arising near midlength of rostrum, acumen extending well beyond anterior pair; carapace with 1 median dorsal spine in posterior 1/2, anterior median gastric spine minute or reduced to granule, 2 pairs conspicuous lateral spines (other than marginal spines), inconspicuous spine above orbital cleft; major diameter of eye usually 1/5 to 1/4 of carapace length, antennal scale slightly more than 1/7 carapace length, usually 3 1/2 to 4 times as long as wide, lateral margin nearly straight, distolateral spine very rarely overreaching blade; maximum carapace length about 12 mm.

MATERIAL.—PHILIPPINES. Off Dasol Bay, western Luzon: sta 5438; 15°54′42″N, 119°-44′42″E; 543 m; green mud; 7.9°C; 8 May 1909 (1620–1641); 12′ Agassiz beam trawl, mud bag: 1♀ [6.8]. 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♀ [5.2]. Lagonoy Gulf, east of southern Luzon: 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: 1 ovig ♀ [12.5]; 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: 2♀ [10.3, 11.0]; sta 5469; 13°36′48″N, 123°38′24″E; [914 m]; green mud; 18 Jun 1909 (1329–1411); 12′ Agassiz beam trawl: 1♀ [11.7]. North of

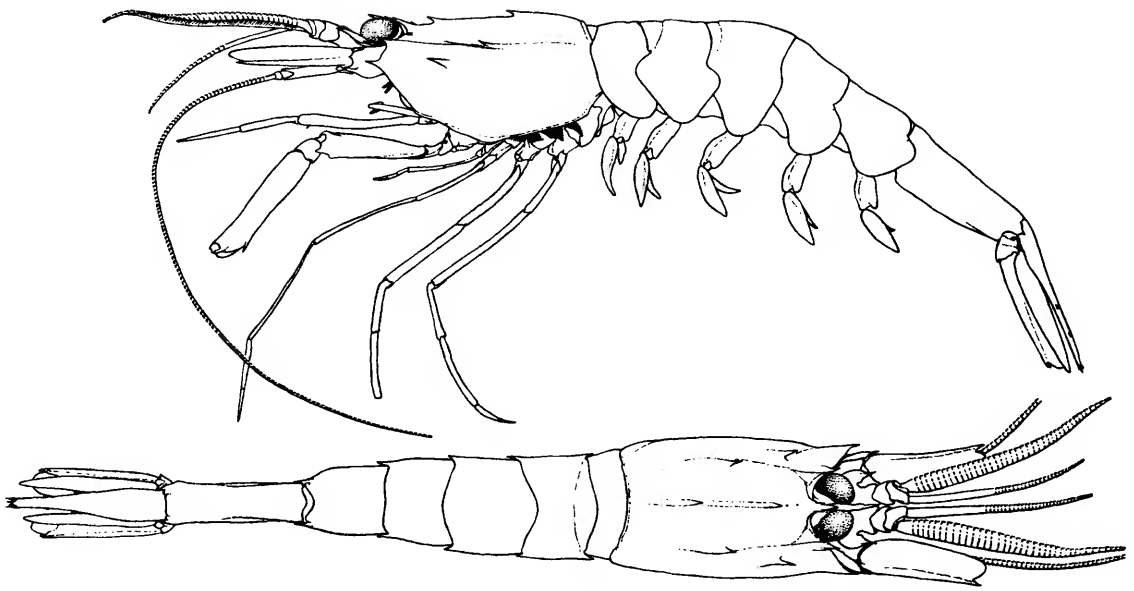

FIGURE 20.—*Pontophilus gracilis junceus*, male from *Albatross* sta 5648 (Celebes), carapace length 9.0 mm, lateral and dorsal aspects. (Magnification: × 3.0.)

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: 1♀ [9.0]. Sogod Bay, southern Leyte: sta 5201; 10°10′N, 125°04′15″E; 1013 m; gray sand, mud; 11.6°C; 10 Apr 1908 (0913–0933); 12′ Agassiz beam trawl, 3 mud bags (veered 205 m cable during haul): 1♀ [4.6].

INDONESIA. Celebes Sea off Sabah (north Borneo): sta 5587; 4°10′35″N, 118°37′12″E; 759 m; green mud, sand, coral; 5.7°C; 28 Sep 1909 (1511–1532); 9′ Tanner beam trawl, mud bag: 1 ovig ♀ [9.3]. 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♀ [7.7]; 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♂ [7.0]; sta 5620; 0°21′30″N, 127°16′45″E; 655 m; gray mud; 28 Nov 1909 (0624–0645); 12′ Agassiz beam trawl: 1 ovig ♀ [7.2]; 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: 3♀ [5.2–6.7], 1 ovig [6.5]. Selat Butung, Celebes: sta 5648; 5°35′00″S, 122°20′00″E; 1023 m; green mud; 4.0°C; 16 Dec 1909 (1629–1652); 12′ Agassiz beam trawl: 1♂ [9.0], 1♀ [10.8]. Teluk Bone, Celebes: 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 ovig ♀ [10.7]; 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♂ [7.5]; sta 5656; 3°17′40″S, 120°36′45″E; 885 m; gray mud; 5.1°C; 19 Dec 1909 (0837–0842); 12′ Agassiz beam trawl: 1♀ [9.1]; 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♀ [9.9]. Southwest of Makasar, Celebes: sta 5662; 5°43′00″S, 119°18′00″E; 386 m; (no bottom sample); 9.3°C; 21 Dec 1909 (0612–0632); 12′ Agassiz beam trawl: 1 ovig ♀ [10.8].

RANGE.—I have seen no material of this subspecies except the holotype and the lots listed above from the Philippines and Indonesia from

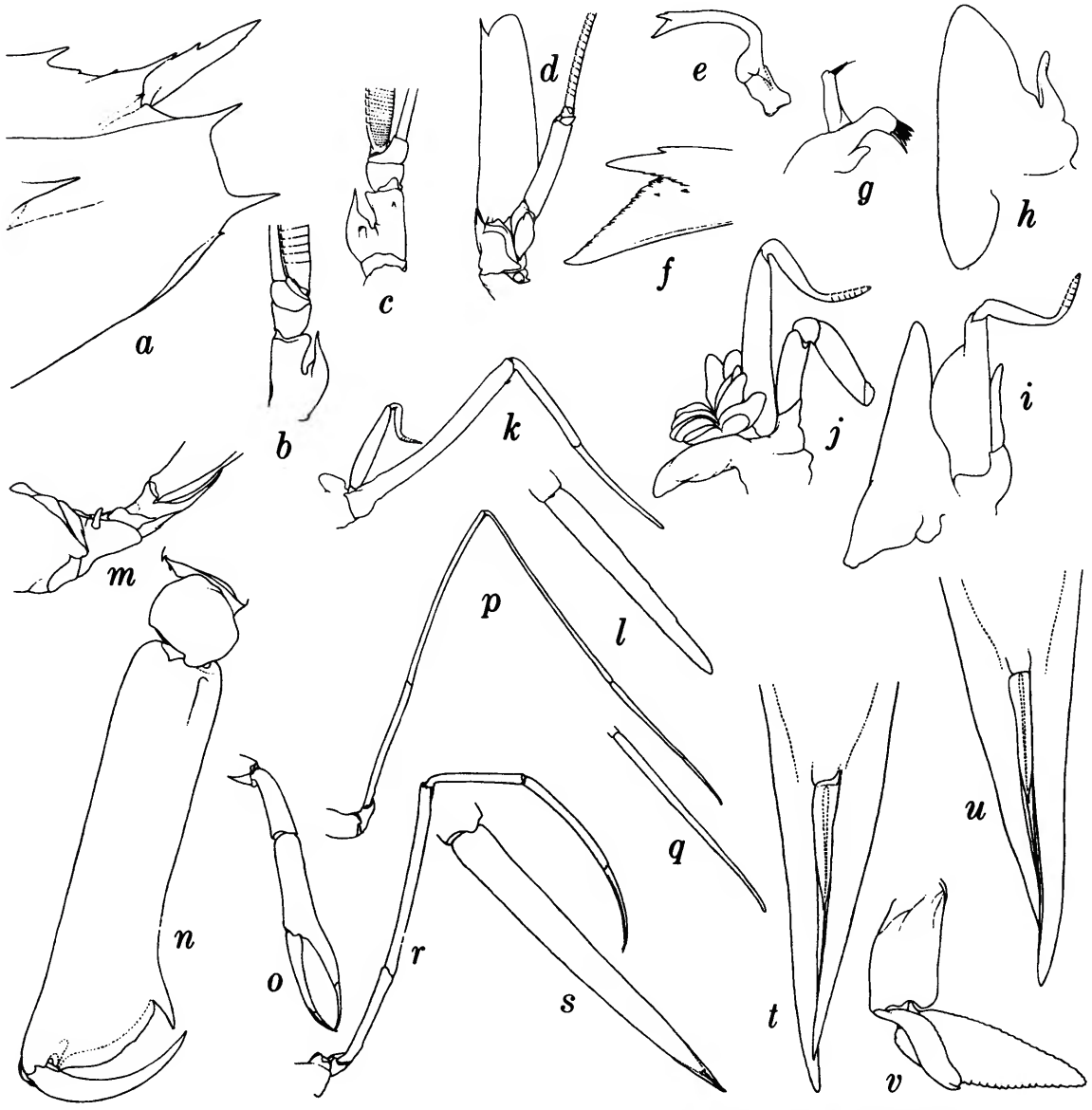

FIGURE 21.—*Pontophilus gracilis junceus*, male from *Albatross* sta 5648 (Celebes), carapace length 9.0 mm: *a*, anterior part of carapace, lateral aspect; *b*, right antennular peduncle, dorsal aspect; *c*, same, ventral aspect; *d*, right antenna, ventral aspect; *e*, right mandible; *f*, same, distal part; *g*, right 1st maxilla; *h*, right 2nd maxilla; *i*, right 1st maxilliped; *j*, right 2nd maxilliped; *k*, right 3rd maxilliped; *l*, same, distal segment, flexor (dorsal) aspect; *m*, right 1st pereopod, coxa and basis; *n*, same, chela and carpus; *o*, right 2nd pereopod, chela and carpus, flexor aspect; *p*, right 3rd pereopod; *q*, same, dactyl; *r*, right 5th pereopod; *s*, same, dactyl, extensor aspect; *t*, same, tip of dactyl, extensor aspect; *u*, same, flexor aspect; *v*, right 1st pleopod, posterior aspect. (Magnifications: *b–d*, *k*, *p*, *r*, × 5.2; *a*, *e*, *g–j*, *l–n*, *v*, × 10.8; *o*, *q*, *s*, × 21.5; *f*, X 53.8; *t*, *u*, × 223.6.)

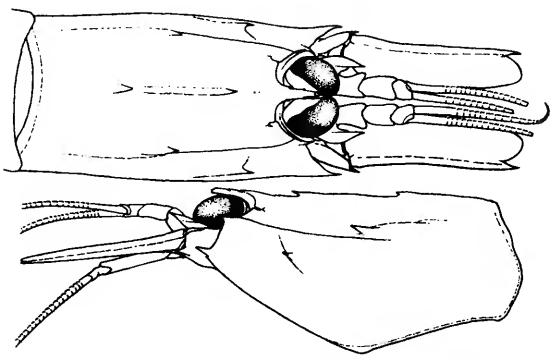

FIGURE 22.—*Pontophilus gracilis junceus*, female holotype of *P. junceus* from *Challenger* sta 200 (Mindanao), carapace length 8.2 mm; carapace and anterior appendages, dorsal and lateral aspects. (Magnification: × 4.3).

depths of 386 to 1280 meters, but I suspect that it may be identical with populations from similar depths off Southeast Africa and the Indian Ocean and recorded in the literature under the name *P. occidentalis* var. *indica* by Kensley (1968:319) and *P. indica* by Calman (1939:219). The species does not seem to be represented in Hawaii (see "Remarks" under *P. g. abyssi*).

REMARKS.—It is difficult to understand how either C. Spence Bate or his lithographer, J. C. Richards, could have contrived, from the unique holotype of *P. junceus* (Figure 22), the fanciful illustration of an anteriorly expanding carapace, with a linear-lanceolate rostrum overreaching the eyes, shown in pl. 88: fig. 3, of the *Challenger* report. Until this specimen was examined, I did not even consider the possibility that it might represent what seems to be the commonest member of *Pontophilus* in the Phillipine-Indonesian region. There is little doubt that *P. junceus* is a senior synonym of De Man's *P. occidentalis* var. *indica*.

The dozen Atlantic specimens of *P. gracilis*, including the male syntype, that I have been able to compare with the Philippine and Indonesian series seem to indicate that *P. g. junceus* can usually be distinguished by a proportionately shorter rostrum, the presence of an inconspicuous spine above the orbital cleft, and usually somewhat smaller eyes.

The appendices masculinae in the three males of this taxon in the *Albatross* collection (Figures 23*d–f*) show, once again, the apparent lack of correlation between the development of this appendage and the size of the animal, as noted in *Parapontocaris levigata*. The curious underdevelopment of the appendix masculina in occasional male crangonids large enough to be mature suggests the possibility of sex reversal of some kind, but no other evidence of protandry has been observed in the *Albatross* series.

* *Prionocrangon* Wood-Mason and Alcock, 1891

Prionocrangon Wood-Mason and Alcock, 1891b:361 [type-species, by monotypy: *Prionocrangon ommatosteres* Wood-Mason and Alcock, 1891b:362; gender: feminine].

DIAGNOSIS.—Rostrum triangular in dorsal aspect, laterally unarmed; carapace with longitudinal suture extending posteriorly from near branchiostegal spine; eye vestigial, without cornea; antennal scale without blade; 1st pereopod without exopod; 2nd pereopod simple, marginally setose, overreaching distal end of merus of anteriorly extended 1st pereopod.

RANGE.—Bay of Bengal, Indonesia, Philippines, southern Japan, New Zealand, and Lesser Antilles; 350–1301 meters.

REMARKS.—The material available heretofore of the four species currently recognized in this genus (nine specimens of *P. curvicaulis*, two of *P. dofleini*, four of *P. ommatosteres*, and one of *P. pectinata*) is hardly sufficient to determine the nature and extent of variability in the taxon. It seems clear, however, that such an obvious character as the length of the antennal scale, relative to the antennal and antennular peduncles, is not constant enough to be of much value. The one feature that seems to be most useful in distinguishing the species, from prevailing knowledge, is the form of the degenerate eyes and eyestalks, and that character has been adopted almost exclusively in the following key to the provisionally recognized species.

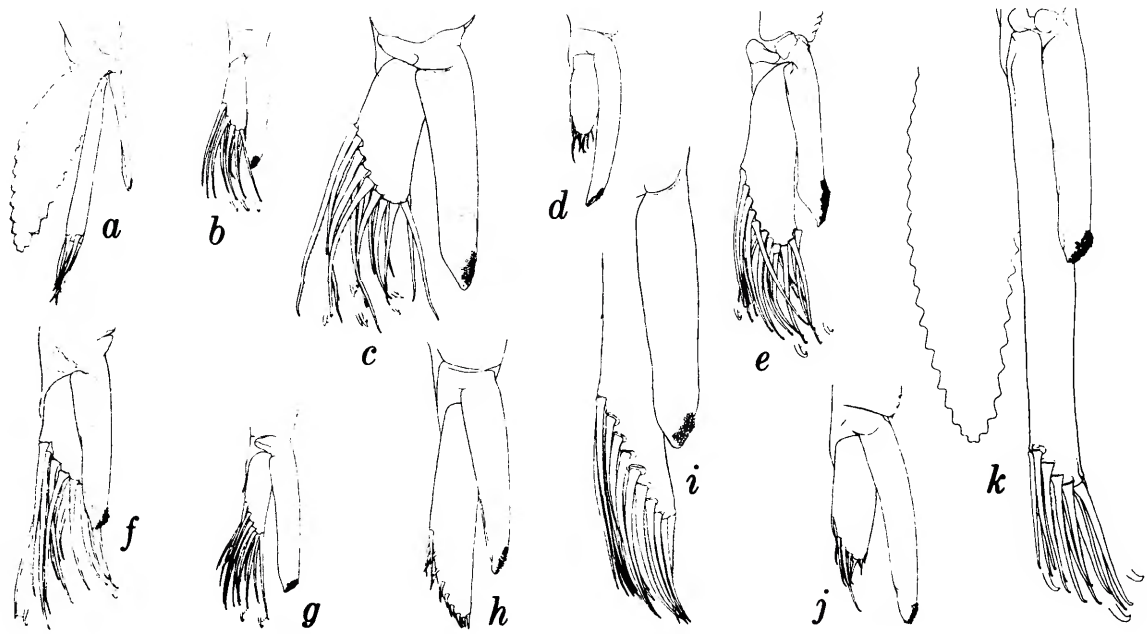

FIGURE 23.—Appendices masculinae (mesial aspects) from various males of *Pontophilus: a, P. brevirostris*, syntype from *Fish Hawk* sta 872 (southeast of New England), carapace length 4.2 mm; *b, P. gracilis gracilis*, from *Albatross* sta 2376 (Gulf of Mexico), carapace length 5.0 mm; *c, P. gracilis abyssi*, from *Albatross* sta 2226 (east of Chesapeake Bay), carapace length 12.0 mm; *d, P. gracilis junceus*, from *Albatross* sta 5655 (Celebes), carapace length 7.5 mm; *e*, same, from *Albatross* sta 5619 (Molucca Sea), carapace length 7.0 mm; *f*, same, from *Albatross* sta 5648 (Celebes), carapace length 9.0 mm; *g, P. gracilis*, subspecies?, from *Albatross* sta 4137 (Hawaii), carapace length 6.9 mm; *h, P. norvegicus*, collected by *Triton* (England), carapace length 7.0 mm; *i*, same, from *Albatross* sta 2586 (east of Delaware Bay), carapace length 10.1 mm; *j, P. gracilis occidentalis*, from *Albatross* sta 5689 (west of Baja California), carapace length 9.7 mm; *k, P. spinosus* (Adriatic Sea), carapace length 9.7 mm. (Magnifications: all × 27.0.)

Key to Species of *Prionocrangon*

1. Eyestalks drawn out to bluntly cylindrical or villiform extremities 2
   Eyestalks triangular 3
2. Eyestalks curving ventrally between antennules . . . . . *31. ***P. curvicaulis***
   Eyestalks not curving ventrad . . . . . ***P. dofleini*** Balss, 1913:238 (Sagami Nada, Japan; 350–400+ meters)
3. Rostrum reaching anteriorly nearly to level of distal extremities of eyestalks; telson somewhat shorter than uropods, slightly constricted posterior to midlength, posterior margin armed with 2 pairs of long spines in addition to minute dorsolateral pair . . . . . *32. ***P. ommatosteres***
   Rostrum not nearly reaching level of distal extremities of eyestalks; telson reaching little beyond midlength of uropods, abruptly constricted near midlength, posterior margin setiferous. ***P. pectinata*** Faxon, 1896:157 (Off Martinique, Lesser Antilles; 1033 meters)

* 31. *Prionocrangon curvicaulis* Yaldwyn, 1960

FIGURE 24

Prionocrangon curvicaulis Yaldwyn, 1960:46, fig. 10 [type-locality: Chatham Rise, New Zealand; 43°40′S, 179°28′E; 402 meters].

DIAGNOSIS.—Rostrum slightly overreaching downcurved eyestalks; telson, not including posterior marginal spines, shorter than uropods, somewhat constricted posterior to midlength, armed posteriorly with 3 long spines, in addition to submarginal dorsolateral spine, on each side of minute median tooth; eyestalks drawn out to bluntly cylindrical distal extremities and curving ventrad between antennules; maximum carapace length 9 mm.

MATERIAL.—PHILIPPINES. 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: 1♂ [6.4].

RANGE.—Known previously only from four locations on the Chatham Rise eastward from Canterbury, South Island, New Zealand, in 402 to 603 meters.

REMARKS.—The *Albatross* specimen is broken in two between the thorax and abdomen. The extreme tip of the elongate rostrum is missing, the carapace bears eight spines in the dorsal midline, half of the telson is missing posterior to the midlength bulge, and the posterior pair of pereopods are lost. The features that are intact agree very well with Yaldwyn's description and illustrations, except that the "small curved tooth" on the ventral surface of the downcurved eyestalks cannot be discerned with those appendages in place on the Philippine specimen. The appendix masculina is illustrated (Figure 24*b*). Although this specimen is smaller than most of those that were available to Yaldwyn, it is fully as large as the only male in the type series and may therefore be mature.

When this somewhat damaged *Albatross* specimen was first examined, I could find no sign of eyes or eyestalks. This condition agreed with the original diagnosis of the genus by Wood-Mason and Alcock (1891b:362): "There is no trace either of eyes or even of eye peduncles," and

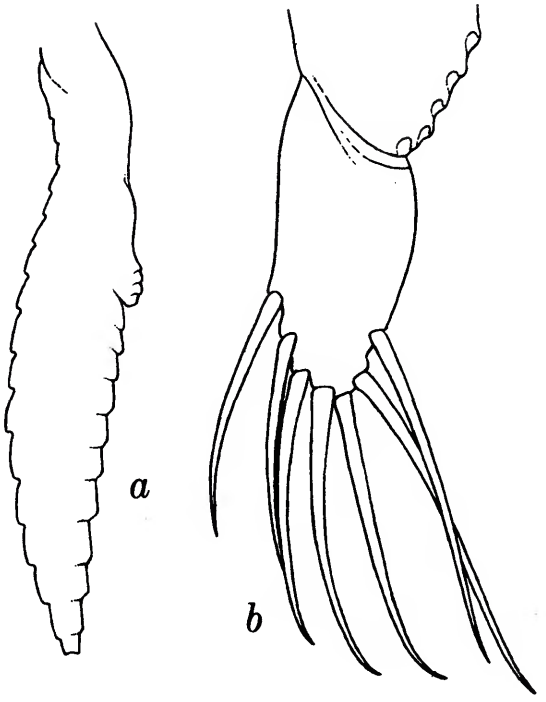

FIGURE 24.—*Prionocrangon curvicaulis*, male from *Albatross* sta 5445, carapace length 6.4 mm: *a*, endopod of 2nd right pleopod, anterior aspect; *b*, right appendix masculina, mesial aspect. (Magnifications: *a*, × 43.0; *b*, × 106.0.)

with the statement by Alcock (1901:123) about the type-species, *P. ommatosteres*: "Though the eyes and eyestalks are wanting, there is a fairly well pronounced orbital notch. . . ." Subsequent manipulation of the *Albatross* specimen, however, disclosed that the carapace had been displaced anteriorad, effectively concealing the eyestalks that proved to be nearly identical with those described by Yaldwyn. Is it possible that similar displacement of the carapace occurred in the two *Investigator* specimens? In view of the similar carapace profile depicted in the illustration of *P. ommatosteres* by Alcock and Anderson (1895, pl. 9: fig. 4) and in Yaldwyn's fig. 10(2) of *P. curvicaulis*, it is not inconceivable that the latter may prove to be a synonym of the type-species of the genus and that the form tentatively assigned to *P. ommatosteres* by De Man (1920:308) is an unnamed Indo-Pacific analogue of the Atlantic *P.*

pectinata of Faxon. It seems clear that the true identity of *P. ommatosteres* must await reexamination of the type material of that species.

* 32. *?Prionocrangon ommatosteres* Wood-Mason and Alcock, 1891

Prionocrangon ommatosteres Wood-Mason and Alcock, 1891b:362 [type-locality: south of Port Blair, Andaman Islands; 11°25′05″N, 92°47′06″E; 741 meters].—Alcock and Anderson, 1895, pl. 9: fig. 4.—Alcock, 1901:123.—De Man, 1920:308, pl. 25: fig. 76, a–i.

DIAGNOSIS.—Rostrum reaching nearly to level of distal ends of eyestalks; telson, not including posterior marginal spines, slightly shorter than uropods, somewhat constricted posterior to midlength, armed posteriorly with 2 pairs of long spines in addition to pair of minute dorsolateral spines and fixed median tooth; eyestalks triangular; maximum carapace length less than 9 mm.

MATERIAL.—INDONESIA. Off southern Buru: sta 5637; 3°53′20″S, 126°48′00″E; 1280 m; gray mud; 10 Dec 1909 (0757–0809); 12′ Agassiz beam trawl (net fouled on bottom): 1♀ without carapace.

RANGE.—Bay of Bengal and Indonesia; 366 to 1301 meters.

REMARKS.—There is little doubt that the *Albatross* specimen, which lacks the carapace and most of the second and all of the fifth pereopods, is conspecific with the two *Siboga* specimens described by De Man (1920). It agrees almost exactly with De Man's illustrations of the eystalks and telson and differs only in having the antennal scale no longer than the antennal peduncle and the dactyl of the fourth pereopod much broader than in De Man's fig. 76g, but I suspect that the dactyl may be transversely foreshortened in that representation. There is no certainty, however (as noted by De Man), that the Indonesian population in 1158 to 1301 meters is identical with the one known from 366 to 741 meters in the Bay of Bengal. As noted in my "Remarks" under the preceding species, the specimens questionably identified as *P. ommatosteres* by De Man, and herein, may prove to represent a new species related to the Atlantic *P. pectinata.*

* *Sabinea* Ross, 1835

Sabinea Ross, 1835:1xxxii [type-species, by monotypy: *Crangon Septemcarinatus* Sabine, 1824:ccxxxvi; gender: feminine].

DIAGNOSIS.—Rostrum with or without lateral teeth; carapace without longitudinal suture on lateral surface; eye well developed, cornea large, pigmented; antennal scale with well-developed blade; 1st pereopod without exopod; 2nd pereopod simple, not chelate, not reaching distal end of merus of anteriorly extended 1st pereopod.

RANGE.—Indonesia, Philippines, and North Atlantic from Arctic to Lesser Antilles in west and to Spanish Sahara in east; 0–3957 meters.

Key to Species of *Sabinea*

1. Carapace with 3 dentate carinae on each side; abdomen with paired dorsal dentate or serrate carinae on 5th and 6th somites 2
   Carapace with at most 2 carinae and 2 teeth on each side; abdomen without paired dorsal dentate or serrate carinae on 5th and 6th somites 4
2. Rostrum long, extending to distal end of antennal scale or beyond, armed with pair of lateral spines; abdomen with pleura ventrally pointed; telson without paired posterior spines; maximum carapace length about 28 mm . . . . . ***S. hystrix*** (A. Milne-Edwards, 1881:6)
   (Western North Atlantic Ocean from Davis Strait to Lesser Antilles; eastern North Atlantic off Spanish Sahara; 536–3957 meters)

Rostrum short, not nearly reaching distal end of antennal scale, unarmed laterally; abdomen with pleura rounded; telson with paired posterior spines; maximum carapace length about 18 mm 3

3. Rostrum apically acute in dorsal aspect; telson with acute apex flanked by 1 or 2 posterolateral spines ..... ***S. sarsii*** Smith, 1879:59 (Davis Strait, Iceland and Faeroes to Nantucket in west and Skagerrak in east; 48–710 meters)

Rostrum broadly rounded in dorsal aspect; telson subtruncate posteriorly, with 8 or more pairs of posterior spines or setae ..... ***S. septemcarinata*** (Sabine, 1824:ccxxxvi) (East Siberian Sea westward and southward in North Atlantic Ocean to Massachusetts Bay in west and western Norway in east; 0–300 meters)

4. Carapace with 2 teeth on dorsal median carina, lateral teeth consisting of none on upper carina and 2 on lower one ..... *33. ***S. indica***

Carapace with 3 teeth on dorsal median carina, lateral teeth consisting of 1 on upper carina and 1 on lower one ..... ***S. tridentata*** Pequegnat, 1970:115 (Southeastern Gulf of Mexico; 391 meters)

* 33. *Sabinea indica* De Man, 1918

Sabinea indica De Man, 1918b:304 [type-locality: Flores Sea north of Pulau Tanahdjampea, Indonesia; near 7°00′S, 120°34′30″E; 400 meters]; 1920:303, pl. 25: fig. 75, a–l.

DIAGNOSIS.—Rostrum not reaching as far as distal end of antennular peduncle, distally pointed, and armed with pair of lateral spines; carapace armed with only 2 teeth on median dorsal carina and 2 on lower lateral carina, in addition to antennal and pterygostomian spines; abdomen without paired dorsal dentate or serrate carinae on 5th and 6th somites, pleura rounded ventrally; telson with acute apex flanked by paired lateral spines; maximum carapace length about 10 mm.

MATERIAL.—PHILIPPINES. West of Jolo Island, Sulu Archipelago: sta 5550; 6°02′00″N, 120°-44′40″E; 472 m; fine sand, shells; 11.3°C; 17 Sep 1909 (1046–1114); 9′ Tanner beam trawl: 1 ovig ♀ [8.0]. Southwest of Jolo Island, Sulu Archipelago: sta 5565; 5°51′42″N, 120°30′-30″E; 444 m; sand, pteropod shells; 11.3°C; 21 Sep 1909 (1300–1321); 9′ Tanner beam trawl, mud bag: 1♀ [6.2].

INDONESIA. 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 ♀ [9.1].

RANGE.—Indonesia and Philippines; 400–545 meters.

REMARKS.—Only one of the *Albatross* specimens has the telson intact; in that ovigerous female there seems to be a pair of long, ventral, subdistal spines in addition to the lateral pair mentioned by De Man (1920:305). In both ovigerous females, the eggs are in the late stage of development and measure about 2 mm in major diameter.

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