

The Caridean Shrimps (Crustacea:
Decapoda) of the *Albatross*
Philippine Expedition, 1907–1910,
Part 5: Family Alpheidae

Fenner A. Chace, Jr.

SERIES PUBLICATIONS OF THE SMITHSONIAN INSTITUTION

Emphasis upon publication as a means of "diffusing knowledge" was expressed by the first Secretary of the Smithsonian. In his formal plan for the Institution, Joseph Henry outlined a program that included the following statement: "It is proposed to publish a series of reports, giving an account of the new discoveries in science, and of the changes made from year to year in all branches of knowledge." This theme of basic research has been adhered to through the years by thousands of titles issued in series publications under the Smithsonian imprint, commencing with *Smithsonian Contributions to Knowledge* in 1848 and continuing with the following active series:

Smithsonian Contributions to Anthropology
Smithsonian Contributions to Astrophysics
Smithsonian Contributions to Botany
Smithsonian Contributions to the Earth Sciences
Smithsonian Contributions to the Marine Sciences
Smithsonian Contributions to Paleobiology
Smithsonian Contributions to Zoology
Smithsonian Folklife Studies
Smithsonian Studies in Air and Space
Smithsonian Studies in History and Technology

In these series, the Institution publishes small papers and full-scale monographs that report the research and collections of its various museums and bureaux or of professional colleagues in the world of science and scholarship. The publications are distributed by mailing lists to libraries, universities, and similar institutions throughout the world.

Papers or monographs submitted for series publication are received by the Smithsonian Institution Press, subject to its own review for format and style, only through departments of the various Smithsonian museums or bureaux, where the manuscripts are given substantive review. Press requirements for manuscript and art preparation are outlined on the inside back cover.

Robert McC. Adams
Secretary
Smithsonian Institution

The Caridean Shrimps (Crustacea: Decapoda)
of the *Albatross* Philippine Expedition,
1907–1910, Part 5: Family Alpheidae

Fenner A. Chace, Jr.



SMITHSONIAN INSTITUTION PRESS

Washington, D.C.

1988

ABSTRACT

Chace, Fenner A., Jr. The Caridean Shrimps (Crustacea: Decapoda) of the *Albatross Philippine Expedition, 1907-1910, Part 5: Family Alpheidae*. *Smithsonian Contributions to Zoology*, number 466, 99 pages 25 figures, 1988. Keys are offered to the Philippine genera of the family, including the new monotypic genus *Vexillipar*, based on the new species *V. repandum*, the commonest alpheid in the collection and a possible inhabitant of *Euplectella*, the Venus's-flower-basket sponge, in depths of 296 to 875 meters. Also included are keys to all currently recognized species of *Automate*, *Batella*, *Betaeopsis*, and *Nennalpheus*, and to the known Philippine species of *Alpheopsis*, *Alpheus*, *Athanas*, and *Synalpheus*. The following new species are described, in addition to *Vexillipar repandum*: *Alpheus davaoensis* from 51 meters in Davao Gulf, Mindanao; *A. hyphalus* from 296 meters in Verde Island Passage south of western Luzon; *A. macellarius* from the Cebu Market; *A. quasirapacida* and *A. suluensis* from 18 and 38 meters, respectively, in the southwestern Sulu Archipelago; and *Batella leptocarpus* from 296 meters in the western Mindanao Sea.

OFFICIAL PUBLICATION DATE is handstamped in a limited number of initial copies and is recorded in the Institution's annual report, *Smithsonian Year*. SERIES COVER DESIGN: The coral *Montastrea cavernosa* (Linnaeus).

Library of Congress Cataloging in Publication Data

Chace, Fenner Albert

The caridean shrimps (Crustacea—Decapoda) of the Albatross Philippine Expedition, 1907-1910.

(Smithsonian contributions to zoology ; no. 381—)

Includes bibliographies.

Supt. of Docs. no.: SI 1.27:381

1. Shrimps—Philippines—Classification. 2. Crustacea—Classification—Collected works. 3. Crustacea—Philippines—

Classification—Collected works. I. Title. II. Series: Smithsonian contributions to zoology ; no. 381, etc.

QL1.S54 no. 381, etc 591 s [595.3'843] 83-6000061 [QL444.M33]

Contents

	<i>Page</i>
Introduction	1
Acknowledgments	1
*ALPHEIDAE Rafinesque, 1815	3
Key to Philippine Genera of Alpheidae	3
* <i>Alpheopsis</i> Coutière, 1896	4
Key to Previously Known Philippine Species of <i>Alpheopsis</i>	5
1. <i>Alpheopsis aequalis</i> Coutière, 1896	5
2. <i>Alpheopsis diabolus</i> A.H. Banner, 1956	5
* <i>Alpheus</i> Fabricius, 1798	6
Key to Philippine Species of <i>Alpheus</i>	7
3. <i>Alpheus acutocarinatus</i> De Man, 1909	14
* 4. <i>Alpheus acutofemoratus</i> Dana, 1852	15
* 5. <i>Alpheus alcyone</i> De Man, 1902	15
6. <i>Alpheus barbatus</i> Coutière, 1897	16
7. <i>Alpheus batesi</i> A.H. and D.M. Banner, 1964	16
8. <i>Alpheus bicostatus</i> De Man, 1908	16
* 9. <i>Alpheus bidens</i> (Olivier, 1811)	17
* 10. <i>Alpheus bucephalus</i> Coutière, 1905	17
11. <i>Alpheus canaliculatus</i> A.H. and D.M. Banner, 1968	18
12. <i>Alpheus chiragricus</i> H. Milne Edwards, 1837	18
13. <i>Alpheus collumianus</i> Stimpson, 1860	19
14. <i>Alpheus compressus</i> A.H. and D.M. Banner, 1981	19
15. <i>Alpheus coutierei</i> De Man, 1909	20
16. <i>Alpheus crinitus</i> Dana, 1852	20
* 17. <i>Alpheus crockeri</i> (Armstrong, 1941)	20
* 18. <i>Alpheus davaoensis</i> , new species	21
* 19. <i>Alpheus deuteropus</i> Hilgendorf, 1879	22
* 20. <i>Alpheus diadema</i> Dana, 1852	23
* 21. <i>Alpheus dispar</i> Randall, 1840	23
22. <i>Alpheus dolerus</i> A.H. Banner, 1956	24
* 23. <i>Alpheus edamensis</i> De Man, 1888	24
* 24. <i>Alpheus edwardsii</i> (Audouin, 1826)	25
25. <i>Alpheus ehlersii</i> De Man, 1909	25
26. <i>Alpheus euchirus</i> Dana, 1852	26
* 27. <i>Alpheus eulimene</i> De Man, 1909	26
* 28. <i>Alpheus euphrosyne euphrosyne</i> De Man, 1897	27
29. <i>Alpheus facetus</i> De Man, 1908	27
30. <i>Alpheus foresti</i> A.H. and D.M. Banner, 1981	27
* 31. <i>Alpheus frontalis</i> H. Milne Edwards, 1837	28
* 32. <i>Alpheus funafutensis</i> Borradaile, 1898	28
* 33. <i>Alpheus gracilipes</i> Stimpson, 1860	29
34. <i>Alpheus gracilis</i> Heller, 1862	30
* 35. <i>Alpheus hailstonei</i> Coutière, 1905	30
* 36. <i>Alpheus hippothoe</i> De Man, 1888	30
* 37. <i>Alpheus hyphalus</i> , new species	31
38. <i>Alpheus ladronis</i> A.H. Banner, 1956	31

39.	<i>Alpheus leptochirus</i> Coutière, 1905	33
40.	<i>Alpheus leviusculus leviusculus</i> Dana, 1852	34
* 41.	<i>Alpheus lobidens</i> De Haan, 1849	34
* 42.	<i>Alpheus lottini</i> Guérin, 1829	35
* 43.	<i>Alpheus macellarius</i> , new species	35
* 44.	<i>Alpheus macroskeles</i> Alcock and Anderson, 1894	37
45.	<i>Alpheus maindroni</i> , Coutière, 1898	38
* 46.	<i>Alpheus malabaricus</i> (Fabricius, 1775)	39
* 47.	<i>Alpheus malleodigitus</i> (Bate, 1888)	40
* 48.	<i>Alpheus microstylus</i> (Bate, 1888)	41
49.	<i>Alpheus miersi</i> Coutière, 1898	41
50.	<i>Alpheus mitis</i> Dana, 1852	42
* 51.	<i>Alpheus nonalter</i> Kensley, 1969	42
* 52.	<i>Alpheus obesomanus</i> Dana, 1852	44
53.	<i>Alpheus ovaliceps</i> Coutière, 1905	44
54.	<i>Alpheus pachychirus</i> Stimpson, 1860	45
* 55.	<i>Alpheus pacificus</i> Dana, 1852	45
56.	<i>Alpheus paracrinitus</i> Miers, 1881	45
57.	<i>Alpheus paradentipes</i> Coutière, 1905	46
* 58.	<i>Alpheus paralcyone</i> Coutière, 1905	46
* 59.	<i>Alpheus pareuchirus pareuchirus</i> Coutière, 1905	47
* 60.	<i>Alpheus parvirostris</i> Dana, 1852	47
* 61.	<i>Alpheus parvus</i> De Man, 1909	48
* 62.	<i>Alpheus polyxo</i> De Man, 1909	48
63.	<i>Alpheus proseuchirus</i> De Man, 1908	49
* 64.	<i>Alpheus pustulosus</i> A.H. and D.M. Banner, 1968	49
* 65.	<i>Alpheus quasirapacida</i> , new species	50
* 66.	<i>Alpheus serenei</i> Tiwari, 1963	51
* 67.	<i>Alpheus soela</i> D.M. and A.H. Banner, 1987	52
* 68.	<i>Alpheus spatulatus</i> A.H. and D.M. Banner, 1968	52
69.	<i>Alpheus splendidus</i> Coutière, 1897	54
70.	<i>Alpheus spongiarum</i> Coutière, 1897	54
71.	<i>Alpheus stanleyi</i> Coutière, 1908	55
72.	<i>Alpheus staphylinus</i> Coutière, 1908	55
* 73.	<i>Alpheus strenuus strenuus</i> Dana, 1852	56
74.	<i>Alpheus sulcatus</i> Kingsley, 1878	56
* 75.	<i>Alpheus suluensis</i> , new species	57
76.	<i>Alpheus villosus</i> (Olivier, 1811)	59
<i>Aretopsis</i> De Man, 1910		59
77.	<i>Aretopsis amabilis</i> De Man, 1910	60
* <i>Athanas</i> Leach, 1814		60
Key to Philippine Species of <i>Athanas</i>		61
78.	<i>Athanas areteformis</i> Coutière, 1903	61
79.	<i>Athanas borradailei</i> (Coutière, 1903)	61
80.	<i>Athanas dimorphus</i> Ortmann, 1894	61
81.	<i>Athanas djiboutensis</i> Coutière, 1897	62
82.	<i>Athanas dorsalis</i> (Stimpson, 1860)	62
83.	<i>Athanas indicus</i> (Coutière, 1903)	62
* 84.	? <i>Athanas jedanensis</i> De Man, 1910	62
85.	<i>Athanas marshallensis</i> Chace, 1955	63
86.	<i>Athanas parvus</i> De Man, 1910	63

<i>Automate</i> De Man, 1888	63
Key to Species of <i>Automate</i>	64
87. <i>Automate dolichognatha</i> De Man, 1888	64
* <i>Batella</i> Holthuis, 1955	65
Key to Species of <i>Batella</i>	65
* 88. <i>Batella leptocarpus</i> , new species	65
* 89. <i>Batella parvimanus</i> (Bate, 1888)	67
<i>Betaeopsis</i> Yaldwyn, 1971	67
Key to Species of <i>Betaeopsis</i>	69
90. <i>Betaeopsis indica</i> (De Man, 1910)	69
<i>Metalpheus</i> Coutière, 1908	69
91. <i>Metalpheus paragracilis</i> (Coutière, 1897)	69
<i>Nennalpheus</i> A.H. and D.M. Banner, 1981	69
Key to Species of <i>Nennalpheus</i>	70
92. <i>Nennalpheus inarticulatus</i> A.H. and D.M. Banner, 1981	70
<i>Neopalpheus</i> A.H. Banner, 1953	70
93. <i>Neopalpheus euryone</i> (De Man, 1910)	70
<i>Prionalpheus</i> A.H. and D.M. Banner, 1960	70
94. <i>Prionalpheus sulu</i> A.H. and D.M. Banner, 1971	70
<i>Racilius</i> Paulson, 1875	71
95. <i>Racilius compressus</i> Paulson, 1875	71
<i>Salmoneus</i> Holthuis, 1955	71
96. <i>Salmoneus mauiensis</i> (Edmondson, 1930)	71
97. <i>Salmoneus serratidigitus</i> (Coutière, 1896)	71
* <i>Synalpheus</i> Bate, 1888	72
Key to Philippine Species of <i>Synalpheus</i>	72
98. <i>Synalpheus albatrossi</i> Coutière, 1909	75
99. <i>Synalpheus amabilis</i> De Man, 1910	76
100. <i>Synalpheus antenor</i> De Man, 1910	76
*101. <i>Synalpheus bituberculatus</i> De Man, 1910	76
102. <i>Synalpheus charon</i> (Heller, 1861)	77
103. <i>Synalpheus coutierei</i> A.H. Banner, 1953	77
*104. <i>Synalpheus demani</i> Borradaile, 1899	77
*105. <i>Synalpheus fossor</i> (Paulson, 1875)	78
106. <i>Synalpheus gracilirostris</i> De Man, 1910	78
*107. <i>Synalpheus hastilicrassus</i> Coutière, 1905	79
*108. <i>Synalpheus iocasta</i> De Man, 1909	80
109. <i>Synalpheus laticeps</i> Coutière, 1905	81
*110. <i>Synalpheus neomeris</i> (De Man, 1897)	81
*111. <i>Synalpheus neptunus</i> (Dana, 1852)	82
*112. <i>Synalpheus nilandensis</i> Coutière, 1905	82
*113. <i>Synalpheus odontophorus</i> De Man, 1909	83
114. <i>Synalpheus paraneomeris</i> Coutière, 1905	83
*115. <i>Synalpheus pescadorensis</i> Coutière, 1905	83
116. <i>Synalpheus quadriarticulatus</i> D.M. and A.H. Banner, 1975	84
*117. <i>Synalpheus quadrispinosus</i> De Man, 1910	84
*118. <i>Synalpheus sciro</i> D.M. and A.H. Banner, 1975	85
119. <i>Synalpheus septemspinus</i> De Man, 1910	85
*120. <i>Synalpheus stimpsonii</i> (De Man, 1888)	86
*121. <i>Synalpheus streptodactylus</i> Coutière, 1905	87
122. <i>Synalpheus thai</i> A.H. and D.M. Banner, 1966	87

*123. <i>Synalpheus theano</i> De Man, 1910	88
*124. <i>Synalpheus triacanthus</i> De Man, 1910	88
*125. <i>Synalpheus trispinosus</i> De Man 1910	89
*126. <i>Synalpheus tropidodactylus</i> D.M. and A.H. Banner, 1975	89
127. <i>Synalpheus tumidomanus</i> (Paulson, 1875)	90
* <i>Vexillipar</i> , new genus	90
*128. <i>Vexillipar repandum</i> , new species	91
Literature Cited	94

The Caridean Shrimps (Crustacea: Decapoda) of the *Albatross* Philippine Expedition, 1907–1910, Part 5: Family Alpheidae

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 particulars that are common to each of the parts.

The taxa itemized are those known from the Philippines, whether or not they are represented in the *Albatross* collections; those taken by that Expedition are indicated by an asterisk (*). (This is a departure from earlier parts of the report, in which taxa recorded from either the Philippines or Indonesia were included.) 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. 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 bottom; (6) bottom temperature in degrees Celsius; (7) date and astronomical time intervals (hours between midnight and midnight, local time) that the gear operated at the indicated depth; (8) gear used; and (9) the number and sex of the specimens, with minimum and maximum carapace length to base of rostrum, 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

This report compares quite unfavorably with the exemplary publications on Indo-Pacific alpheids by the late Albert H. and Dora May Banner (see "Literature Cited") but it is far better than it would have been without benefit of the solid foundation that they established. Perhaps partial reiteration of my remarks to Dora Banner following Hank's untimely death on August 18, 1985, will not only express publicly my indebtedness to them but may demonstrate to other novices the requirements for successful taxonomic research: "Only someone who has taken full advantage of the Banner legacy, as I have for the past eight months, knows the significance of the example they have set for anyone undertaking the revision of a group of organisms: (1) become sufficiently familiar with earlier students of the group and their publications to be able to interpret their descriptions to the utmost; (2) take advantage of every opportunity to examine type specimens; (3) visit as many collecting sites as possible, especially type localities, in an effort to correlate color and ecological factors with morphological ones; (4) develop an ample standard descriptive format that permits ready comparison of diagnostic characters and follow it consistently; and (5) when disaster strikes, don't cry over spilled milk—pitch into the cow and get more!" Thirty years of adherence to such doctrines provided the Banners with an alpheid species sense that seems to me to be nearly infallible.

In addition to their published contributions, I have been privileged to profit in two other ways from the Banners' industry: (1) much of the material identified by A.H. Banner—especially unrecorded specimens from the Philippines collected subsequent to the Banner reports of 1978 and 1981—was available in the Smithsonian for direct comparison

Fenner A. Chace, Jr., Department of Invertebrate Zoology (NHB 163), National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560.

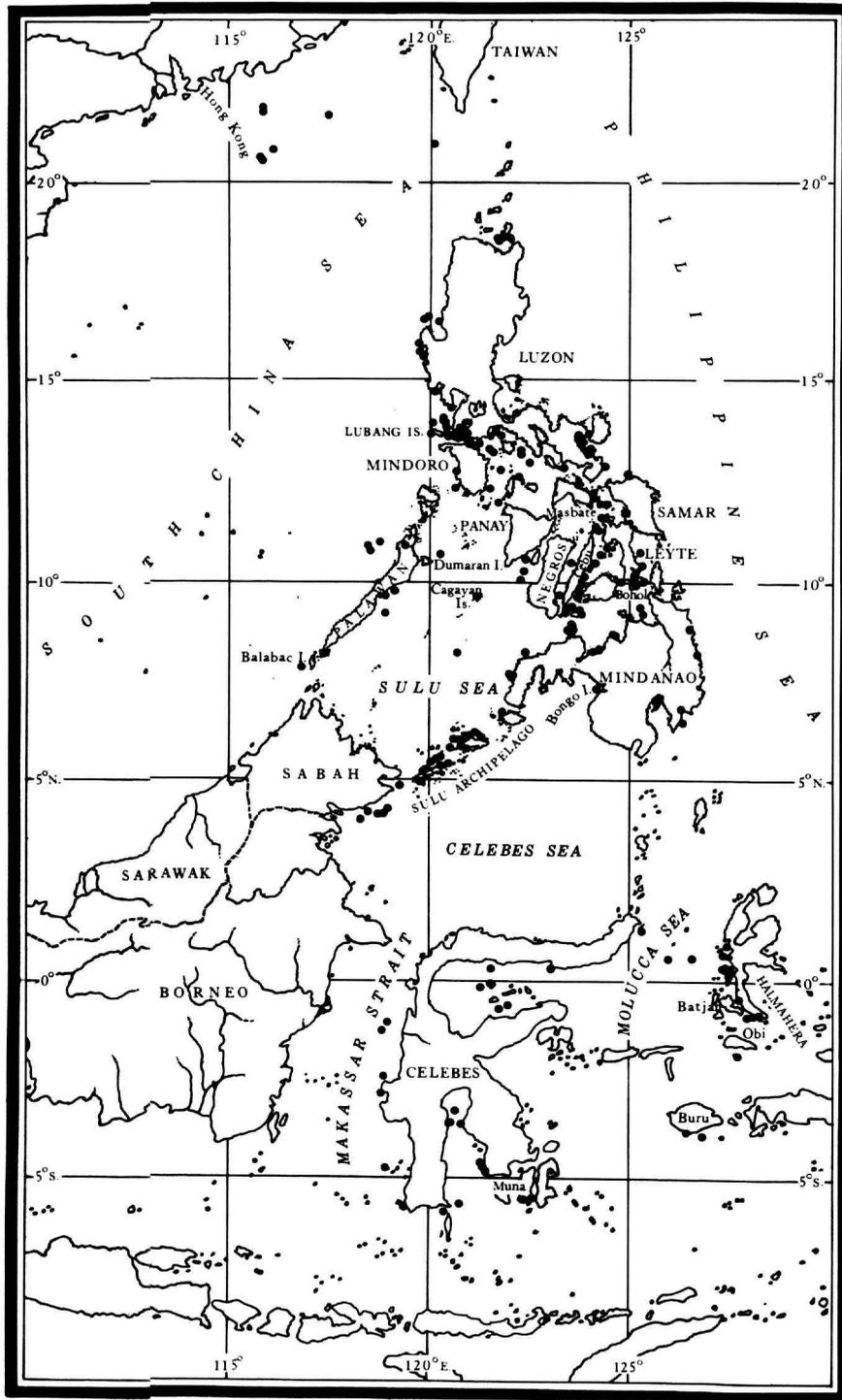


FIGURE 1.—The Philippines and central Indonesia, showing the positions of the more than 330 *Albatross* offshore stations at which caridean shrimps were collected.

during preparation of the keys, and (2) D.M. Banner, although retired from active systematic research and coping with grievous terminal illness, graciously reviewed the penultimate draft of this report and considerably enhanced its value, especially in regard to the reliability of the ranges of the species—a component of contributions of this kind that I am prone to treat with somewhat limited enthusiasm because of the often questionable reliability of identifications in the literature (a problem that is of minor importance in an area that has been so nearly monopolized for so long by a single research team). The report has also been materially improved by a characteristically detailed review by L.B. Holthuis of the Rijksmuseum van Natuurlijke Historie in Leiden and perusal by my Smithsonian colleague, B.F. Kensley, who devoted considerable effort to testing the keys to the genera and to the genus *Alpheus*. A.J. Bruce of the Northern Territory Museum, Darwin, Australia, also reported successful trials of some of the keys. R.W. Ingle of the British Museum (Natural History) voluntarily made the holotype of *Batella parvimanus* available for examination. As previously, my colleagues Horton H. Hobbs, Jr., Raymond B. Manning, and Austin B. Williams were continuing sources of professional assistance and encouragement. Finally, I am deeply indebted to Sandra L. Charles and Mary Ann MacLeod, who shared the task of transferring my typescript to a word processor, an exercise so remote from my sphere of competence as to distinguish clearly my helpless senior status from that of my colleagues, nearly all of whom have long since mastered such currently mandatory research procedures.

***ALPHEIDAE Rafinesque, 1815**

Alphidia Rafinesque, 1815:98.

DIAGNOSIS.—Rostrum, if present, immovably attached to remainder of carapace, without single subterminal dorsal tooth; eyes short, often partially or completely concealed by carapace; antennule with dorsolateral flagellum usually more or less bifurcate; 2nd maxilliped with terminal segment applied as strip to mesial margin of flexed penultimate segment; 3rd maxilliped bearing well-developed exopod; pereopods without distinct exopods, both members of 2 anterior pairs distinctly chelate, 2nd pair with carpus subdivided into 2 or more segments, 3 posterior pairs not unusually long, carpus shorter than propodus.

RANGE.—Commonly pantropical, especially numerous on coral reefs, to 45°—unusually to 60°—north and south latitude; littoral, rarely in fresh water, to 875 meters.

REMARKS.—Of the slightly less than 30 alpheid genera generally recognized today, more than half are represented in the Philippines, alone. Partly because most of the alpheid genera are represented by small species that are commonly found in shallow water, whereas the emphasis of the *Albatross* Expedition was directed toward collecting the larger, offshore animals, only six of the 15 Philippine genera are represented in the resultant material. The most abundant species in the collections, however, belongs to a new genus that occurs only in depths greater than 296 meters.

Key to Philippine Genera of Alpheidae

1. Strap-like epipods on at least 2 anterior pairs of pereopods 2
 No strap-like epipods on any pereopods 13
2. Eyes concealed from view in dorsal aspect (except when artificially displaced anteriorly) 3
 Eyes at least partially exposed in dorsal aspect 11
3. Third maxilliped broad, flat, and longitudinally curved, partially covering enlarged anterior mouthparts; appendix masculina unusually elongate, overreaching exopod of 2nd pleopod of male *Metalpheus*
 Third maxilliped subtriangular in cross-section, not suboperculate; appendix masculina not unusually elongate 4
4. Telson produced posteriorly into triangular point *Neopalpheopsis*
 Telson posteriorly truncate, convex, incised, not triangularly produced 5
5. Body much compressed from side to side; carapace with sharp, high carina over nearly entire length of dorsal midline *Racilius*
 Body not unusually compressed, carapace with, at most, partial low carina in dorsal midline 6
6. Rostrum absent *Betaeopsis*
 Rostrum usually distinct (if not, 1st pereopods asymmetrical, major chela carried with movable finger dorsolateral, not ventral, with molar-like tooth on movable finger, with adhesive plaques at base of movable finger and on distal end of palm, and with strap-like epipods on 4 anterior pairs of pereopods) 7

7. Major cheliped carried in flexed position *Salmoneus*
Major cheliped carried extended 8
8. Major cheliped carried with movable finger dorsolateral 9
Major cheliped carried with movable finger ventrolateral 10
9. Major chela without molar-like tooth on movable finger **Alpheopsis*
Major chela with molar-like tooth on movable finger **Alpheus*
10. Mandible with palp; major chela with adhesive plaques at base of movable finger
and on distal end of palm; 3rd pereopod with dactyl simple, not biunguiculate
. *Nennalpheus*
Mandible without palp; 1st pereopods without adhesive plaques at base of movable
finger and on distal end of palm; 3rd pereopod with dactyl biunguiculate
. **Vexillipar*
11. Both cornea and eyestalk exposed in dorsal aspect; rostrum vestigial or absent; 6th
abdominal somite without articulated plate at posteroventral angle . *Automate*
Little more than cornea of eye exposed in dorsal aspect; rostrum overreaching eyes;
6th abdominal somite with movable plate articulated at posteroventral angle . 12
12. Rostrum broadly rounded terminally in lateral aspect; mandible without palp; 1st
pereopods carried with movable finger ventrolateral *Aretopsis*
Rostrum acute in lateral aspect; mandible with palp; 1st pereopods carried with
movable finger dorsolateral **Athanas*
13. Sixth abdominal somite with movable plate articulated at posteroventral angle . .
. 14
Sixth abdominal somite without articulated plate at posteroventral angle 15
14. Eyes exposed in dorsal aspect; mandible with palp and molar process
. **Athanas*
Eyes concealed from view in dorsal aspect; mandible without palp or molar process
. *Prionalpheus*
15. Eyes exposed in dorsal aspect; mandible without palp; 1st pereopods symmetrical;
major chela without molar-like tooth on movable finger; appendix masculina
on 2nd pleopod of male **Batella*
Eyes concealed in dorsal aspect; mandible with palp; 1st pereopods asymmetrical;
major chela with molar-like tooth on movable finger; no appendix masculina
on 2nd pleopod of male **Synalpheus*

****Alpheopsis* Coutière, 1896**

Alpheopsis Coutière, 1896:382 [type species, selected by Holthuis, 1955:84:
Betaeus trispinosus Stimpson, 1860:32; gender: feminine].

DIAGNOSIS.—Body not unusually compressed from side to side; rostrum distinct, acute in lateral aspect; carapace without high carina throughout length of dorsal midline; abdomen usually with triangular flap articulated at posterolateral angle of 6th somite; telson terminating posteriorly in triangular tooth; eyes concealed from dorsal view, visible in anterior aspect; mandible with palp and molar process; 3rd maxilliped not unusually broadened to form partial operculum over other mouthparts; 1st pereopods similar but not necessarily equal, carried extended with movable finger dorsal or lateral, not ventral, major chela without molar-like tooth on movable finger; 2nd chela with fingers about as long as palm, carpus with 3–5, usually 5, articles; pereopods with strap-like epipods on at least 3 anterior pairs; appendix masculina not overreaching exopod of 2nd pleopod.

RANGE.—Pantropical with temperate extensions; littoral to 786 meters.

REMARKS.—The useful list of species of *Alpheopsis* published by Hobbs (1973:77) may be modified by adding the species *A. harperi* Wicksten, 1984, *A. shearmii* (Alcock and Anderson, 1899) A.H. and D.M. Banner, 1977a, *A. undicola* D.M. and A.H. Banner, 1973, and *A. yaldwyni* D.M. and A.H. Banner, 1973, and also *A. equidactylus* (Lockington, 1877) and *A. garricki* Yaldwyn, 1971, by those who consider those two forms to be distinct from *A. trispinosa* (Stimpson, 1860), and by deleting *A. haugi* Coutière, 1906, and *A. monodi* Sollaud, 1932, both of which were transferred to the genus *Potamalpheops* by Powell (1979), and *A. stygicola* Hobbs, 1973, subsequently transferred to that genus by Hobbs (1983). Currently, *Alpheopsis* seems to be represented by 21 species, or 19 species in the opinion of those who believe that *A. trispinosa* is a single pantropical species. Wicksten (1984b:99) recorded *A. trispinosa* from the Gulf of Mexico and referred to it as "a pantropical species," but the same author in a paper

issued a month earlier (1984a:186) reported a range extension of *A. equidactylus* without referring to the remark in Schmitt (1921:77) that "According to Coutière this [species] is *Alpheopsis trispinosus* of Stimpson (Rathbun)." A footnote in D.M. and A.H. Banner (1973:337) reads: "In personal correspondence Dr. J.C. Yaldwyn has indicated that he believes his species *A. garrick* [sic] (1971:87) may prove to be a synonym of this species [*A. trispinosa*] as redefined," but three pages later (1973:340), Banner and Banner remark that "On the basis of distributional pattern, we feel as we did in our 1966 paper that there may well be 3 species, one from the tropical Pacific, one from the south temperate Pacific, and another from the tropical and subtropical Atlantic," and "Until the true identity of De Man's, Coutière's, Sollaud's, and our specimens are confirmed, we are loath to ascribe any non-Australian distribution to this species."

The only specimen of *Alpheopsis* in the *Albatross* Philippine collections is a large female without either anterior cheliped with a postrostral carapace length of 10.2 mm (total length about 31 mm) from station 5188; Tañon Strait, east of Negros; 9°44'N, 123°14'20"E; 547 m; green mud; 17.0°C; 1 Apr 1908 (1044–1104); 12' Agassiz beam trawl, 3 mud bags. The frontal margin is devoid of ocular teeth, there are five articles in the

carpus of the second pereopod, and the dactyls of the three posterior pairs of pereopods are simple. This combination of characters is shared by only five of the known species of the genus: *A. aequalis* Coutière, 1897, *A. consobrinus* De Man, 1910, *A. labis* Chace, 1972, *A. trigonus* (Rathbun, 1901), and *A. yaldwyni* D.M. and A.H. Banner, 1973. The *Albatross* specimen seems to agree with most of the species of *Alpheopsis* examined in having strap-like epipods on the four anterior pairs of pereopods, but specimens available of the variable *A. aequalis* seem to have them on only the three anterior pairs. Even more distinctive is the dorsolateral antennular flagellum in the *Albatross* specimen, in which the fused portion, of six articles, is only one-half to three-fourths as long as the shorter of the free branches, which consists of as many as 12 articles. Of the five species that may be most like the *Albatross* specimen, only the Australian *A. yaldwyni* seems to be of similar size and to have even superficially similar antennular flagella, but that species has the proximal article in the carpus of the second pereopod proportionately longer and it is known only from shallow water, whereas the Philippine specimen came from a depth of nearly 550 meters, the deepest record for the genus, except for 786 meters at the type locality of *A. shearmii*.

Key to Previously Known Philippine Species of *Alpheopsis*

- Ocular hoods convex, unarmed; 2nd pereopod with proximal article of carpus little if any longer than 2 succeeding articles combined; 3rd–5th pereopods with dactyl simple 1. *A. aequalis*
- Ocular hoods acutely produced, front tridentate; 2nd pereopod with proximal article of carpus longer than 4 succeeding articles combined; 3rd–5th pereopods with dactyl biunguiculate 2. *A. diabolus*

1. *Alpheopsis aequalis* Coutière, 1896

Alpheopsis aequalis Coutière, 1896:382 [type locality; the type specimens were recorded from two localities: Red Sea and Indian Ocean].
Alpheopsis equalis.—A.H. Banner, 1953:15, fig. 4.—D.M. and A.H. Banner, 1973:342, fig. 16; 1978:218.

DIAGNOSIS.—Ocular hoods variably convex, not dentate; dorsolateral antennular flagellum with fused portion very short, composed of 1 or 2 articles; 2nd pereopod with proximal article of carpus no longer than 2 succeeding articles combined; 3rd–5th pereopods with dactyl simple, not biunguiculate; epipods on 3 anterior pairs of pereopods; maximum carapace length about 5 mm.

RANGE.—Red Sea and eastern Africa to Hawaii; intertidal to 80 meters.

REMARKS.—There is no apparent justification for spelling the specific name of this shrimp in any but the correct Latin way originally proposed by Coutière (1896).

2. *Alpheopsis diabolus* A.H. Banner, 1956

Alpheopsis diabolus [*diabolus* in figure legend] A.H. Banner, 1956:325, fig. 3 [type locality: Saipan, Mariana Islands].
Alpheopsis diabolus.—A.H. and D.M. Banner, 1964:86; 1967:262.—D.M. and A.H. Banner, 1978:218.

DIAGNOSIS.—Ocular hoods dentate; dorsolateral antennular flagellum with fused portion swollen and composed of more than 5 articles; 2nd pereopod with proximal article of carpus considerably longer than 4 succeeding articles; 3rd–5th pereopods with dactyl biunguiculate; epipods on 4 anterior pairs of pereopods; maximum carapace length about 4 mm.

RANGE.—Philippines and Mariana, Phoenix, and Society islands, littoral.

REMARKS.—A.H. and D.M. Banner (1964) confirmed that the original spelling of the specific name of this species (1956) was a typographical error. Although that external evidence does not automatically invalidate the original spelling, according to Article 32c(ii) of the *International Code of*

Zoological Nomenclature, the alternate spelling was validated by the Banners' action under the first reviser principle, Article 24(c).

**Alpheus* Fabricius, 1798

Crangon Weber, 1795:94 [type species, by monotypy: *Astacus Malabaricus* Fabricius, 1775:415; gender feminine; name suppressed by plenary action of the International Commission on Zoological Nomenclature, Opinion 334 (1955)].

Alpheus Fabricius, 1798:380, 404 [type species, selected by Latreille, 1810:422: *Alpheus avarus* Fabricius, 1798:404; gender: masculine].

Cryptopthalmus Rafinesque, 1814:23 [type species, by monotypy: *Cryptopthalmus ruber* Rafinesque, 1814:23 (= *Cancer glaber* Olivi, 1792:51); gender: masculine].

Autonomaea Risso, 1816:166 [type species, by monotypy: *Autonomaea Olivii* Risso, 1816:166 (= *Cancer glaber* Olivi, 1792:51); gender: feminine].

Asphalius P. Roux, 1831:22 [type species, by monotypy: *Palaemon brevis* Olivier, 1811:664; gender: masculine].

Dienezia Westwood in Hailstone, 1835:552 [type species, by monotypy: *Hippolyte rubra* Hailstone, 1835:272 (= *Hippolyte macrocheles* Hailstone, 1835:395); gender: feminine].

Phleusa Nardo, 1847:6 [type species, by monotypy: *Phleusa cynea* Nardo, 1847:6 (= *Cancer glaber*, Olivi, 1792:51); gender: feminine].

Halopsyche De Saussure, 1857:100 [type species, by monotypy: *Halopsyche lutaria* De Saussure, 1857:100 (= *Alpheus heterochaelis* Say, 1818:243); gender: feminine].

Alpheoides Paulson, 1875:105 [type species, selected by Holthuis, 1955:91: *Alpheus insignis* Heller, 1861:26; gender: masculine].

Paralpheus Bate, 1888:567 [type species, by monotypy: *Palaemon diversimanus* Olivier, 1811:663; gender: masculine].

DIAGNOSIS.—Rostrum variable, acute in lateral aspect; carapace without high carina throughout length of dorsal midline; abdomen without triangular flap articulated at posterolateral angle of 6th somite; telson not terminating posteriorly in triangular tooth; eyes concealed from dorsal view; mandible with palp and molar process; 3rd maxilliped not unusually broadened to form partial operculum over other mouthparts; 1st pereopods dissimilar and unequal, carried extended with movable finger dorsal or lateral, not ventral, major chela usually with molar-like tooth on movable finger; 2nd chela with fingers about as long as palm, carpus with 5 articles; pereopods with strap-like epipods on 4 anterior pairs; appendix masculina not overreaching exopod of 2nd pleopod.

RANGE.—Virtually all tropical and subtropical and some temperate seas; intertidal to 640 meters.

REMARKS.—Of the approximately 220 species and 10 subspecies of the genus *Alpheus* currently recognized (including the six species described herein and seven nominal species that must be regarded for the time being as nomina dubia), 74 have now been recorded from the Philippines, and 41 of them are represented in the *Albatross* collections.

It is unfortunate that acceptable means of subdividing this cumbersome genus are not yet apparent. To be sure, the seven generally accepted species groups of *Alpheus* are probably characterized by valid phylogenetic differences, but there would be no practical gain in elevating them to even subgeneric status. The most important taxonomic features of each of the

groups stems from the structure of the major cheliped, an appendage that is all too often missing from preserved material. It is hoped that recourse to these characters only as a last resort in the following key may facilitate the identification of collections comprising variably intact material. Each of the species diagnoses, however, is accompanied by an indication of the group with which it is associated, and the groups are characterized below in alphabetical order (characterizations adapted from D.M. and A.H. Banner, 1982).

Brevirostris Group

Orbital teeth lacking, orbital hoods often prominent; major chela with palm always compressed, more or less quadrangular in cross-section, often with surfaces delimited by distinct angles, with or without "saddle" proximal to adhesive plaque; minor chela sometimes "balaeniceps" in male; 3rd pereopod with dactyl always simple, sometimes subspatulate, merus usually unarmed on flexor margin.

Crinitus Group

Rostrum often reduced, sometimes lacking; orbital teeth lacking; major chela with palm rounded in cross-section, without sculpture; minor chela often "balaeniceps" in male; 3rd pereopod with dactyl simple or biunguiculate, merus usually armed with strong tooth on flexor margin.

Diadema Group

Rostrum with base sometimes flattened and abruptly delimited from adrostral furrows; orbital teeth usually lacking; major chela with palm rounded to oval in cross-section, usually with "saddle" proximal to adhesive plaque but lacking longitudinal grooves; minor chela sometimes "balaeniceps" in male; 3rd pereopod with dactyl almost always simple, sometimes variable intraspecifically, merus with or without tooth on flexor margin.

Edwardsii Group

Orbital teeth lacking except in *A. euchirus*; major chela with palm compressed, with "saddle" proximal to adhesive plaque and usually with shoulder on opposite margin proximal to fixed finger, "saddle" usually extending onto both adjoining surfaces as triangular or quadrangular depressions; minor chela often "balaeniceps" in male; 3rd pereopod with dactyl usually simple, sometimes subspatulate, merus usually dentate on flexor margin.

Macrocheles Group

Orbital teeth always present; major chela with dactyl often deep and compressed into thin lamina, tip sometimes bulbous, palm compressed, somewhat twisted, with 3 longitudinal ridges and grooves, sometimes interrupted, terminating distally in

adhesive plaque and strong tooth on each side of dactylar articulation; minor chela never “balaeniceps”; 3rd pereopod with dactyl simple or biunguiculate, merus with or without teeth on flexor margin.

Obesomanus Group

Rostrum reduced, sometimes lacking; orbital teeth lacking; antennal peduncle often elongate, stylocerite with tooth weak or lacking; antennal peduncle and scale reduced; major chela with dactyl in form of single- or double-headed hammer, palm proximally rounded, distally tapering, with variably distinct

longitudinal grooves; minor chela never “balaeniceps”; 2nd pereopods sometimes unusually long and asymmetrical; 3rd pereopod variable, not strongly dentate.

Sulcatus Group

Rostrum sometimes with base flattened and delimited from adrostral furrows; orbital teeth often present; major chela with palm never markedly compressed, usually with longitudinal but without transverse grooves; minor chela never “balaeniceps”; 3rd pereopod with dactyl simple or biunguiculate, merus with or without tooth on flexor margin.

Key to Philippine Species of *Alpheus*

1. Acute anterior tooth on each orbital hood or on margin between rostrum and orbital hood 2
Anterior margin of carapace without acute tooth either side of rostrum 18
2. Orbital spine arising from surface rather than margin of orbital hood 3
Frontal spine arising from margin of adrostral region or of orbital hood, which may be incised dorsad to base of spine 6
3. Third pereopod with merus armed with distal tooth on flexor margin 4
Third pereopod with merus unarmed on flexor margin 5
4. Body not densely setose; adrostral frontal margin unarmed; without median tooth or tubercle on gastric region; 3rd pereopod with dactyl simple, not biunguiculate *19. *A. deuteropus*
Body densely setose; both adrostral frontal margin and orbital hood armed with acute tooth; median tooth or tubercle on gastric region; 3rd pereopod with dactyl biunguiculate 76. *A. villosus*
5. Rostral base dorsally flattened and abruptly delimited from adrostral furrows; 3rd pereopod with dactyl blunt distally *42. *A. lottini*
Rostral base not flattened, sloping gradually into adrostral furrows; 3rd pereopod with dactyl sharp pointed 69. *A. splendidus*
6. Third pereopod with strong distal tooth on flexor margin of merus 7
Third pereopod without strong distal tooth on flexor margin of merus 10
7. Major chela without tooth either side of dactylar articulation 8
Major chela with sharp tooth either side of dactylar articulation 9
8. Rostrum barely overreaching distal margin of 1st antennular segment; carapace with median tubercle on anterior gastric region and paired flanges overhanging posterior ends of adrostral furrows, anterior margin armed with acute tooth slightly mesial to orbital hood, orbital hood unarmed; 2nd antennular segment twice as long as wide; major chela with narrow transverse “saddle” on palm proximal to adhesive plaque, minor chela with dactyl distinctly shorter than palm, palm without teeth at dactylar articulation; 2nd pereopod with proximal carpal article subequal to 2nd; 3rd pereopod with dactyl simple, not biunguiculate 8. *A. bicostatus*
Rostrum not reaching nearly as far as distal margin of 1st antennular segment; carapace without median tubercle on gastric region or paired flanges overhanging posterior ends of adrostral furrows, anterior margin unarmed mesial to orbital hood, latter armed with sharp marginal tooth; 2nd antennular segment 3 times as long as wide; major chela without “saddle” on palm proximal to adhesive plaque; minor chela with dactyl slightly longer than palm, sharp tooth on extensor margin of palm at articulation with dactyl; 2nd pereopod with proximal carpal article nearly twice as long as 2nd; 3rd pereopod with dactyl biunguiculate 11. *A. canaliculatus*

9. Rostrum overreaching orbital spines 13. *A. collumianus*
 Rostrum shorter than orbital spines 57. *A. paradentipes*
10. Major chela contorted and strongly sculptured, with at least 1 sharp carina
 terminating distally in acute tooth at dactylar articulation 11
 Major chela relatively smooth, without sharp carina supporting acute tooth at
 dactylar articulation 14
11. Adrostral furrows distinct, extending posteriorly beyond eyes . 13. *A. collumianus*
 Adrostral furrows short and somewhat obscure or absent 12
12. Major chela with carina supporting mesial tooth at dactylar articulation entire, not
 interrupted *17. *A. crockeri*
 Major chela with carina supporting mesial tooth at dactylar articulation interrupted
 by transverse incision 13
13. Major chela with dactyl strongly compressed and curved in longitudinal plane; 3rd
 pereopod with dactyl usually at least obscurely biunguiculate; typically
 deepwater species (25–536 meters) *35. *A. hailstonei*
 Major chela with dactyl not strongly compressed or markedly curved in longitudinal
 plane; 3rd pereopod with dactyl simple, not even obscurely biunguiculate;
 shallow-water species 72. *A. staphylinus*
14. Major chela twice as long as wide, with distinct “saddle” proximal to adhesive
 plaque and marginal shoulder proximal to fixed finger 26. *A. euchirus*
 Major chela 2½ to 4 times as long as wide, without distinct “saddle” proximal to
 adhesive plaque or marginal shoulder proximal to fixed finger 15
15. Second antennular segment 3 or more times as long as wide 16
 Second antennular segment less than twice as long as wide 17
16. Body strongly compressed, carapace twice as high as wide; minor chela with dactyl
 not “balaeniceps,” at least in female; 3rd pereopod with dactyl subspatulate
 14. *A. compressus*
 Body not unusually compressed; minor chela with dactyl “balaeniceps” in both
 sexes; 3rd pereopod with dactyl not subspatulate *67. *A. soela*
17. Margin between rostrum and orbital hood convex throughout; blunt rostral carina
 extending posteriorly to near midlength of carapace; major chela without
 depression on either margin proximal to fingers; 3rd pereopod with movable
 spine on ischium 29. *A. facetus*
 Margin between rostrum and orbital hood deeply incised at base of rostrum; rostrum
 dorsally rounded, not carinate; major chela with slight depressions on both
 margins proximal to fingers; 3rd pereopod without spine on ischium
 34. *A. gracilis*
18. Rostrum abruptly delimited from adrostral furrows 19
 Rostrum sloping gradually into adrostral furrows 24
19. Rostrum carinate in dorsal midline; margin between rostrum and orbital hood
 convex; median tubercle on gastric region; major chela subcylindrical; 3rd
 pereopod with acute subdistal tooth on flexor margin of merus
 *20. *A. diadema*
 Rostrum not carinate in dorsal midline; margin between rostrum and orbital hood
 not distinctly convex; without median tubercle on gastric region; major chela
 compressed; 3rd pereopod with merus unarmed on flexor margin 20
20. Third pereopod with dactyl subspatulate 21
 Third pereopod with dactyl conical or biunguiculate, not subspatulate 23
21. Rostral margin not overhanging adrostral furrow; 2nd antennular segment 3 times
 as long as wide; major chela with proximal shoulder overhanging “saddle”
 proximal to adhesive plaque *68. *A. spatulatus*
 Rostral margin overhanging adrostral furrow; 2nd antennular segment twice as
 long as wide; major chela with proximal shoulder overhanging very slightly, if
 at all, “saddle” proximal to adhesive plaque 22

- 22. Antennal scale with lateral margin straight, distolateral spine overreaching distal margin of blade little, if at all; major chela with proximal shoulder sloping into "saddle" proximal to adhesive plaque, not abrupt, distinct shoulder on opposite margin proximal to fixed finger; minor chela with dactyl not "balaeniceps" in either sex 30. *A. foresti*
 Antennal scale with lateral margin concave, distolateral spine clearly overreaching distal margin of blade; major chela with abrupt shoulder proximal to "saddle" proximal to adhesive plaque, without distinct shoulder on opposite margin proximal to fixed finger; minor chela with dactyl "balaeniceps" in male 63. *A. proseuchirus*
- 23. First pereopods with flexor margin of merus armed with sharp distal tooth and 2 or more spines proximal thereto; major chela 3 1/2 times as long as wide, with distinct "saddle" proximal to adhesive plaque; minor chela with dactyl "balaeniceps" in both sexes; 3rd pereopod with dactyl simple, not biunguiculate *33. *A. gracilipes*
 First pereopods with merus unarmed on flexor margin; major chela less than 3 times as long as wide, without distinct "saddle" proximal to adhesive plaque; minor chela with dactyl not "balaeniceps" in either sex; 3rd pereopod with dactyl often biunguiculate or with vestige of subdistal tooth on flexor margin 74. *A. sulcatus*
- 24. Median tooth or tubercle on gastric region 25
 Without median tooth or tubercle on gastric region 28
- 25. Rostrum overreaching 1st antennular segment; large acute tooth arising each side of median gastric denticle and overhanging posterior end of adrostral furrow; 2nd antennular segment barely twice as long as wide; major chela less than 3 times as long as wide, with narrow transverse cleft or "saddle" proximal to adhesive plaque; 3rd pereopod with dactyl not subspatulate, merus armed with sharp subterminal tooth on flexor margin *9. *A. bidens*
 Rostrum not reaching as far as distal margin of 1st antennular segment; carapace without tooth arising either side of median gastric tubercle; 2nd antennular segment more than 3 times as long as wide; major chela more than 4 times as long as wide, without "saddle" proximal to adhesive plaque; 3rd pereopod with dactyl subspatulate, merus unarmed on flexor margin 26
- 26. Median postrostral carina extending posteriorly at least to midlength of carapace; antennal scale with distolateral spine barely overreaching distal margin of blade 3. *A. acutocarinatus*
 Median postrostral carina, if present, not extending posteriorly beyond anterior gastric region; antennal scale with distolateral spine distinctly overreaching distal margin of blade 27
- 27. First pereopods with strong subdistal tooth on extensor margin of merus; major chela oval in cross section, without longitudinal carinae or ridges on palm *44. *A. macroskeles*
 First pereopods without subdistal tooth on extensor margin of merus; major chela with palm subrectangular in cross section and bearing strong longitudinal carina near margin proximal to fixed finger, obscure longitudinal ridge near midline of same surface, and 2 ridges defining flattened surface proximal to adhesive plaque *51. *A. nonalter*
- 28. Median postrostral carina extending posteriorly nearly or quite to midlength of carapace 29
 Median rostral carina not extending posteriorly beyond anterior gastric region 35
- 29. Third pereopod with acute distal tooth on flexor margin of merus 30
 Third pereopod with merus unarmed on flexor margin 34
- 30. Major chela without conspicuous sculpture; 2nd pereopod with proximal carpal article much shorter than 2nd 31

- Major chela with "saddle" overhung by proximal shoulder proximal to adhesive plaque and shoulder on opposite margin proximal to fixed finger; 2nd pereopod with proximal carpal article much longer than 2nd 33
31. Rostrum prominent, sharply acute; frontal margin of carapace not extending anteriorly beyond margins of orbital hoods; antennal scale with well-developed blade reaching nearly or quite to distal end of antennular peduncle, basal antennal segment (basicerite) bearing strong lateral spine; 3rd pereopod with conspicuous movable spine on ischium *61. *A. parvus*
 Rostrum very short and broad; frontal margin of carapace extending anteriorly beyond margins of orbital hoods; antennal scale with reduced blade reaching about as far as midlength of 2nd antennular segment, basal antennal segment (basicerite) unarmed; 3rd pereopod with ischium unarmed 32
32. Rostrum minute, not extending anteriorly as far as lateral frontal margin; antennal scale strongly concave laterally, distolateral spine not unusually robust; major chela without distal sinus on palm proximal to adhesive plaque; minor chela with fingers shorter than palm *18. *A. davaoensis*
 Rostrum extending anteriorly beyond lateral frontal margin; antennal scale moderately concave laterally, distolaterally spine unusually stout; major chela with distal sinus on palm immediately proximal to adhesive plaque; minor chela with fingers slightly longer than palm *27. *A. eulimene*
33. Margins of orbital hoods not extended anteriorly as flattened projections; minor chela without distinct lateral crest on dactyl *36. *A. hippothoe*
 Margins of orbital hoods extended anteriorly as flattened projections; minor chela with distinct lateral crest on dactyl, setiferous in male *66. *A. serenei*
34. Major chela with strong shoulder on margin proximal to fixed finger; 3rd pereopod with dactyl not subspatulate, ischium unarmed 15. *A. coutierei*
 Major chela without distinct shoulder on margin proximal to fixed finger; 3rd pereopod with dactyl subspatulate, ischium bearing movable spine *21. *A. dispar*
35. Third pereopod with strong distal tooth on flexor margin of merus 36
 Third pereopod without strong distal tooth on flexor margin of merus 53
36. Second pereopod with proximal article of carpus no more than $\frac{1}{2}$ as long as 2nd 37
 Second pereopod with proximal article of carpus more than $\frac{1}{2}$ as long as longer than 2nd 45
37. Third pereopod with dactyl biunguiculate 38
 Third pereopod with dactyl simple, not biunguiculate 40
38. Antennal scale with blade much reduced, reaching little more than halfway to tip of distolateral spine; 3rd pereopod without spines on flexor margin of carpus or movable spine on ischium 70. *A. spongiarum*
 Antennal scale less reduced, reaching at least $\frac{2}{3}$ of distance to tip of distolateral spine; 3rd pereopod with 1-4 spines on flexor margin of carpus and with movable spine on ischium 39
39. Minor chela not sexually dimorphic, fingers no more than $\frac{3}{4}$ as long as palm; 3rd pereopod with series of spines on mesial flexor margin of merus *5. *A. alcyone*
 Minor chela sexually dimorphic, dactyl distinctly wider and slightly longer in male than in female, fingers at least as long as palm in both sexes; 3rd pereopod without series of spines on flexor margin of merus *58. *A. paralcycone*
40. Third pereopod with movable spine on ischium 41
 Third pereopod without spine on ischium 44
41. Major chela with dactyl like double-headed hammer 42
 Major chela with conventional dactyl, not double-headed 43
42. Antennal scale with blade well-developed, overreaching 2nd antennular segment *48. *A. microstylus*

- Antennal scale with blade reduced, not reaching beyond midlength of 2nd antennular segment *52. *A. obesomanus*
43. Basal antennal segment (basicerite) armed with strong lateral tooth; major chela with transverse and longitudinal grooves; minor chela with fingers less than $\frac{1}{2}$ as long as palm, dactyl not "balaeniceps" in either sex . *4. *A. acutofemoratus*
Basal antennal segment (basicerite) usually unarmed; major chela without apparent sculpture; minor chela with fingers at least $\frac{3}{4}$ as long as palm, dactyl "balaeniceps" in male *10. *A. bucephalus*
44. Second antennular segment 3 times as long as wide; major chela with dactyl like double-headed hammer *47. *A. malleodigitus*
Second antennular segment twice as long as wide; major chela with conventional dactyl, not double-ended 70. *A. spongiarum*
45. Major chela with strong tooth either side of dactylar articulation 13. *A. collumianus*
Major chela without strong teeth flanking dactylar articulation 46
46. Major chela with palm distinctly constricted on both margins proximal to dactylar articulation 47
Major chela without distinct sinus in margin proximal to fixed finger 50
47. Major chela with sinus on margin proximal to fixed finger not delimited proximally by very strong shoulder 7. *A. batesi*
Major chela with very strong shoulder on margin proximal to fixed finger . . . 48
48. Basal antennal segment (basicerite) with unusually long ventrolateral tooth far overreaching stylocerite; major chela with "saddle" proximal to adhesive plaque in form of narrow oblique groove; 2nd pereopod with proximal carpal article considerably longer than 2nd article *60. *A. parvirostris*
Basal antennal segment (basicerite) armed with spine-like ventrolateral tooth not overreaching stylocerite; major chela with "saddle" proximal to adhesive plaque U-shaped and transverse; 2nd pereopod with proximal carpal article shorter than 2nd article 49
49. Major cheliped with sharp distal tooth on inferior flexor margin of merus; minor chela without sharp carina on extensor margin of dactyl and without sharp granules on extensor surface of palm *23. *A. edamensis*
Major cheliped with flexor margin of merus unarmed; minor chela with sharp carina on extensor margin of dactyl and sharp granules on extensor surface of palm *32. *A. funafutensis*
50. Rostrum prominent, acute 51
Rostrum small, subrectangular 52
51. Major chela with palm devoid of grooves and ridges, fingers about $\frac{1}{3}$ as long as palm 16. *A. crinitus*
Major chela with subdistal, cleft-like "saddle" on palm, fingers about $\frac{2}{3}$ as long as palm 49. *A. miersi*
52. Antennal scale with distolateral spine not especially stout, laterally convex, slightly overreaching well-developed blade; minor 1st chela with dactyl broadly "balaeniceps" in male only; 3rd pereopod with dactyl simple 54. *A. pachychirus*
Antennal scale with distolateral spine stout, laterally straight or slightly concave, considerably overreaching somewhat reduced blade; minor 1st chela with dactyl not "balaeniceps" in either sex; 3rd pereopod with dactyl variably biunguiculate 71. *A. stanleyi*
53. Third pereopod with dactyl biunguiculate or subspatulate 54
Third pereopod with dactyl neither biunguiculate nor subspatulate 63
54. Third pereopod with dactyl biunguiculate 55
Third pereopod with dactyl subspatulate 56
55. Major chela with prominent acute tooth either side of dactylar articulation, without "saddle" proximal to adhesive plaque, without distinct shoulder on margin

- proximal to fixed finger; minor chela with dactyl not "balaeniceps" in either sex; 2nd pereopod with proximal carpal article $1\frac{3}{4}$ times as long as 2nd 13. *A. collumianus*
- Major chela without prominent acute tooth either side of dactylar articulation, with distinct "saddle" proximal to adhesive plaque overhung by proximal shoulder, with distinct shoulder on margin proximal to fixed finger; minor chela with dactyl "balaeniceps" in male only; 2nd pereopod with proximal carpal article twice as long as 2nd *62. *A. polyxo*
56. Major chela without "saddle" proximal to adhesive plaque 57
Major chela with "saddle" proximal to adhesive plaque 61
57. Body strongly compressed, carapace twice as high as wide; 1st pair of pereopods with merus armed with 3 distal teeth on extensor margin . . 14. *A. compressus*
Body not unusually compressed; 1st pair of pereopods with merus armed, at most, with single distal tooth on extensor margin 58
58. Second pereopod with proximal article of carpus shorter than 2nd 59
Second pereopod with proximal article of carpus longer than or subequal to 2nd . 60
59. Antennal peduncle (carpocerite) overreaching antennular peduncle; 1st pereopods with series of long, acicular spines on flexor margin of merus; minor chela nearly 8 times as long as wide, dactyl slightly shorter than palm, "balaeniceps" in male *64. *A. pustulosus*
Antennal peduncle (carpocerite) not reaching as far as distal end of antennular peduncle; 1st pereopods with short, inconspicuous spines on flexor margin of merus; minor chela less than 5 times as long as wide, dactyl distinctly longer than palm, not "balaeniceps" in male *65. *A. quasirapacida*
60. First pereopods with strong subdistal tooth on extensor margin of merus; major chela oval in cross-section, without longitudinal carinae or ridges on palm **A. macroskeles*
First pereopods without subdistal tooth on extensor margin of merus; major chela with palm subrectangular in cross section and bearing strong longitudinal carina near margin proximal to fixed finger, obscure longitudinal ridge near midheight of same surface, and 2 ridges defining flattened surface proximal to adhesive plaque *51. *A. nonalter*
61. Major chela without shoulder on margin proximal to fixed finger *43. *macellarius*
Major chela with shoulder on margin proximal to fixed finger 62
62. Major chela less than $2\frac{1}{2}$ times as long as wide; minor chela with fingers subequal to or slightly longer than palm, dactyl "balaeniceps" in male; maximum carapace length about 27 mm *28. *A. euphrosyne euphrosyne*
Major chela $2\frac{1}{2}$ to $3\frac{1}{2}$ times as long as wide; minor chela with fingers usually about 3 times as long as palm, dactyl not "balaeniceps" in either sex; maximum carapace length about 13 mm *46. *A. malabaricus*
63. Major chela with "saddle" or transverse cleft proximal to adhesive plaque . . . 64
Major chela without "saddle" or transverse cleft proximal to adhesive plaque 80
64. Second pereopod with proximal carpal article 2 or more times as long as 2nd 65
Second pereopod with proximal carpal article less than twice as long as 2nd 67
65. Major chela with abrupt shoulder on margin proximal to fixed finger; 3rd pereopod without spine on ischium 45. *A. maindroni*
Major chela without marginal shoulder proximal to fixed finger; 3rd pereopod with movable spine on ischium 66
66. Margin of orbital hood curving regularly to base of rostrum, not produced anteromesially; major cheliped without distal tooth on inferior flexor margin of

- merus 6. *A. barbatus*
 Frontal margin between rostrum and orbital hood convexly produced; major
 cheliped with strong distal spine on inferior flexor margin of merus
 25. *A. ehlersii*
67. Major chela with "saddle" proximal to adhesive plaque at least partially overhung
 by shoulder proximal to "saddle" 68
 Major chela with "saddle" proximal to adhesive plaque not even partially overhung
 by shoulder proximal to "saddle" 74
68. Major chela with dactyl bearing very short, obliquely truncate plunger 69
 Major chela with dactyl bearing well-developed plunger 71
69. Major chela with both proximal shoulder overhanging "saddle" proximal to
 adhesive plaque and shoulder on margin proximal to fixed finger sharply acute
 12. *A. chiragricus*
 Major chela with both proximal shoulder overhanging "saddle" proximal to
 adhesive plaque and shoulder on margin proximal to fixed finger bluntly rounded
 70
70. Major chela with margin proximal to fixed finger supporting low shoulder, forming
 shallow notch distally; minor chela of male with dactyl strongly "balaeniceps"
 and with distinct "saddle" on palm proximal to dactylar articulation
 *59. *A. pareuchirus pareuchirus*
 Major chela with margin proximal to fixed finger supporting strong shoulder
 forming rather deep notch distally; minor chela with dactyl not "balaeniceps"
 and palm without distinct "saddle" in either sex *75. *A. suluensis*
71. First pereopods with merus armed with acute distal tooth on inferior flexor margin
 72
 First pereopods with merus unarmed at distal end of inferior flexor margin
 73
72. Minor chela with dactyl "balaeniceps" in male only; 2nd pereopod with proximal
 article of carpus 1¹/₄ to 2 times as long as 2nd *24. *A. edwardsii*
 Minor chela with dactyl "balaeniceps" in both sexes; 2nd pereopod with proximal
 subequal to 2nd article in length *73. *A. strenuus strenuus*
73. Rostrum nearly reaching level of distal margin of 1st antennular segment; antennal
 scale with distolateral spine distinctly overreaching distal margin of blade; major
 chela with sharp ridge on mesial surface of palm subparallel with "dorsal"
 margin of palm; minor chela of male with dactyl robust, displaying "balaeniceps"
 carina, especially on lateral surface *37. *A. hyphalus*
 Rostrum not nearly reaching level of distal margin of 1st antennular segment;
 antennal scale with distolateral spine only moderately overreaching distal margin
 of blade; major chela with sharp ridge on mesial surface of palm diverging
 distally from "dorsal" margin of palm at angle of about 45°; minor chela of
 male with dactyl slender, without "balaeniceps" carina on either surface
 *55. *A. pacificus*
74. Major chela 3 or more times as long as wide 75
 Major chela seldom more than 2¹/₂ times as long as wide 76
75. Frontal margin between rostrum and orbital hood convex 7. *A. batesi*
 Frontal margin between rostrum and orbital hood incised 39. *A. leptochirus*
76. Second pereopod with proximal article of carpus not appreciably longer than 2nd
 77
 Second pereopod with proximal article of carpus distinctly longer than 2nd 78
77. Antennal scale with lateral margin sinuous, distolateral spine laterally convex; 1st
 pereopods with 2–3 spines on flexor margin of merus proximal to distal tooth;
 minor chela with dactyl not distinctly "balaeniceps" in either sex
 22. *A. dolerus*
 Antennal scale with lateral margin concave, distolateral spine nearly straight

- laterally; 1st pereopods without spines on flexor margin proximal to distal tooth; minor chela with dactyl strongly "balaeniceps" in both sexes *73. *A. strenuus strenuus*
78. Major chela with "saddle" proximal to adhesive plaque rather broad longitudinally and shallow, not abruptly delimited proximally; minor chela with dactyl not "balaeniceps" in either sex 38. *A. ladronis*
Major chela with "saddle" proximal to adhesive plaque in form of notch rather abruptly delimited proximally; minor chela with dactyl usually "balaeniceps" in male 79
79. Major cheliped without distal or subdistal tooth on inferior flexor margin of merus; 3rd pereopod usually without spine on ischium 40. *A. leviusculus leviusculus*
Major cheliped usually with subdistal tooth on inferior flexor margin of merus; 3rd pereopod usually with movable spine on ischium *41. *A. lobidens*
80. Major cheliped without distal tooth on inferior flexor margin of merus 81
Major cheliped usually with acute tooth on inferior flexor margin of merus 82
81. Rostrum vestigial, frontal margin of carapace extending well beyond margins of orbital hoods; 2nd antennular segment nearly 3 times as long as wide; basal antennal segment (basicerite) armed with small, inconspicuous tooth; 2nd pereopod with proximal article of carpus more than twice as long as 2nd *31. *A. frontalis*
Rostrum well-developed, frontal margin of carapace not extending beyond margins of orbital hoods; 2nd antennular segment about 1½ times as long as wide; basal antennal segment (basicerite) armed with large, sharp tooth overreaching stylocerite; 2nd pereopod with proximal article of carpus less than 1½ times as long as 2nd 53. *A. ovaliceps*
82. Major chela with palm slightly less than twice as long as wide, fingers slightly more than ½ as long as palm; minor chela with fingers slightly shorter than palm 50. *A. mitis*
Major chela with palm slightly more than twice as long as wide, fingers slightly less than ½ as long as palm; minor chela with fingers slightly longer than palm 56. *A. paracrinitus*

3. *Alpheus acutocarinatus* De Man, 1909

Alpheus acutocarinatus De Man, 1909a:104 [type locality: the type series came from 4 Indonesian localities: Selat Madura (56 m); west coast of Lombok (18–27 m); north coast of Celebes (72 m); and east coast of Sumbawa (to 36 m)]; 1911:301, pl. 21: fig. 94–94f, pl. 22: fig. 94g–j.—A.H. and D.M. Banner, 1981:225.—D.M. and A.H. Banner, 1982:151, fig. 44.

DIAGNOSIS.—(Brevirostris Group). Body not unusually compressed or setose; rostrum prominent but not reaching as far as distal margin of 1st antennular segment, sharply carinate in midline, carina extending posteriorly beyond midlength of carapace, base not abruptly delimited from adrostral furrows; carapace with median tooth interrupting postrostral carina on gastric region, without flattened teeth overhanging posterior ends of adrostral furrows, anterior margin transverse and unarmed mesial to orbital hoods, curving directly onto rostral margin, region not unusually flattened, orbital hoods unarmed, adrostral furrows deep; 2nd antennular segment more than 4 times as long as wide; basal antennal segment (basicerite) armed with small lateral tooth not nearly reaching level of tip of

stylocerite; antennal scale with lateral margin moderately concave, distolateral spine not unusually stout, barely overreaching distal margin of blade; 1st pereopods with merus armed with acute distal tooth on inferior flexor margin; major chela oval in cross-section, 6 times as long as wide, dactyl nearly straight in longitudinal plane, not double-ended, bearing well-developed plunger, palm without teeth either side of dactylar articulation or other obvious sculpture, without longitudinal carina near margin proximal to fixed finger, without "saddle" proximal to adhesive plaque but with indistinct distal sinus adjacent to plaque, without shoulder on margin proximal to fixed finger; minor chela 9 times as long as wide, dactyl slender, slightly shorter than or subequal to palm, "balaeniceps" in male only, without longitudinal crests on opposable margin; 2nd pereopod with proximal carpal article subequal to 2nd; 3rd pereopod with dactyl pointed, simple, subspatulate, propodus, carpus, and merus without spines on flexor margin, ischium bearing movable spine; maximum carapace length to base of rostrum about 9.0 mm.

RANGE.—Madagascar, Gulf of Thailand, Philippines (off

Manila Bay), Indonesia, and southern Queensland, Australia; about 20–72 meters. In the Smithsonian collections, there are six specimens of *A. acutocarinatus* collected by the NAGA Expedition in the Bay of Nha Trang, Viet Nam in 1966.

REMARKS.—The *Albatross* collected, at station 5397 in the Samar Sea east of Masbate in 245 meters, an ovigerous female (carapace length 8.3 mm to base of rostrum) of a shrimp without its three anterior pairs of pereopods that seems to be related to *A. acutocarinatus*. That it probably represents a distinct species is suggested not only by the greater depth at which it was taken but also by the remnant of what must have been a larger mesial gastric tooth, by a small spine on the frontal margin either side of the rostrum, and by a rather distinct branchiostegal spine.

*4. *Alpheus acutofemoratus* Dana, 1852

Alpheus acuto-femoratus Dana, 1852b:550, pl. 35: fig. 2 [type locality: Balabac Strait].—De Man, 1902:888, pl. 27: fig. 63.

Alpheus parabrevipes Coutière, 1898a:151, fig. 2 [type locality: Samoa].

Alpheus acutofemoratus.—D.M. and A.H. Banner, 1978:218; 1982:77, fig. 29; 1985:11.

DIAGNOSIS.—(Sulcatus Group). Body not unusually compressed or setose; rostrum distinct but not reaching as far as distal margin of 1st antennular segment, bluntly carinate in midline, carina broadening posteriorly and disappearing on anterior gastric region, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle posterior to base of rostrum, without flattened teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood unarmed but angularly projecting anteriorly beyond orbital hood, submarginal region somewhat flattened, orbital hoods unarmed, adrostral furrows not very deep; 2nd antennular segment about twice as long as wide; basal antennal segment (basicerite) armed with distinct lateral tooth that does not reach level of tip of stylocerite; antennal scale with lateral margin rather strongly concave, distolateral spine stout, distinctly overreaching distal margin of blade; 1st pereopods with merus armed with acute distal tooth on inferior flexor margin; major chela subconical, slightly more than twice as long as wide, dactyl little curved but directed somewhat laterad from longitudinal plane of palm, not double-ended, bearing well-developed plunger, palm without sharp teeth either side of dactylar articulation, without longitudinal carina near margin proximal to fixed finger, with narrow, V-shaped transverse “saddle” proximal to adhesive plaque, proximal shoulder not overhanging “saddle,” without shoulder on margin proximal to fixed finger, deep longitudinal sulcus but no sharp carina on mesial surface of palm subparallel with dorsal margin; minor chela about 3 times as long as wide, dactyl not especially slender, less than $\frac{1}{2}$ as long as palm, not carinate on extensor margin, not “balaeniceps” even in males, palm granulate and setose on mesial surface; 2nd pereopod with proximal carpal article $\frac{1}{3}$ as long as 2nd; 3rd and 4th

pereopods with dactyl simple, propodus armed with 10–12 spines on flexor margin, carpus with acute tooth at distal end of flexor margin, merus armed with large acute distal tooth on flexor margin, ischium bearing movable spine; maximum carapace length to base of rostrum about 9 mm.

MATERIAL.—PHILIPPINES. Port Gubat, southeastern Luzon [12°55'N, 124°09'E]; tide pool; 23 Jun 1909 (1300–1700): 1 ovig female [7.3].

RANGE.—Andaman Sea, Gulf of Thailand, Philippines, Indonesia, and Queensland, Australia, to the Marshall, Fiji, Samoa, and Tonga islands; intertidal to 3 meters.

*5. *Alpheus alcyone* De Man, 1902

Alpheus crinitus.—Bate, 1888:548, pl. 98: fig. 2 [not *A. crinitus* Dana, 1852].

Alpheus alcyone De Man, 1902:870, pl. 27: fig. 61 [type locality: Ternate].—D.M. and A.H. Banner, 1982:110, fig. 29.

Alpheus aculeipes Coutière, 1905:892, pl. 79: fig. 31 [type locality: several localities in the Maldives Islands, as well as Djibouti and Mozambique].

DIAGNOSIS.—(Crinitus Group). Body neither unusually compressed nor densely setose; rostrum small, not reaching nearly as far as distal margin of 1st antennular segment, sharply carinate in extreme anterior part, carina becoming blunt posteriorly and disappearing on anterior gastric region, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle posterior to base of rostrum and without flattened teeth overhanging posterior ends of adrostral furrows, anterior margin transverse and unarmed mesial to orbital hoods, region not flattened, orbital hoods unarmed, adrostral furrows rather deep; 2nd antennular segment less than twice as long as wide; basal antennal segment (basicerite) unarmed; antennal scale with lateral margin moderately concave, distolateral spine stout, far overreaching distal margin of rather narrow blade; major 1st cheliped with merus armed with acute distal tooth on inferior flexor margin; minor 1st cheliped with merus unarmed on flexor margin; major chela broadly oval in cross-section, about $2\frac{1}{2}$ times as long as wide, dactyl slightly curved in longitudinal plane, not double-ended, bearing short, truncated plunger, palm without obvious sculpture of any kind; minor chela 4 times as long as wide, dactyl not especially slender, nearly $\frac{1}{3}$ as long as palm, not “balaeniceps” and without carinae on either extensor or opposable margin; 2nd pereopod with proximal carpal article about $\frac{1}{3}$ as long as 2nd; 3rd pereopod with dactyl variably biunguiculate, sometimes obscurely so, propodus bearing 8 spines on flexor margin, carpus with 1–4 spines on flexor margin, merus with distal tooth and 3–12 spines on parallel carina of flexor margin; 4th pereopod with merus lacking teeth or spines on flexor margin; maximum carapace length to base of rostrum about 8 mm.

MATERIAL.—PHILIPPINES. Off Jolo Island, Sulu Archipelago: sta 5174; 6°03'45"N, 120°57'E; 37 m; coarse sand; 5 Mar 1908 (1551–1557); 9' Johnston oyster dredge: 1 male [5.5]. Near Siasi, Sulu Archipelago: sta 5147; 5°41'40"N, 120°47'10"E;

38 m; coral sand, shells; 16 Feb 1908 (1127–1147); 12' Agassiz beam trawl, mud bag; 1 male [4.0].

RANGE.—Red Sea and eastern Africa to Japan, Philippines, Indonesia, Australia, and Caroline, Marshall, Fiji, Samoa, and Tonga islands; intertidal to 71 meters, in coral and probably sponges.

REMARKS.—Apparently a small and inconspicuous movable spine may be present or absent on the ischium of the third and fourth pereopods in this species.

6. *Alpheus barbatus* Coutière, 1897

Alpheus barbatus Coutière, 1897a:235 [type locality: Djibouti]; 1899:230, figs. 279, 280.—De Man, 1911:387, pl. 19: fig. 88.—D.M. and A.H. Banner, 1982:163, fig. 49.

DIAGNOSIS.—(Brevirostris Group). Body neither unusually compressed nor densely setose; rostrum short, subrectangular, not reaching nearly as far as distal margin of 1st antennular segment, slightly carinate in midline, carina not extending posteriorly beyond orbital hoods, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without flattened teeth overhanging posterior ends of adrostral furrows, anterior margin transverse or concave and unarmed mesial to orbital hoods, region not especially flattened, orbital hoods unarmed, adrostral furrows shallow; 2nd antennular segment only slightly longer than wide; basal antennal segment (basicerite) unarmed; antennal scale with lateral margin nearly straight, distolateral spine unusually stout, moderately overreaching distal margin of blade; 1st pereopods with merus unarmed on flexor margin; major chela compressed, about twice as long as wide, dactyl not double-ended, palm without teeth either side of dactylar articulation, without longitudinal carina on mesial surface parallel with "dorsal" margin, but with shallow longitudinal sulcus on lateral surface extending from base of fixed finger to midlength of palm; minor chela about $2\frac{1}{2}$ times as long as wide, fingers gaping, about $\frac{12}{3}$ times as long as palm, lateral surface of dactyl and mesial surface of both fingers bearing dense fringes of hair, filling gap, dactyl not "balaeniceps"; 2nd pereopod with proximal carpal article twice as long as 2nd; 3rd pereopod with dactyl pointed, simple, propodus bearing 7 spines on flexor margin, carpus and merus unarmed on flexor margin, ischium bearing movable spine; maximum carapace length to base of rostrum probably at least 10 mm.

RANGE.—Red Sea and eastern Africa to Philippines, Indonesia, and Queensland, Australia; intertidal to 10 meters.

7. *Alpheus batesi* A.H. and D.M. Banner, 1964

Alpheus leviusculus, var. Bate, 1888:549, pl. 98: fig. 1.
Alpheus batesi A.H. and D.M. Banner, 1964:94 [type locality: Viscayan Sea off Tagubanan Island, Philippines; 11°06'N, 123°09'E; 37 meters; mud].

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum sharp, overreaching distal margin of 1st antennular segment, dorsally rounded, mesial ridge not

extending posteriorly beyond orbital hoods, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without flattened teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood unarmed but protruding anteriorly as convex lobe, region slightly flattened, orbital hoods unarmed, adrostral furrows not very deep; 2nd antennular segment about 3 times as long as wide; basal antennal segment (basicerite) not armed with strong ventro-lateral tooth; antennal scale with lateral margin slightly concave, distolateral spine not unusually stout, slightly overreaching and separated from blade by moderate gap; major chela slightly compressed, about 3 times as long as wide, dactyl not doubled-ended, bearing short, truncate plunger, unarmed either side of dactylar articulation, without longitudinal carina near margin proximal to fixed finger, with shallow "saddle" on palm proximal to adhesive plaque, without distinct shoulder proximal to "saddle," with sinus on opposite margin proximal to fixed finger but without distinct shoulder proximal thereto, palm without sharp ridge on mesial surface subparallel with "dorsal" margin of palm; minor chela lost; 2nd pereopod with proximal article slightly longer than 2nd; 3rd pereopod with dactyl elongate, simple, and sharp; carapace length about 11 mm.

RANGE.—Apparently known only from the ovigerous female holotype from the Viscayan Sea, Philippines, in 37 meters.

8. *Alpheus bicostatus* De Man, 1908

Alpheus bicostatus De Man, 1908:102 [type locality: the type series came from 3 Philippine and Indonesian localities: Kepulauan Balabalagan, Makassar Strait (to 27 m); off North Ubian Island, Sulu Archipelago (surface to 23 m); and Selat Butung, southern Celebes (in floating seaweed)].—D.M. and A.H. Banner, 1982:124, fig. 34.

DIAGNOSIS.—(Diadema Group). Body not unusually compressed or setose; rostrum slender, sharp, slightly overreaching distal margin of 1st antennular segment, bluntly carinate, carina interrupted on anterior gastric region, finally terminating on midgastric region; carapace with median tubercle on anterior gastric region, with paired convex or oblique flanges abruptly delimiting and overhanging posterior ends of adrostral furrows, anterior margin armed with acute tooth slightly mesial to orbital hood, meeting base of rostrum at right angle, region flattened, orbital hood unarmed but bearing nearly vertical carina; 2nd antennular segment twice as long as wide; basal antennal segment (basicerite) armed with prominent ventral tooth reaching anteriorly nearly as far as tip of stylocerite; antennal scale with lateral margin concave, distolateral spine stout, overreaching distal margin of blade; major cheliped with chela subcylindrical, about 3 times as long as wide, dactyl nearly straight in longitudinal plane, not double-ended, bearing poorly developed concavely truncate plunger, palm without sculpture except for narrow and shallow "saddle" proximal to adhesive plaque, merus with subdistal tooth on inferior flexor

margin; minor cheliped with chela about 4 times as long as wide, dactyl $\frac{2}{3}$ as long as palm, without carina in midline of extensor surface, palm without sculpture, merus unarmed on inferior flexor margin; 2nd pereopod with proximal carpal article subequal to 2nd; 3rd pereopod with dactyl pointed, simple, neither biunguiculate nor subspatulate, propodus with numerous spines on and near flexor margin, carpus with long distal tooth on flexor margin, merus with acute distal tooth on flexor margin, ischium bearing movable spine; maximum carapace length to base of rostrum about 10 mm.

RANGE.—Kenya and Madagascar to the Philippines, Indonesia, and Australia; intertidal to 27 meters, occasionally at surface.

*9. *Alpheus bidens* (Olivier, 1811)

Palaemon bidens Olivier, 1811:663 [type locality: Australia ("sur les cotes de la Nouvelle-Hollande")].

Alpheus tridentatus Zehnter, 1894:204, pl. 8: fig. 24 [type locality: Ambon, Indonesia].

Alpheus praedator De Man, 1908:103 [type locality: Ambon, Indonesia].

Alpheus dissodonotus Stebbing, 1915:83, pl. 86 [type locality: off Port Elizabeth, South Africa; 33°50'S, 25°46'E; 37 meters].

Alpheus bidens.—D.M. and A.H. Banner, 1982:136, fig. 39.

DIAGNOSIS.—(Diadema Group). Body not unusually compressed or setose; rostrum prominent, reaching anteriorly as far as or beyond distal margin of 1st antennular segment, strongly and sharply carinate in dorsal midline, base not abruptly delimited from adrostral furrows; carapace with median tubercle interrupting postrostral carina on gastric region and with paired large acute teeth overhanging posterior ends of adrostral furrows, anterior margin unarmed but convex mesial to orbital hoods, meeting base of rostrum at almost right angle, region somewhat depressed, concave, orbital hoods unarmed but with strong vertical carina appearing almost toothlike in lateral aspect, adrostral furrows deep; 2nd antennular segment nearly $1\frac{1}{2}$ times as long as wide; basal antennal segment (basicerite) with strong ventrolateral tooth not reaching level of tip of stylocerite; antennal scale with lateral margin concave, stout, laterally convex distolateral spine overreaching blade; major cheliped with chela nearly cylindrical, fully $2\frac{1}{2}$ times as long as wide, dactyl nearly straight in longitudinal plane, not double-ended, bearing poorly developed, somewhat concave plunger, palm virtually without sculpture except for narrow, deep "saddle" proximal to adhesive plaque, merus with inferior flexor margin armed with strong distal tooth; minor cheliped with chela $\frac{2}{3}$ to $\frac{3}{4}$ times as long as wide, dactyl subequal to palm in length, balaeniceps and with suggestion of "saddle" on palm in male only, merus without distal tooth on inferior flexor margin; 2nd pereopod with proximal carpal article as long as 2nd; 3rd pereopod with dactyl usually simple, neither subspatulate nor biunguiculate, propodus bearing 9–16 spines on flexor margin, carpus with 2 terminal spines on flexor margin, merus with acute subdistal tooth, ischium bearing movable spine; maximum carapace

length about 23 mm.

MATERIAL.—PHILIPPINES. Off Jolo Island, Sulu Archipelago; 6°06'N, 120°58'50"E; 35 m; sand, coral; 14 Feb 1908 (1055–1115); 12' Agassiz beam trawl, 2 mud bags: 1 female [6.3].

RANGE.—Madagascar and Hong Kong, Ryukyus, Philippines, Indonesia, Australia, Tasmania, Caroline, and Marshall islands; intertidal to 83 m.

REMARKS.—Although D.M. and A.H. Banner (1982:139) considered "rather insignificant" the fact that all of the Australian specimens seen by them lacked elongate teeth on the distal margin of the first antennular segment, while all of De Man's Indonesian specimens bore two prominent teeth in this position, I attempted to couple this difference with an apparent difference in size between the Australian population and specimens available to me from off Hong Kong, the Philippines, and the Marshall Islands. The extra-Australian material examined was composed of small specimens, none exceeding a carapace length of 10 mm, ovigerous females yielding carapace lengths of 6.0 to 9.7 mm, whereas Australian material recorded in the literature seemed to be larger, corresponding to carapace lengths of 14 to 23 mm, and to occur in shallower water, 0 to 24 meters in contrast to 0 to 83 meters for the smaller form. Of 11 specimens of the extra-Australian shrimps examined, however, only two specimens displayed two teeth on the first segment of both antennular peduncles, two had two teeth on one side and one on the other, one had one tooth on each peduncle, two had one on one side and none on the other, and four specimens—all from the Marshall Islands—had no teeth on either peduncle. I am forced, therefore, to agree with the Banners about the variability of this character but I am still intrigued by the apparently larger size of the Australian examples and the possibility of eventually finding correlated morphological differences that might be of taxonomic significance.

*10. *Alpheus bucephalus* Coutière, 1905

Alpheus bucephalus Coutière, 1905:890, pl. 78, fig. 29 [type locality: the material cited came from 2 Indian Ocean localities: Hulele, Male, Maldives Islands, and Minicoy, Laccadive Islands].—D.M. and A.H. Banner, 1982:120, figs. 23d–f, 32.

Alpheus consobrinus De Man, 1908:101 [type locality: the type series came from 7 Siboga stations in the Philippines and Indonesia: Pulau Lumulumu, Makassar Strait (reef); Pearl Bank (Lahangan Island), Sulu Archipelago (15 m); Pulau Pajunga, Kuandang Bay, northern Celebes (reef); Pulau Siau [Kepulauan Sangi] (reef); Pulau Selajar [south of Celebes] (to 36 m); Pulau Roti (to 36 m); and Kepulauan Balabalagan [Makassar Strait] (to 36 m)].

DIAGNOSIS.—(Crinitus Group). Body not unusually compressed or setose; rostrum acute, short, not reaching nearly as far as distal margin of 1st antennular segment, sharply carinate in midline, carina not extending posteriorly beyond base of eyes, rostral base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or acute teeth overhanging posterior end of adrostral

furrows, anterior margin partially convex and unarmed mesial to orbital hoods, region flattened, orbital hood unarmed but with projecting vertical carina, adrostral furrows distinct; 2nd antennular segment twice as long as wide; basal antennal segment (basicerite) usually unarmed; antennal scale with lateral margin quite concave, distolateral spine not unusually stout, reaching considerably beyond distal margin of blade; 1st pereopods with merus often armed with acute distal tooth on inferior flexor margin; major chela subcylindrical, $2\frac{1}{2}$ times as long as wide, dactyl not curved in longitudinal plane but both fingers bent slightly toward flexor aspect of chela, not double-ended, bearing truncate plunger becoming acute proximally, palm without sculpture except for faint distal sinus adjacent to adhesive plaque; minor chela about $2\frac{1}{2}$ to $3\frac{1}{2}$ times as long as wide, dactyl about equal to or somewhat longer than palm, "balaeniceps" in male only; 2nd pereopod with proximal carpal article $\frac{1}{3}$ to $\frac{1}{2}$ as long as 2nd; 3rd pereopod with dactyl simple, curved to sharp tip, not subspatulate or biunguiculate, propodus bearing 6 pairs of spines on flexor margin, carpus with acute distal tooth on flexor margin, merus armed with strong acute distal tooth on flexor margin, ischium bearing movable spine; maximum carapace length to base of rostrum, probably little more than 6 mm.

MATERIAL.—PHILIPPINES. Off Jolo Island, Sulu Archipelago: sta 5145; $6^{\circ}04'30''N$, $120^{\circ}59'30''E$; 42 m; coral sand, shells; 15 Feb 1908 (1344–1359); 12' Agassiz beam trawl, mud bag: 1 ovig female [5.3]. Marungas Island, Sulu Archipelago: [$6^{\circ}06'N$, $120^{\circ}58'E$]; 19 Feb 1908; shore, coral head: 1 male [4.3].

RANGE.—Red Sea and eastern Africa to Japan, Philippines, Indonesia, Australia, and Pacific Islands to Line and Society islands; intertidal to 80 meters.

11. *Alpheus canaliculatus* A.H. and D.M. Banner, 1968

Alpheus canaliculatus A.H. and D.M. Banner, 1968:141, fig. 1 [type locality: South China Sea southeast of Hong Kong; $20^{\circ}05'N$, $115^{\circ}11'E$; 250 meters; sand and mud]; 1981:225.

DIAGNOSIS.—(Sulcatus Group). Body not unusually compressed or setose; rostrum sharp, prominent, but not reaching nearly as far as distal margin of 1st antennular segment, rounded dorsally, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or paired large acute teeth overhanging posterior ends of adrostral furrows, anterior margin unarmed mesial to orbital hoods, joining rostral margin at less than right angle, orbital hood armed with sharp marginal tooth directed slightly mesiad, adrostral furrows moderately deep but narrow; 2nd antennular segment 3 times as long as wide; basal antennal segment (basicerite) armed with strong ventrolateral tooth nearly reaching level of tip of stylocerite; antennal scale with lateral margin concave in proximal $\frac{1}{2}$, distolateral spine strong, laterally convex, considerably overreaching distal margin of blade; anterior pereopods with merus armed with acute distal

tooth on inferior flexor margin; major chela compressed, fully $2\frac{1}{2}$ times as long as wide, dactyl not curved in longitudinal plane but directed slightly toward flexor side of chela, not double-ended, bearing truncated, very short plunger, palm without teeth either side of dactylar articulation, without longitudinal carina near margin proximal to fixed finger, without "saddle" proximal to adhesive plaque but with 4 longitudinal furrows, furrow extending posteriorly from adhesive plaque bounded on each side by rather distinct carina; minor chela nearly 4 times as long as wide, dactyl slightly longer than palm, "sub-balaeniceps" even in female, with sharp tooth on extensor margin of palm at articulation with dactyl; 2nd pereopod with proximal carpal article nearly twice as long as 2nd; 3rd pereopod with dactyl biunguiculate, propodus with 14 spinules on flexor margin, carpus unarmed, merus bearing small, acute, distal tooth on flexor margin, ischium with distinct movable spine; carapace length to base of rostrum 5 mm.

RANGE.—South China Sea off Hong Kong and northeast of Lubang Islands, Philippines; 186 to 250 meters.

REMARKS.—The carapace length and the proportions of the carpal articles of the second pereopod were determined from examination of the female holotype in the Smithsonian collections.

12. *Alpheus chiragricus* H. Milne Edwards, 1837

Alpheus chiragricus H. Milne Edwards, 1837:354 [type locality: "les mers d'Asie"].—D.M. and A.H. Banner, 1982:267, fig. 82.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum prominent, 2–3 times as long as wide, reaching nearly as far as distal margin of 1st antennular segment, distinctly carinate in midline, carina extending posteriorly onto anterior gastric region, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or strong paired acute teeth overhanging posterior ends of adrostral furrows, anterior margin mesial to orbital hoods unarmed, meeting rostral margin at less than right angle, orbital hoods unarmed, adrostral furrows comparatively deep and narrow; 2nd antennular segment about twice as long as wide; basal antennal segment (basicerite) armed with small, acute ventrolateral tooth not reaching level of tip of stylocerite; antennal scale with lateral margin slightly concave, distolateral spine strong but not unusually stout, distinctly but not greatly overreaching distal margin of blade; 1st pereopods with merus armed with acute distal tooth on inferior flexor margin; major chela somewhat compressed, about $2\frac{1}{2}$ times as long as wide, dactyl straight in longitudinal plane, not double-ended, bearing short, truncated plunger, palm without longitudinal carina near margin proximal to fixed finger, with "saddle" proximal to adhesive plaque, both proximal shoulder overhanging "saddle" and shoulder on margin proximal to fixed finger sharply acute; minor chela nearly 4 to nearly $4\frac{1}{2}$ times as long as wide, dactyl

about as long as palm, "balaeniceps" in male; 2nd pereopod with proximal carpal article nearly twice as long as 2nd; 3rd pereopod with dactyl pointed, simple, propodus bearing 8 spines on flexor margin, carpus unarmed except for distal tooth on extensor margin, merus unarmed, ischium with strong movable spine; maximum carapace length to base of rostrum perhaps exceeding 25 mm.

RANGE.—Eastern Africa and Madagascar, Mergui Archipelago, Indonesia, and Australia; intertidal to 20 meters.

REMARKS.—In their description of the neotype of *A. edwardsii*, A.H. and D.M. Banner (1972:1142) fail to mention the size of the plunger on the dactyl of the major chela either in their "Diagnosis" or under "Variation". In their Australian report, however (D.M. and A.H. Banner, 1982:271, fig. 83q), they illustrated the plunger on the dactyl of a small female of *A. edwardsii* dredged in Moreton Bay, Queensland. Comparison of this drawing with two in the same work showing the dactyl of a male *A. chiragricus* trawled in the Gulf of Carpentaria, Queensland (1982:268, fig. 82c) and of a Madras specimen of the same species (fig. 82j) suggests that the development of the plunger may offer another character for distinguishing *A. chiragricus* from *A. edwardsii*. Unfortunately the material of the former species available to me is insufficient to confirm or deny that possibility.

13. *Alpheus collumianus* Stimpson, 1860

Alpheus collumianus Stimpson, 1860:30 [type locality: Bonin Islands; in coral in 2 meters].—D.M. and A.H. Banner, 1982:45, fig. 9.

Alpheus Malhaensis Coutière, 1908:205 [type locality: the original pair of specimens came from 2 localities in the western Indian Ocean: Saya de Malha Bank (53 m) and Amirante Isles, Seychelles (53 m)].

Alpheus collumianus probabilis A.H. Banner, 1956:338, fig. 10 [type locality: off northwest coast of Saipan, Mariana Islands; about 3 meters].

Alpheus collumianus medius A.H. Banner, 1956:340, fig. 11 [type locality: Hawaii].

Alpheus collumianus inermis A.H. Banner, 1956:342, fig. 12 [type locality: off Saipan, Mariana Islands; about 6 meters].

DIAGNOSIS.—(Macrocheles Group). Body not unusually compressed or setose; rostrum acute, not nearly reaching as far as distal margin of 1st antennular segment, bluntly but strongly carinate in midline, carina not extending posteriorly far beyond eyes, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without paired large acute teeth overhanging posterior ends of adrostral furrows, anterior margin somewhat convex and unarmed mesial to orbital hoods, typically notched adjacent to rostrum, and region often flattened, orbital hoods varying from armed with strong marginal tooth to unarmed, adrostral furrows deep; 2nd antennular segment 2 to 3½ times as long as wide; basal antennal segment (basicerite) varying from unarmed to armed with strong, acute tooth overreaching stylocerite; antennal scale with lateral margin concave, distolateral spine strong, far overreaching narrow blade, but not unusually stout; 1st pereopods with merus armed with few

short spines and acute distal tooth on inferior flexor margin; major chela somewhat compressed, about 2⅓ times as long as wide, dactyl nearly straight in longitudinal plane but directed somewhat toward flexor side of chela, not double-ended, bearing short, truncated plunger, palm with strong, carinate tooth on mesial side of articulation interrupted by transverse incision, without longitudinal carina near margin proximal to fixed finger, without "saddle" or distal sinus on palm proximal to adhesive plaque, with indistinct shoulder on margin proximal to fixed finger; minor chela about 3 times as long as wide, fingers about as long as palm, dactyl carinate on extensor margin but not "balaeniceps," palm with strong tooth on mesial aspect at dactylar articulation, with transverse incision in carina supporting tooth; 2nd pereopod with proximal carpal article distinctly longer than 2nd; 3rd pereopod with dactyl variably biunguiculate, propodus bearing 6 pairs of spines on flexor margin, merus varying from being armed with series of spines and strong distal tooth on flexor margin to complete absence of spines and rounded distal angle, ischium bearing movable spine; maximum carapace length to base of rostrum about 9 mm.

RANGE.—Red Sea, Madagascar, and South Africa to Japan and Australia and Pacific islands to Hawaii and Societies; intertidal reef flats to about 75 meters.

REMARKS.—This species vies with some of those in the Brevirostris Group for extreme variability in characters that are otherwise believed to be relatively stable, like the presence or absence of spines on the orbital hoods and of a distal tooth on the flexor margin of the merus of the 3rd pereopod.

14. *Alpheus compressus* A.H. and D.M. Banner, 1981

Alpheus compressus A.H. and D.M. Banner, 1981:227, fig. 3 [type locality: southwest of Manila Bay, Philippines; 13°59.8'N, 120°18.6'E; 192 meters].

DIAGNOSIS.—(Brevirostris Group). Body strongly compressed, carapace twice as high as wide, not unusually setose; rostrum narrow, reaching nearly to distal margin of 1st antennular segment, base not abruptly delimited from orbital hoods; carapace without median tooth or tubercle or acute paired teeth on gastric region, anterior margin of orbital hood joining base of rostrum at slightly less than right angle, adrostral furrows minimal; 2nd antennular segment 3 times as long as wide; basal antennal segment (basicerite) armed with strong acute tooth reaching nearly to level of tip of stylocerite; antennal scale with lateral margin straight, distolateral spine not unusually stout, barely overreaching distal margin of blade; 1st pereopods with merus armed with acute subdistal tooth on inferior flexor margin; major chela somewhat compressed, 3¾ times as long as wide, dactyl nearly straight in longitudinal plane, not double-ended, bearing poorly developed plunger marked only by semicircular gap in proximal part of dactyl, palm without teeth either side of dactylar articulation or other obvious sculpture, without carina near margin proximal to fixed finger, without "saddle" proximal to adhesive plaque,

without shoulder on margin proximal to fixed finger; minor chela about $5\frac{1}{2}$ times as long as wide, dactyl not "balaeniceps" and without carina on extensor margin, about twice as long as palm; 2nd pereopod with proximal carpal article twice as long as 2nd; 3rd pereopod with dactyl subspatulate, propodus bearing 2 or 3 feeble spines on flexor margin, ischium with prominent movable spine; maximum carapace length to base of rostrum 16 mm.

RANGE.—Réunion, Andaman Sea west of peninsular Thailand, South China Sea southeast of Hong Kong, southwest of Manila Bay, Philippines, and Selat Sunda, Indonesia; 14 to 280+ meters.

REMARKS.—The only specimen of this species that I have seen is the incomplete large female paratype from southeast of Hong Kong that has the orbital hoods dentate. Although the rostrum of this specimen conforms with the original description of the species, being "highly compressed and narrow, dorsally rounded, without carina," there is a rather prominent, though blunt, ridge in the midline of the carapace, reaching posteriorly slightly beyond the midlength of the latter. Inasmuch as this rather obvious ridge was not mentioned in the original description, it is not included among the characters attributed in the above key to those specimens in which the orbital hoods are unarmed.

15. *Alpheus coutierei* De Man, 1909

Alpheus Coutierei De Man, 1909a:107 [type locality: the type series came from 2 *Siboga* stations: southeast side of Pearl Bank, Sulu Archipelago, Philippines (15 m) and off northeastern tip of Timor, Indonesia (27–54 m)]; 1911:409, pl. 22: fig. 97.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum acute, barely overreaching 1st antennular segment, sharply carinate in midline, carina extending posteriorly to posterior $\frac{1}{3}$ of carapace, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle or acute paired teeth on gastric region, anterior margin transverse and unarmed mesial to orbital hoods, curving directly onto rostral margin, orbital hoods unarmed; 2nd antennular segment $2\frac{1}{2}$ times as long as wide; basal antennal segment (basicerite) bearing extremely small ventrolateral spine; antennal scale with lateral margin deeply concave, distolateral spine rather stout, considerably overreaching narrow distal margin of blade; major cheliped with merus armed with small, acute, subdistal tooth on inferior flexor margin, chela compressed, $2\frac{1}{2}$ times as long as wide, palm with "saddle" proximal to adhesive plaque, proximal shoulder obtuse, with shoulder on margin proximal to fixed finger; minor cheliped with merus unarmed on inferior flexor margin, chela 4 times as long as wide, fingers slightly longer than palm; 2nd pereopod with proximal carpal article subequal to or somewhat longer than 2nd; 3rd pereopod with dactyl simple, merus and ischium unarmed; maximum carapace length to base of rostrum about 6 mm.

RANGE.—Sulu Archipelago, Philippines, southeastern Indonesia off eastern Timor, Fiji, Tonga, and Samoa islands; 15 to at least 27 meters.

16. *Alpheus crinitus* Dana, 1852

Alpheus crinitus Dana, 1852a:21 [type locality: Balabac Strait]; 1852b:548, pl. 34: fig. 8.—D.M. and A.H. Banner, 1978:221.

DIAGNOSIS.—(Crinitus Group). Body not unusually compressed or setose; rostrum large, overreaching 1st antennular segment, carinate in midline, base not abruptly delimited from adrostral furrows; orbital hoods unarmed; 2nd antennular segment about 4 times as long as wide; major chela slightly compressed, $2\frac{1}{3}$ times as long as wide, without sculpture, smooth, slightly pubescent, dactyl not double-ended; minor chela $3\frac{2}{3}$ times as long as wide, lightly pubescent, fingers slightly shorter than palm; 2nd pereopod with proximal carpal article slightly shorter than 2nd; 3rd pereopod lightly pubescent, with dactyl pointed, simple, propodus with about 4 pairs of spinules on flexor margin, merus with acute distal tooth on flexor margin; carapace length to base of rostrum about 7 mm.

RANGE.—Recorded from the Red Sea, in addition to the type locality in Balabac Strait, the southernmost passage between the Sulu Sea and the South China Sea.

*17. *Alpheus crockeri* (Armstrong, 1941)

Crangon crockeri Armstrong, 1941:8, figs. 2, 3 [type locality: Matautu Bay, Savai'i, Western Samoa; coral in shallow water].

Crangon tuthilli A.H. Banner, 1953:63, fig. 19 [type locality: off southwest Oahu, Hawaii; 12 to 107 meters].

Alpheus crockeri.—Crosnier and Forest, 1966:225, figs. 4, 5.—A.H. and D.M. Banner, 1966b:84, fig. 28.

DIAGNOSIS.—(Macrocheles Group). Body not unusually compressed or setose; rostrum prominent but not nearly reaching as far as distal margin of elongate 1st antennular segment, rounded dorsally, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle or paired large acute teeth on gastric region, anterior margin concave and unarmed mesial to orbital hoods, meeting rostral margin at somewhat less than right angle, region not flattened, orbital hoods armed with acute marginal teeth, adrostral furrows shallow; 2nd antennular segment about twice as long as wide; basal antennal segment (basicerite) armed with strong ventrolateral spine not overreaching stylocerite; antennal scale with lateral margin slightly concave, distolateral spine rather weak, distinctly but not far overreaching tapered blade; 1st pereopods with merus armed with acute distal tooth on inferior flexor margin; major chela compressed, about 3 times as long as maximum width, dactyl rather sharply angled toward flexor side of chela, not clearly double-ended, mesially laminate except near opposable margin, forming high, sharp dorsal crest, bulbous distally, plunger reduced to small blunt triangle,

palm with acute tooth each side of dactylar articulation, blunt carina supporting tooth on mesial side of dactylar articulation entire, not interrupted by transverse notch, without "saddle" proximal to adhesive plaque, with very low, broadly rounded shoulder on margin proximal to fixed finger; minor chela about $4\frac{1}{2}$ times as long as maximum width, dactyl slender, slightly longer than palm, not "balaeniceps" or carinate on extensor margin; 2nd pereopod with proximal carpal article about $1\frac{3}{4}$ times as long as 2nd; 3rd pereopod with dactyl simple, sharp, propodus with 7 to 9 spiniform setae on flexor margin, merus unarmed, ischium with mobile spine; maximum carapace length probably about 8 mm.

MATERIAL.—PHILIPPINES. South of Itbay Island, Batan Island; sta 5321; $20^{\circ}18'30''\text{N}$, $121^{\circ}51'15''\text{E}$; 48 m; white sand, coral, broken shells; 9 Nov 1908 (1125–1129); 9' Johnston oyster dredge; 1 female [5.3].

RANGE.—Réunion, Andaman Sea coast of peninsular Thailand, Gulf of Thailand, Philippines, Indonesia, Mariana and Samoan islands and Hawaii in the Pacific Ocean and the islands of Sao Tomé and Annobon in the eastern Atlantic; intertidal to 50 meters.

*18. *Alpheus davaoensis*, new species

FIGURE 2

DIAGNOSIS.—(Crinitus Group). Body neither unusually compressed nor densely setose; rostrum minute, barely visible (Figure 2a), carinate in extreme anterior part, carina becoming indistinct on anterior gastric region but more apparent on posterior gastric region and extending posteriorly as barely visible line to about midlength of carapace, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle or paired acute teeth on gastric region, anterior margin unarmed, forming slightly flattened convex lobe either side of rostrum protruding anteriorly beyond margin of orbital hoods, orbital hoods unarmed, rostral furrows moderately deep anteriorly; 2nd antennular segment slightly less than twice as long as wide; basal antennal segment (basicerite) unarmed; antennal scale with lateral margin rather strongly and regularly concave, distolateral spine not very stout, far overreaching semicircular distal margin of greatly reduced blade; 1st pereopods (Figure 2e,h) with merus armed with acute subdistal tooth on inferior flexor margin; major chela (Figure 2f) subcylindrical, fully $2\frac{1}{2}$ times as long as maximum width, dactyl bent slightly toward flexor side of chela, not really double-ended, bearing very short, truncated, distally concave plunger, acutely prominent proximally (Figure 2g), palm without sculpture except for faint sulcus proximal to adhesive plaque; minor chela (Figure 2i,j) $3\frac{1}{3}$ times as long as wide, dactyl slender, fingers $\frac{4}{5}$ as long as palm, rather deeply excavate on opposable margins; both 2nd pereopods missing; 3rd pereopod (Figure 2k,l) with dactyl hooked, obscurely biunguiculate, propodus bearing about 9 spines on flexor margin, carpus not distinctly armed, merus armed with strong

distal tooth on flexor margin, ischium without movable spine; carapace length 4 mm.

MATERIAL.—PHILIPPINES. Davao Gulf, Mindanao: sta 5253; $7^{\circ}04'48''\text{N}$, $125^{\circ}39'38''\text{E}$; 51 m; coral; 18 May 1908 (1347–1358); 6' Johnston oyster dredge; 1 female [4.0], holotype (USNM 205661).

TYPE LOCALITY.—Same as above.

RANGE.—Known only from the unique female holotype from Davao Gulf, Mindanao, Philippines; 51 meters.

REMARKS.—My opinion that the single specimen described above represents a previously undescribed species of a genus several members of which are quite variable may be unjustified, but I have been unable to relate the specimen to any of the approximately 22 known species of the Crinitus Group. The following six species apparently agree with *A. davaoensis* in lacking an ischial spine on the third pereopod: *A. arethusa* De Man, 1909a; *A. bradypus* Coutière, 1905; *A. cylindricus* Kingsley, 1878; *A. spongium*, *A. stanleyi*, and *A. styliceps* Coutière, 1905. The specimen from the Davao Gulf differs from *A. arethusa* from Indonesia and Australia in having the frontal margin recessed and the distolateral spine of the antennal scale less stout and the blade more reduced. It is distinguished from *A. bradypus* from the Laccadive and Mariana islands in having the rostrum less distinct, the distolateral spine of the antennal scale less stout and the blade more reduced, the major chela with a less pronounced depression proximal to the adhesive plaque, and the dactyl of third pereopod indistinctly biunguiculate rather than simple. From *A. cylindricus* from the eastern Pacific and western and eastern Atlantic it disagrees in having the front recessed, the distolateral spine of the antennal scale less stout and the blade more reduced, and a distal tooth on the inferior flexor margin of the merus of the third pereopod. It seems to be separated from *A. spongium* from the Red Sea to Japan, the Philippines, Indonesia, and Australia, with which it may be most similar, in the recessed front and minute rostrum, and the more concave lateral margin of the antennal scale and less stout distolateral spine. It deviates from *A. stanleyi* from the Indian Ocean, the Philippines, and Indonesia in the recessed front and minute rostrum, the absence of a tooth on the basal antennal segment (basicerite), and the much more reduced blade of the antennal scale. It differs from *A. styliceps* from the Indian Ocean in the very different front and rostrum, the more concave lateral margin of the antennal scale, and the shorter fingers of the minor chela. In two species of the Crinitus Group, *A. crinitus* and *A. heurteli* Coutière, 1897c, the presence or absence of an ischial spine on the third pereopod is unknown. *Alpheus davaoensis* differs from the Philippine *A. crinitus* in the minute rather than unusually large rostrum, more robust antennular peduncle, and, possibly, the obscurely biunguiculate dactyl of the third pereopod, and from *A. heurteli* from the Bay of "Fernando-Velosa" in having the rostrum not overreaching the orbital hoods (the latter species has the two proximal carpal articles of the second pereopod subequal, a character that

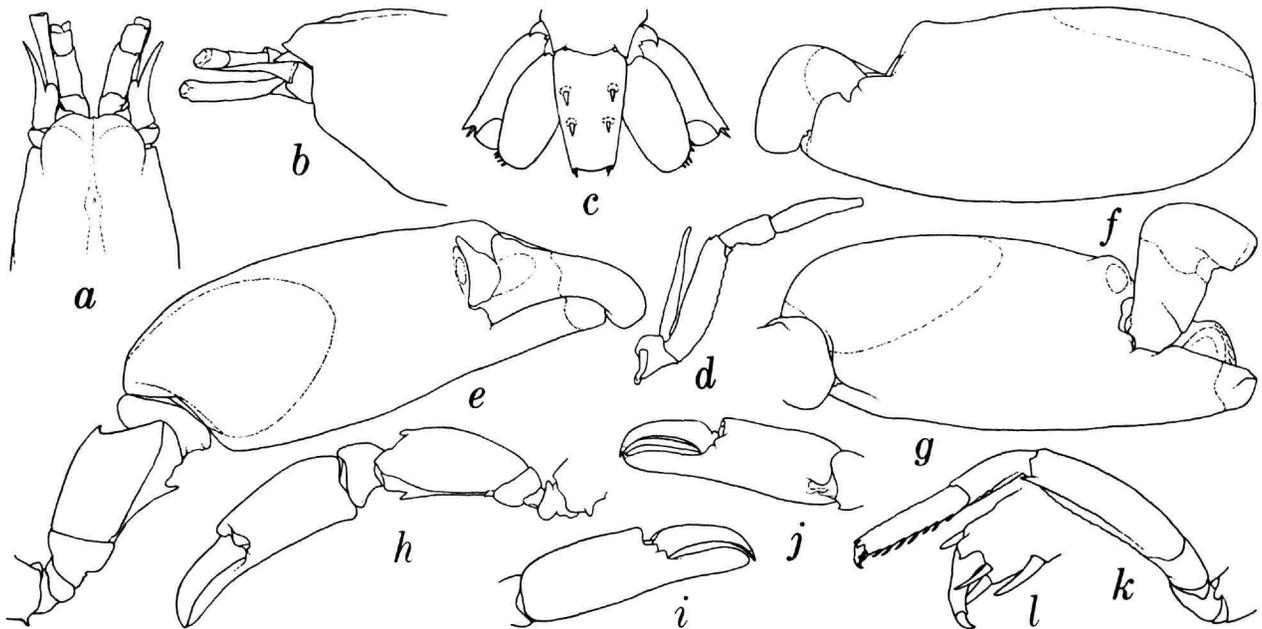


FIGURE 2.—*Alpheus davaoensis*, new species, female holotype from *Albatross* sta 5253, carapace length 4.0 mm: a, anterior carapace and appendages, dorsal aspect; b, same, lateral aspect; c, telson and uropods, dorsal aspect; d, right 3rd maxilliped; e, right (major) cheliped; f, right (major) chela, extensor surface; g, same, flexor surface; h, left (minor) cheliped; i, left (minor) chela, extensor surface; j, same, flexor surface; k, left 3rd pereopod; l, same, dactyl.

cannot be compared with the missing second pereopods in *A. davaoensis*).

ETYMOLOGY.—The proposed specific name obviously relates to the type locality of the species.

***19. *Alpheus deuteropus* Hilgendorf, 1879**

Alpheus deuteropus Hilgendorf, 1879:834, pl. 4: figs. 8–10 [type locality: Zanzibar].—Coutière, 1899:81 (fig. 45), 166 (fig. 184), 215 (figs. 254, 255).—D.M. and A.H. Banner, 1982:42, fig. 8.

DIAGNOSIS.—(Macrocheles Group). Body not unusually compressed or setose; rostrum acute, not nearly reaching as far as distal margin of 1st antennular segment, bluntly but strongly carinate in midline, carina not extending posteriorly far beyond eyes, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without paired large acute teeth overhanging posterior ends of adrostral furrows, anterior margin variable, region shelf-like, flattened, orbital hoods armed with slender tooth, nearly as long as rostrum, adrostral furrows deep; 2nd antennular segment about 3 times as long as wide; basal antennal segment (basicerite) armed with strong acute tooth not overreaching stylocerite; antennal scale with lateral margin concave, distolateral spine strong, far overreaching distally narrow blade, but not unusually stout; 1st pereopods with merus armed

with small acute distal tooth on inferior flexor margin; major chela compressed, about twice as long as wide, dactyl directed slightly toward flexor side of chela, not double-ended, bearing short, truncated, distally excavate plunger, palm with strong, acute tooth each side of dactylar articulation, ridge supporting tooth on mesial side of articulation with transverse notch terminating prominent channel on mesial side of palm, very shallow "saddle" or distal sinus proximal to adhesive plaque, with shoulder offset from margin proximal to fixed finger; minor chela nearly $2\frac{3}{4}$ times as long as wide, fingers more than $\frac{1}{2}$ as long as palm, dactyl neither carinate nor "balaeniceps," palm with unusually strong tooth on mesial aspect at dactylar articulation, with offset transverse incision at base of tooth; 2nd pereopod with proximal carpal article at least $\frac{1}{3}$ longer than 2nd; 3rd pereopod with dactyl simple, not biunguiculate, propodus bearing 5 pairs of spines on flexor margin, merus armed with strong distal spine on flexor margin, ischium bearing movable spine; maximum carapace length to base of rostrum about 11 mm.

MATERIAL.—PHILIPPINES. Grand Island, Subic Bay, Luzon [14°46'N, 120°14'E]; 2–6 m; scattered clumps of coral; 8 Jan 1908 (1300–1730); dynamite: 1 female [7.7].

RANGE.—Red Sea, eastern and South Africa through the Indian Ocean to Japan and Australia, and eastward across the

Pacific to Hawaii.

REMARKS.—The single specimen collected by the *Albatross Expedition* lacks the two anterior pairs of pereopods, but comparison with intact specimens identified by A.H. Banner leaves little doubt about the determination.

Partial dissection of some of the material in the Smithsonian collections revealed a frontal region slightly different from the Coutière illustration (1899, fig. 45). Although the supramarginal orbital spines are situated at the lateral extremities of the orbitorostral carinae, as indicated by Coutière, there is no suggestion of what appears from his illustration to be a fused extension of the margin of the orbital hood extending dorsally to the base of each spine. In other words, the orbital spines seem to be completely isolated from the margin, except for their connection with the base of the rostrum by the orbitorostral carinae.

***20. *Alpheus diadema* Dana, 1852**

Alpheus diadema Dana, 1852a:23 [type locality: Lahaina, Maui, Hawaii]; 1852b:555, pl. 35: fig. 7.—D.M. and A.H. Banner, 1982:140, fig. 40.
Alpheus insignis Heller, 1862a:269, pl. 3: figs. 17, 18 [type locality: Red Sea].

DIAGNOSIS.—(Diadema Group). Body not unusually compressed or setose; rostrum prominent but variable, not reaching level of distal margin of 1st antennular segment, feebly carinate in dorsal midline, base abruptly delimited from adrostral furrows; carapace with median tubercle on gastric region, anterior margin unarmed but convex mesial to orbital hoods and slightly incised lateral to rostral margin, orbital hoods unarmed, adrostral furrows deep and sharply defined laterally on orbital hoods as well as mesially at rostral margin; 2nd antennular segment nearly twice as long as wide; basal antennal segment (basicerite) with strong ventrolateral tooth not reaching level of tip of stylocerite; antennal scale with lateral margin concave proximally, stout, laterally convex distolateral spine overreaching diagonal distal margin of blade; major cheliped with chela nearly cylindrical, fully twice as long as wide, dactyl nearly straight in longitudinal plane, not double-ended, bearing well-developed plunger, palm without sculpture except for narrow transverse "saddle" proximal to adhesive plaque, merus with inferior flexor margin armed with strong distal tooth; minor cheliped with chela about 3 times as long as wide, dactyl about as long as palm and "balaeniceps" in male, shorter and not "balaeniceps" in female, merus without distal tooth on inferior flexor margin; 2nd pereopod with proximal carpal article about as long as 2nd; 3rd pereopod with dactyl simple or obscurely biunguiculate, propodus with at least a dozen spines on flexor margin, carpus with flexor margin terminating distally in strong tooth, merus with acute subdistal tooth, ischium with strong movable spine; maximum carapace length to base of rostrum about 9 mm.

MATERIAL.—PHILIPPINES. Marungas Island, Sulu Archipelago [6°06'N, 120°58'E]; shore, coral head; 19 Feb 1908: 1 male [3.5].

RANGE.—Red Sea and eastern Africa, Indian Ocean, Japan, Philippines, Indonesia, Australia, and tropical Pacific to Hawaii.

REMARKS.—The single specimen from Marungas Island lacks the three anterior pairs of pereopods, but the carapace is so distinctive in this species that there is little danger of misidentification unless the concept of the species becomes modified.

***21. *Alpheus dispar* Randall, 1840**

Alpheus dispar Randall, 1840:141 [type locality: Manila].
[?] *Alpheus digitalis* De Haan, 1844: pl. 45: fig. 4; 1849:178 [type locality: Japan].—Coutière, 1898b:249, fig. 2.—Holthuis and Sakai, 1970:94.
Alpheus distinguendus De Man, 1909b:155, pl. 7: figs. 9–14 [type locality: Japan].—D.M. and A.H. Banner, 1982:157, fig. 47.

DIAGNOSIS.—(Brevirostris Group). Body not unusually compressed or setose; rostrum reaching nearly as far as distal margin of 1st antennular segment, carinate in midline, carina becoming somewhat obscure posteriorly but extending nearly to midlength of carapace, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or strong paired acute teeth overhanging posterior ends of adrostral furrows, anterior margin transverse and unarmed mesial to orbital hoods, curving directly onto rostral margin, region not unusually flattened, orbital hoods unarmed, adrostral furrows deep; 2nd antennular segment 3 times as long as wide; basal antennal segment (basicerite) armed with small lateral tooth not nearly reaching level of tip of stylocerite; antennal scale with lateral margin very slightly concave, distolateral spine not unusually stout, barely overreaching distal margin of blade; 1st pereopods with merus armed with acute distal tooth on inferior flexor margin; major chela compressed, 3 times as long as wide, dactyl nearly straight in longitudinal plane, not double-ended, bearing very short plunger defined only proximally, palm without teeth either side of dactylar articulation, sculpture limited to narrowly triangular flattened or slightly concave plane, widening distally, on margin proximal to dactylar articulation and to obscure longitudinal ridge on flexor surface, without "saddle," without shoulder on strongly compressed margin proximal to fixed finger, surface paved with flattened granules; minor chela about 4½ times as long as wide, dactyl broad in male, 2¾ times as long as palm, somewhat "balaeniceps" in male only; 2nd pereopod with 2 proximal carpal articles subequal; 3rd pereopod with dactyl pointed, simple, subspatulate, propodus, carpus, and merus without spines, ischium bearing movable spine; maximum carapace length 27 mm.

MATERIAL.—PHILIPPINES. Cotabate, Mindanao, below mouth of Mindanao River [7°13'N, 124°15'E]; 20 May 1908 (1430–1730); seine: 1 male [15.0]. Tilik, Lubang Island [13°49'N, 120°12'E]; beach; sand, mud; 14 Jul 1908 (1430–1700); 130' seine: 1 male [13.0].

RANGE.—Red Sea, Madagascar, Mergui Archipelago, Sing-

apore, Indonesia, Philippines, China, Japan, Australia; in depths shallower than 37 meters, especially off river mouths.

REMARKS.—Both specimens collected during the *Albatross* Philippines Expedition lack the major cheliped, which may be diagnostic in this species, so the identification may be considered somewhat tentative.

Randall (1840:141) referred his species to "*A. brevirostris*? (Edw.) Mus. Acad.," followed by: "Dr. Burroughs has brought from Manilla a species of *Alpheus* agreeing with M. Edwards's description of *A. brevirostris*, with this exception, that it has a distinct tooth on the outer side of the basilar article of the external antennae; there is also a somewhat elevated ridge on the outer side of the arm. I have named it, provisionally, *A. dispar*." This name seems to be a senior synonym of *A. distinguendus*, a name proposed by De Man (1909b) for the Japanese specimen called *A. rapax* Fabricius by De Haan (1844, 1849). According to D.M. and A.H. Banner (1982:173), the only possibly significant differences distinguishing *A. distinguendus* from *A. brevirostris* are the absence of a transverse groove ("saddle") on the palm of the major chela and the granular, rather than smooth, surface of that appendage. Until such time as these two characters may prove to be unimportant, those authors "reluctantly" considered the two forms to be specifically distinct. In a report published a year earlier but actually prepared later, A.H. and D.M. Banner (1981:229) recorded the species that they called *A. distinguendus* from the Philippines (one specimen from 36 meters in Manila Bay and seven from the Manila market). There would seem to be little doubt that the species "brought from Manilla" by Dr. Burroughs is the same as the one from Japan called *A. distinguendus* by De Man and that *A. dispar* is the valid name for this species by all those who consider it to be distinct from *A. brevirostris* (Olivier, 1811).

22. *Alpheus dolerus* A.H. Banner, 1956

Alpheus dolerus A.H. Banner, 1956:362, fig. 21 [type locality: Saipan, Mariana Islands].—D.M. and A.H. Banner, 1982:205, fig. 63.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum acute, not overreaching distal margin of 1st antennular segment, dorsal carina rounded, not extending posteriorly beyond orbital hoods, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without flattened teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood unarmed, narrowly concave, orbital hood unarmed but with stiff seta on anteromesial margin, adrostral furrows shallow; 2nd antennular segment twice as long as wide; basal antennal segment (basicerite) armed with small acute tooth; antennal scale with lateral margin sinuous, distolateral spine not unusually stout, overreaching distally tapered blade; major chela somewhat compressed, $2/3$ times as long as wide, dactyl not double-ended, bearing well-developed, distally convexly oblique plunger, unarmed either

side of dactylar articulation, without distinct longitudinal carina near margin proximal to fixed finger, with "saddle" on palm proximal to adhesive plaque, with distinct shoulder proximal to but not overhanging "saddle," with heavy, rounded shoulder on opposite margin proximal to fixed finger, palm without sharp ridge on mesial surface subparallel with "dorsal" margin; minor chela about $3\frac{1}{2}$ times as long as wide, dactyl subequal to palm in length, with proximal short row of setae in male but not truly "balaeniceps"; 2nd pereopod with proximal carpal article no longer than 2nd; 3rd pereopod with dactyl pointed, simple, propodus bearing about 12 spines on flexor margin, carpus and merus unarmed, ischium with strong movable spine; maximum carapace length to base of rostrum about 7 mm.

RANGE.—Somalia, Madagascar, Philippines and Australia eastward to the Society Islands [Hawaii, according to D.M. Banner, pers. comm.]; in coral heads to a depth of 4 meters.

*23. *Alpheus edamensis* De Man, 1888

Alpheus Hippothoe var. *edamensis* De Man, 1888a:518 [type locality: the type series was collected at 2 Indonesian localities: "Pulo Edam" (= Pulau Damar-Besar) off Djakarta, Java, and "Amboina" (= Ambon)].

Alpheus acanthomerus Ortmann, 1890:474, pl. 36: fig. 12 [type locality: Tahiti].

Alpheus edamensis D.M. and A.H. Banner, 1982:188, fig. 57.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum sharp, reaching level of distal margin of 1st antennular segment, dorsal carina rounded, not extending posteriorly beyond orbital hoods, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without flattened teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood unarmed, slightly concave near rostrum, orbital hood unarmed, adrostral furrows moderately deep; 2nd antennular segment nearly twice as long as wide; basal antennal segment (basicerite) armed with acute lateral tooth; antennal scale with lateral margin strongly concave, distolateral spine stout, overreaching narrow blade; 1st pereopods with merus armed with acute distal tooth on inferior flexor margin, major chela somewhat compressed, about $2\frac{1}{4}$ times as long as broad, dactyl not noticeably curved in longitudinal plane, not double-ended, having well-developed plunger, palm without prominent longitudinal carina near margin proximal to fixed finger, with "saddle" proximal to adhesive plaque, proximal shoulder rounded, not overhanging "saddle," shoulder proximal to fixed finger strong, rounded, slightly projecting; minor chela about 3 times as long as wide, dactyl slightly longer than palm, not "balaeniceps" in either sex; 2nd pereopod with proximal carpal article slightly shorter than 2nd; 3rd pereopod with dactyl pointed, simple, propodus bearing 16 spines on flexor margin, carpus with acute tooth each side of distal margin, merus with acute tooth at distal end of flexor margin, ischium with movable spine; maximum carapace length to base of rostrum 17 mm.

MATERIAL.—PHILIPPINES. Port Palapag, Samar [12°38'N, 125°01'E] 3 Jun 1909: 1 male [11.0]. Batan Island [13°15'N, 124°00'E]; tide pool; 5 Jun 1909: 1 ovig female [12.5].

INDONESIA. Great Tobea, Selat Butung, Celebes [4°33'S, 122°42'E]; tide pools; 15 Dec 1909: 1 male [9.3].

RANGE.—Red Sea, Madagascar, Réunion, Seychelles, Mauritius, Malaya, Thailand, Indonesia, Philippines, Ryukyus, Fiji, Samoa, Society Islands; intertidal to 50 meters.

REMARKS.—The specimen from Port Palapag lacks the 2nd pair of pereopods, but the well-developed, rather than truncate, plunger on the dactyl of the major chela helped to distinguish it from related species of the *Edwardsii* Group.

*24. *Alpheus edwardsii* (Audouin, 1826)

Nomen delinquum Savigny, 1817: pl. 10: fig. 1.

Athanas Edwardsii Audouin, 1826:91.

Alpheus Audouini Coutière, 1905:911, pl. 87: fig. 52.

Alpheus edwardsii.—A.H. and D.M. Banner, 1972:1141, fig. 1 [neotype locality: Suez].

Alpheus edwardsii.—D.M. and A.H. Banner, 1982:270, fig. 83.

DIAGNOSIS.—(*Edwardsii* Group). Body not unusually compressed or setose; rostrum acute, reaching to about distal margin of 1st antennular segment, dorsal carina rounded, not extending posteriorly beyond orbital hoods, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or flattened teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood unarmed, nearly transverse, orbital hood unarmed, adrostral furrows moderately deep; 2nd antennular article about twice as long as wide; basal antennal segment (basicerite) armed with small, acute lateral tooth; antennal scale with lateral margin distinctly concave near midlength, distolateral spine not unusually stout, overreaching tapered blade; 1st pereopods with merus armed with sharp distal tooth on inferior flexor margin; major chela somewhat compressed, about $2\frac{1}{3}$ times as long as wide, dactyl not noticeably curved in longitudinal plane, not double-ended, having well-developed plunger, palm without prominent longitudinal carina near margin proximal to fixed finger, with "saddle" proximal to adhesive plaque, proximal shoulder blunt, but overhanging "saddle," shoulder proximal to fixed finger strong, slightly projecting but not acute; minor chela less than 4 to nearly $4\frac{1}{2}$ times as long as wide, fingers from $\frac{2}{3}$ as long as palm in male to subequal to palm in female, dactyl "balaeniceps" in male only; 2nd pereopod with proximal carpal article $1\frac{1}{4}$ to twice as long as 2nd; 3rd pereopod with dactyl pointed, simple, propodus with about 8 spines on flexor margin, carpus with distal extensor angle acute, merus unarmed, ischium with movable spine; maximum carapace length to base of rostrum about 14 mm.

MATERIAL.—PHILIPPINES. Upper reef, inside Dumurug Point, Port Cataingan, Masbate [11°57'N, 124°03'E]; 2–3 m; sand, scattered clumps of staghorn coral; 19 Apr 1908 (1500–1600); dynamite: 6 males [7.0–10.9] 1 ovig female

[9.1]. Chase Head, Endeavor Strait, Palawan [11°01'N, 119°18'E]; $2\frac{1}{2}$ to 4 mm; coral, sand; 22 Dec 1908 (1400–1600); dynamite (3 shots): 1 ovig female [9.0]. Port Gubat, southeastern Luzon [12°55'N, 124°09'E]; tide pool; 23 Jun 1909 (1300–1700): 1 male [12.6].

RANGE.—Probably from Red Sea and eastern and South Africa to Thailand, Philippines, Indonesia, Australia, and Caroline Islands (not yet known from Central Pacific islands east of Truk or New Zealand); intertidal under rocks to 25 meters.

REMARKS.—In the largest male, from Port Gubat, southeastern Luzon, the dactyl of the minor chela is not fully "balaeniceps" in form; the margins of the dactyl display a low carina above a row of setae on each side, but the segment is rounded on the extensor surface, not noticeably flattened as is usual in males of this species. This specimen might be assigned to *A. haanii* Ortmann, 1890:472, if the minor chela of the male of that Japanese species should prove to be like that of the Port Gubat specimen (see D.M. and A.H. Banner, 1982:273).

25. *Alpheus ehlersii* De Man, 1909

Alpheus ehlersii De Man, 1909c:663, pl. 70 [type locality: "island of Edam, Bay of Batavia" (= Pulau Damar-Besar, off Djakarta, Java, Indonesia)].—D.M. and A.H. Banner, 1982:132, fig. 37; 1985:16.

DIAGNOSIS.—(*Diadema* Group). Body not unusually compressed or setose; rostrum acute, not reaching level of distal margin of 1st antennular segment, carina rounded, not extending posteriorly beyond orbital hoods; carapace without median tooth or tubercle on gastric region or paired flanges overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood unarmed but convexly produced at junction with orbital hood, latter unarmed, adrostral furrows rather shallow; 2nd antennular segment nearly twice as long as wide; basal antennal segment (basicerite) bearing strong tooth not reaching level of tip of stylocerite; antennal scale with lateral margin concave proximally, distinctly convex in distal $\frac{1}{2}$, distolateral spine rather stout, overreaching distal margin of blade; 1st pair of pereopods with merus armed with acute or blunt distal tooth on inferior flexor margin; major chela slightly compressed, about $2\frac{3}{4}$ times as long as wide, dactyl nearly straight in longitudinal plane, not double-ended, with well-developed plunger, palm with shallow oblique groove or "saddle" proximal to adhesive plaque; minor chela about 4 times as long as wide, fingers longer than palm, not "balaeniceps" in either sex; 2nd pereopod with proximal carpal article twice as long as 2nd; 3rd pereopod with dactyl pointed, simple, neither biunguiculate nor subspatulate, propodus bearing about 7 spines on flexor margin, carpus with blunt distal tooth on extensor margin, ischium bearing movable spine; maximum carapace length to base of rostrum about 6 mm.

RANGE.—Red Sea, eastern Africa, Madagascar, Thailand, Philippines, Indonesia, Australia, and Caroline, Marshall,

Phoenix, Samoa, and Tonga island groups; intertidal on dead coral heads.

26. *Alpheus euchirus* Dana, 1852

Alpheus euchirus Dana, 1852a:21 [type locality: Balabac Strait]; 1852b:545, pl. 34: fig. 6.—D.M. and A.H. Banner, 1982:197.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum acute, not overreaching distal margin of 1st antennular segment, dorsal carina not extending posteriorly beyond orbital hoods, base not abruptly delimited from adrostral furrows; carapace without flattened teeth overhanging posterior ends of adrostral furrows, orbital hood armed with small marginal spine; basal antennal segment (basicerite) with, at most, reduced lateral tooth; 1st pereopods with merus unarmed on inferior flexor margin; major chela somewhat compressed, about twice as long as wide, dactyl somewhat skewed from longitudinal plane of palm, not double-ended, palm with "saddle" proximal to adhesive plaque, proximal shoulder not overhanging "saddle," strong, rounded shoulder on opposite margin proximal to fixed finger; minor chela with stout fingers; 2nd pereopod with 1st carpal article about twice as long as second; 3rd pereopod with dactyl pointed, simple, propodus with 7 or 8 sets of spines on flexor margin, merus with very small, inconspicuous distal tooth on flexor margin; carapace length about 7 mm.

RANGE.—Known only from the type locality in Balabac Strait, the southwestern passage between the Sulu Sea and the South China Sea.

REMARKS.—In his preliminary report on the species of *Alpheus* collected by the United States Exploring Expedition, Dana (1852a) listed eight species under the heading "Orbitae margo inermis": *A. strenuus*, *A. pacificus*, *A. obesomanus*, *A. crinitus*, *A. mitis*, *A. parvirostris*, *A. pugnax*, and *A. diadema*; one species, *A. euchirus*, under "Orbitae margo spinula armatus"; and five species under "Orbitae margo spinula dente armatus": *A. acutofemoratus*, *A. tridentulatus*, *A. neptunus*, *A. laevis*, and *A. malleator*. The form of the orbital hoods in the latter group is very variable. The Atlantic *A. malleator* has a sharp marginal spine, sometimes with a smaller spine mesial to it on each orbital hood. *Alpheus laevis* (= *A. lottini*) has an acute tooth arising from the surface of the hood, rather than from its margin. *Alpheus tridentulatus* (a nomen dubium applied to a species possibly from the western Atlantic) and *A. neptunus* have been transferred to the genus *Synalpheus* and have flattened, triangular orbital teeth characteristic of that genus. *Alpheus acutofemoratus*, if the current concept of that species is correct, has the orbital hoods completely unarmed; Dana (1852a:22) notes of this species, "Orbitae margo acutus sed spina non productus." It is difficult to understand why Dana placed this species in the category that he did and species like *A. parvirostris* and *A. diadema* in the first category, inasmuch as the frontal margin in those species is as produced as it is in *A. acutofemoratus*. Although Dana does not mention the orbital hoods in his description of *A. euchirus*, per se, it

seems unlikely that he would have created a special category for this species and illustrated a distinct marginal spine on the orbital hood (clearly seen under a lens) in pl. 34: fig. 6a, if the hoods were unarmed. I am inclined to agree with D.M. and A.H. Banner (1982:199) that *A. euchirus* is the only known member of the Edwardsii Group with spinose orbital hoods and that it is one of several of Dana's species—like *A. pugnax* and perhaps *A. tridentulatus*—that have not yet been rediscovered.

*27. *Alpheus eulimene* De Man, 1909

Alpheus Eulimene De Man, 1909a:101 [type locality: off north coast of Pulau Waigeo; 0°7.2'N, 130°25.5'E; 83 meters]; 1911:364, pl. 16: fig. 76. *Alpheus eulimene*.—D.M. and A.H. Banner, 1982:105, fig. 27.

DIAGNOSIS.—(Crinitus Group). Body neither unusually compressed nor densely setose; rostrum small, not reaching nearly as far as distal margin of 1st antennular segment, carina extending posteriorly as faint line nearly to midlength of carapace, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle posterior to base of rostrum and without flattened teeth overhanging posterior ends of adrostral furrows, frontal region projecting and unarmed except for rostrum between centers of orbital hoods, region not noticeably flattened, orbital hoods unarmed, adrostral furrows not especially deep; 2nd antennular segment fully 1½ times as long as wide; basal antennal segment (basicerite) unarmed; antennal scale with lateral margin somewhat concave, distolateral spine unusually stout, far overreaching distal margin of reduced blade; 1st pereopods with merus armed with acute distal tooth on inferior flexor margin; major chela broadly oval in cross-section, about 2½ times as long as wide, dactyl rather sharply skewed from longitudinal plane, not double-ended, plunger truncate, projecting only proximally as bluntly acute angle, palm without sculpture except for variably distinct depression distally proximal to adhesive plaque; minor chela 3 times as long as wide, dactyl 1½ times as long as palm, curved in longitudinal plane, not "balaeniceps" in either sex; 2nd pereopod with proximal carpal article little more than ½ as long as 2nd; 3rd pereopod with dactyl variably biunguiculate, sometimes simple, propodus bearing about 8 spines on flexor margin, carpus with both distal angles projecting, flexor surface with 1 or 2 spines, merus with strong, acute, distal tooth on flexor margin, ischium unarmed; maximum carapace length to base of rostrum about 5 mm.

MATERIAL.—PHILIPPINES. Babuyan Channel, north of Luzon: sta 5325; 18°34'15"N, 121°51'15"E; 410 m; green mud; 11.8°C; 1 Nov 1908 (1113–1132); 12' Tanner beam trawl, mud bag: 2 males [2.5, 3.0] 2 females [2.6, 4.1]. Grande Island, Subic Bay, Luzon [41°46'N, 120°14'E]; 2–6 m; scattered clumps of coral; 8 June 1908 (1300–1730); dynamite: 1 female [4.6] (identification tentative). Southwest of Manila Bay, Luzon: sta 5108; 14°05'05"N, 120°19'45"E; 24 m; coral; 15 Jan 1908 (0834–0835); 9' Albatross-Blake beam trawl, mud bag (dredging cable fouled on gin block; trawl

not dragged on bottom): 1 female [4.0]; sta 5109; 14°03'N, 120°16'30"E; 18 m; coral; 15 Jan 1908 (1026–1038); 9' *Albatross-Blake* beam trawl (trawl immediately torn on coral): 1 male [3.8]. Davao Gulf, Mindanao: sta 5249; 7°06'06"N, 125°40'08"E; 42 m; coral, sand; 18 May 1908 (1102–1109); 6' Johnston oyster dredge: 1 male [3.3].

RANGE.—Maldives Islands, Australia, Indonesia, Philippines, Japan, Mariana Islands; subtidal to 410 meters.

*28. *Alpheus euphrosyne euphrosyne* De Man, 1897

Alpheus euphrosyne De Man, 1897:745, pl. 36: fig. 64 [type locality: Java Sea].

Alpheus eurydactylus De Man, 1920:109 [type locality: Java].

Alpheus euphrosyne euphrosyne.—D.M. and A.H. Banner, 1982:232, fig. 73.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum acute, not nearly reaching level of distal margin of 1st antennular segment, dorsal carina low, rounded, not extending posteriorly far beyond orbital hoods, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without flattened teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood unarmed, concave near rostrum, orbital hood unarmed, adrostral furrows shallow or obsolescent; 2nd antennular segment nearly twice as long as wide; basal antennal segment (basicerite) usually unarmed; antennal scale with lateral margin slightly convex, nearly straight, distolateral spine not prominent, usually reaching level of broadly rounded distal margin of blade but sometimes shorter; 1st pereopods with merus usually unarmed on inferior flexor margin; major chela somewhat compressed, about $2\frac{1}{3}$ times as long as wide, dactyl lying in longitudinal plane of palm, not double-ended, having well-developed plunger, strong longitudinal ridge extending proximally from heavy, rounded shoulder on margin proximal to fixed finger, "saddle" on opposite margin proximal to adhesive plaque, with proximal shoulder rounded, not overhanging "saddle"; minor chela $4\frac{1}{2}$ times as long as wide in male, more than 5 times as long as wide in female, fingers subequal to length of palm in male, slightly longer in female, dactyl distinctly "balaeniceps" in male only; 2nd pereopod with proximal article from slightly longer to more than twice as long as 2nd; 3rd pereopod with dactyl pointed, subspatulate, propodus bearing about 9 spines on flexor margin, carpus with distal extensor angle projecting but bluntly rounded, merus unarmed, ischium with or without movable spine; maximum carapace length to base of rostrum about 27 mm.

MATERIAL.—PHILIPPINES. Manila market, Luzon; 4 Jan 1908: 1 male [21.8]. Inner Sound, Malampaya River, Palawan [10°50'N, 119°24'E]; 1–2 m; soft mud; 26 Dec 1908 (0900–1500); dynamite or seine: 1 female [20.7].

RANGE.—Kenya, Thailand, Philippines, Indonesia, and Queensland, Australia; shallow, muddy, estuarine habitats.

REMARKS.—There is little doubt that these two specimens belong to the same species even though the fine male from the Manila market has a prominent sharp tooth on the basal

antennal segment (basicerite), whereas this segment is quite unarmed in the somewhat damaged female from Palawan. In both specimens, the blade of the antennal scale clearly overreaches the distolateral spine. The minor chela of the male has the palm only slightly constricted proximal to the adhesive plaque and the fixed finger.

29. *Alpheus facetus* De Man, 1908

Alpheus facetus De Man, 1908:100 [type locality: off Djedan, Kepulauan Aru, Indonesia; 5°23'S, 134°41'E; 18 meters].—D.M. and A.H. Banner, 1982:62, fig. 14; 1985:17.

DIAGNOSIS.—(Sulcatus Group). Body not unusually compressed or setose; rostrum acute, nearly reaching level of distal margin of 1st antennular segment, dorsal carina blunt, widening slightly posteriorly and extending to near midlength of carapace, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or paired large acute teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood forming flattened, convex prominences, orbital hood bearing marginal spine directed anteromesiad, adrostral furrows wide and shallow; 2nd antennular segment nearly $1\frac{1}{2}$ times as long as wide; basal antennal segment (basicerite) armed with acute tooth reaching level of tip of rostrum but not quite as far as end of stylocerite; antennal scale with lateral margin nearly straight, distolateral tooth not unusually strong, but distinctly overreaching distal margin of tapered blade; anterior pereopods with merus armed with small acute distal tooth on inferior flexor margin; major chela slightly compressed, from less than $2\frac{1}{2}$ to more than $3\frac{1}{2}$ times as long as wide, dactyl lying in longitudinal plane of palm, not double-ended, bearing rather strong plunger directed proximally, making virtually no angle with opposable margin of dactyl on distal side of plunger, palm without teeth either side of dactylar articulation, without "saddle" proximal to adhesive plaque but often with paired oblique ridges on central part of palm; minor chela about $4\frac{1}{2}$ times as long as wide, fingers about as long as palm, dactyl not "balaeniceps" in either sex; 2nd pereopod with proximal carpal article about twice as long as 2nd; 3rd pereopod with dactyl simple, propodus bearing about 11 spines on flexor margin, carpus with distal angles slightly projecting, merus unarmed, ischium bearing movable spine; maximum carapace length to base of rostrum about 10 mm.

RANGE.—Western Indian Ocean, Thailand, Viet Nam, Philippines, Indonesia, Japan, Australia, and Caroline Islands; intertidal to 30 meters.

30. *Alpheus foresti* A.H. and D.M. Banner, 1981

Alpheus foresti A.H. and D.M. Banner, 1981:229, fig. 4 [type locality: southwest of Manila Bay, Philippines; 14°02.7'N, 120°20.3'E; 200 meters].—D.M. and A.H. Banner, 1985:17.

DIAGNOSIS.—(Edwardsii Group?). Body not unusually compressed or setose; rostrum reaching nearly as far as distal

margin of 1st antennular segment, flattened dorsally, margins abruptly delimited from and overhanging adrostral furrows; carapace without median tooth or tubercle on gastric region or strong paired acute teeth overhanging posterior ends of adrostral furrows, anterior margin mesial to orbital hoods unarmed, meeting rostral margin in concave curve, orbital hood unarmed, 2nd antennular segment twice as long as wide; basal antennal segment (basicerite) apparently armed with small, acute ventrolateral tooth not nearly reaching level of tip of stylocerite; antennal scale with lateral margin nearly straight, distolateral spine wide, overreaching or falling short of distal margin of blade; 1st pereopods with merus armed with acute distal tooth on inferior flexor margin; major chela considerably compressed, nearly 3 times as long as wide, dactyl lying in longitudinal plane of palm, not double-ended, plunger not separated from terminal tooth, palm with ill-defined notch representing "saddle" proximal to adhesive plaque, subrectangular shoulder on margin proximal to fixed finger followed distally by 2nd prominence; minor chela $6\frac{1}{2}$ times as long as wide, dactyl subequal to palm in length, not "balaeniceps" in either sex; 2nd pereopod with proximal carpal article considerably longer than 2nd; 3rd pereopod with dactyl subspatulate, propodus without spines on flexor margin, carpus without strong projection distally from either extensor or flexor margins, merus unarmed, ischium with movable spine; maximum carapace length to base of rostrum about 16 mm.

RANGE.—Southwest of Manila Bay, Luzon, Philippines, and off southwestern Celebes, Indonesia; 134 to 200 meters.

***31. *Alpheus frontalis* H. Milne Edwards, 1837**

Alpheus frontalis H. Milne Edwards, 1837:356 [type locality: Australia].—D.M. and A.H. Banner, 1982:99, figs. 231,m, 25.

Alpheus latifrons A. Milne-Edwards, 1873:87 [type locality: Upolu, Western Samoa].

Betaeus uricola Richters, 1880:164, pl. 17: figs. 34, 35 [type locality: Mauritius].

DIAGNOSIS.—(Crinitus Group). Body neither unusually compressed nor densely setose; rostrum obsolescent, rostral carina rounded, extending posteriorly to base of eyes, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region and without flattened teeth overhanging posterior ends of adrostral furrows, anterior margin extending as vaulted shelf-like projection between orbits, adrostral furrows rather deep; 2nd antennular segment nearly 3 times as long as wide; basal antennal segment (basicerite) bearing small acute ventral tooth; antennal scale with lateral margin sinuous, distolateral spine strong, overreaching distal margin of blade; 1st pereopods with merus unarmed distally on flexor margin; major chela broadly oval in cross section, about $2\frac{1}{3}$ times as long as wide, dactyl lying nearly in longitudinal plane of palm, not double-ended, bearing well-developed but distally truncate plunger, palm without obvious sculpture of any kind; minor chela slightly less than $2\frac{1}{2}$ times as long as wide in males, $3\frac{3}{4}$ as long as wide in

females, dactyl broadly "balaeniceps" in male, about $\frac{3}{4}$ as long as palm, unmodified in female, about $\frac{1}{2}$ as long as palm; 2nd pereopod with proximal carpal article fully twice as long as 2nd; 3rd pereopod with dactyl simple, propodus bearing about 9 spines on flexor margin, carpus terminating in acute tooth on flexor margin, blunt tooth on extensor margin, merus unarmed, ischium with movable spine; maximum overall carapace length about 16 mm.

MATERIAL.—PHILIPPINES. Port Matalvi, Luzon [15°29'N, 119°56'E]; 23 Nov 1908; electric light: 1 female [5.3]. Varadero Bay, Mindoro [13°30'N, 12°59'E]; surface; 22–23 Jul 1908 (2000–0200); dip net from gangplank with electric light: 2 males [5.2, 5.3]. Sablayan Anchorage, western Mindoro [120°50'N, 120°46'E]; surface; 12 Dec 1908 (1900–2030); dip net, electric light: 1 female [7.5].

RANGE.—Red Sea and eastern Africa to Japan, Philippines, Indonesia, Australia, across Pacific to the Society Islands, but not Hawaii; low tide to 130 meters (all four of the *Albatross* specimens were found swimming at the surface under an electric light).

REMARKS.—The statement by Miya (1974:136) that the major chela of *A. frontalis* is "entirely granulated on the inner surface, and densely covered with rather long soft hairs on the inner ventral surface, especially on the immovable finger" hardly reflects the relatively smooth and very sparsely hairy chelae of the specimens available to me. The larger of the *Albatross* females, however, displays a somewhat rougher and hairier major chela than do most of the other specimens examined.

***32. *Alpheus funafutensis* Borradaile, 1898**

FIGURE 3

Alpheus funafutensis Borradaile, 1898:1013, pl. 15: fig. 10 [type locality: Funafuti, Ellice Islands].—De Man, 1911:436.

Alpheus acanthomerus, var. *inermis* Lankester, 1901:564 [type locality: Kelantan, Malaya].

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum sharp, not reaching level of distal margin of 1st antennular segment, dorsal carina blunt, not extending posteriorly beyond orbital hood, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without flattened teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood concave near rostrum, orbital hood unarmed, adrostral furrows moderately deep; 2nd antennular segment about $1\frac{1}{2}$ times as long as wide; basal antennal segment (basicerite) armed with acute ventrolateral tooth reaching nearly to level of tip of stylocerite; antennal scale with lateral margin deeply concave, distolateral spine stout, far overreaching narrow blade; 1st pereopods with merus unarmed on inferior flexor margin; major chela somewhat compressed, about twice as long as wide, dactyl not noticeably curved in longitudinal plane, not double-ended,

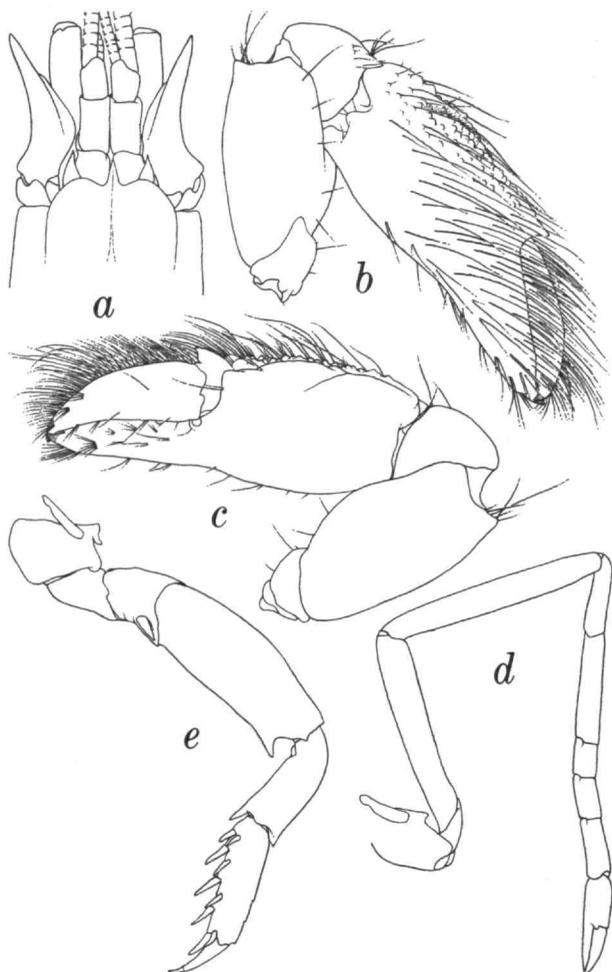


FIGURE 3.—*Alpheus funafutensis*, ovigerous female from Grande Island, Subic Bay, Luzon, carapace length 5.0 mm: a, anterior carapace and appendages, dorsal aspect; b, minor cheliped, extensor aspect; c, same, flexor aspect; d, right 2nd pereopod; e, right 3rd pereopod.

palm with "saddle" proximal to adhesive plaque, proximal shoulder rounded, not overhanging "saddle," shoulder proximal to fixed finger strong, rounded, slightly projecting; minor chela nearly $2\frac{1}{4}$ times as long as wide, dactyl shorter than palm, not "balaeniceps" in either sex; 2nd pereopod with proximal carpal article shorter than 2nd; 3rd pereopod with dactyl pointed, simple, propodus bearing 9 spines on flexor margin, merus with acute tooth at distal end of flexor margin, ischium with movable spine; maximum carapace length to base of rostrum about 7 mm.

MATERIAL.—PHILIPPINES. Grande Island, Subic Bay, Luzon [$14^{\circ}46'N$, $120^{\circ}14'E$]; 2–6 m; scattered clumps of coral; 8 Jan 1908 (1300–1730); dynamite: 1 ovig female [5.0].

RANGE.—Kenya, Malaya, Indonesia, Philippines, and central Pacific islands.

REMARKS.—The specimen from Subic Bay lacks the major cheliped, but it agrees otherwise with the characters mentioned by De Man (1911:331, 436) based on his examination of an ovigerous female syntype of *A. funafutensis*, especially in having the movable finger of the minor chela (Figure 3c) "sharply carinate above." It seems to differ from the male from Thailand described by A.H. and D.M. Banner (1966b:155, fig. 60) in having a shorter rostrum, the frontal margin lateral to the base of the rostrum concave rather than convexly produced, the antennal scales slightly shorter (Figure 3a), sharp granules, rather than "rounded papillae," on the palm of the minor chela (Figure 3b), and the proximal article of the second pereopod (Figure 3d) distinctly shorter than, rather than subequal, to the second.

*33. *Alpheus gracilipes* Stimpson, 1860

Alpheus gracilipes Stimpson, 1860:32 [type locality: Tahiti, among corals in depth of about 2 meters].—D.M. and A.H. Banner, 1982:143, fig. 41.

DIAGNOSIS.—(Diadema Group). Body not unusually compressed or setose; rostrum acutely triangular, flattened dorsally, not carinate, nearly reaching level of distal margin of 1st antennular segment, base abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, anterior margin unarmed and concave mesial to orbital hoods, latter unarmed but bluntly angulate and obscurely carinate, adrostral furrows sharply defined and overhung mesially by margin of rostral base, abruptly but less sharply delimited laterally; 2nd antennular segment twice as long as wide; basal antennal segment (basicerite) armed with acute tooth nearly reaching level of tip of stylocerite; antennal scale with lateral margin concave, distolateral spine strong, laterally convex, overreaching narrow blade; 1st pereopods with merus armed with distal tooth on inferior flexor margin; major chela slightly compressed, $3\frac{1}{2}$ times as long as wide, dactyl moving in plane angled slightly toward flexor side of palm, not double-ended, plunger not strong, clearly defined only proximally, palm with deep transverse groove or "saddle" proximal to adhesive plaque; minor chela 5 times as long as wide, dactyl nearly as long as palm, "balaeniceps" in both sexes; 2nd pereopod with proximal carpal article slightly longer than 2nd; 3rd pereopod with dactyl slender, simple, propodus bearing 10–16 spines on flexor margin, carpus with subacute distal tooth on extensor margin, merus unarmed, ischium with movable spine; maximum carapace length to base of rostrum about 13 mm.

MATERIAL.—INDONESIA. Great Toba, Selat Butung, Celebes [$4^{\circ}33'S$, $122^{\circ}42'E$]; tidepool; 15 Dec 1909: 1 male [9.1].

RANGE.—Red Sea and eastern Africa to Hong Kong, Ryukyu Archipelago, Philippines, Indonesia, Australia, and eastward through Pacific islands to Hawaii; intertidal to depth of 6 meters.

34. *Alpheus gracilis* Heller, 1862

Alpheus gracilis Heller, 1862a:271, pl. 3: figs. 19, 20 [type locality: Red Sea].
Alpheus gracilis var. *Alluaudi* Coutière, 1905:882 [type locality: Mahé Island, Seychelles].

Alpheus gracilis var. *luciparensis* De Man, 1911:338 [type locality: "5700 m. N. 279°E from South point of South-Lucipara-island. Reef."].

Crangon gracilis var. *simplex* A.H. Banner, 1953:75, fig. 25 [type locality: Waikiki Reef, Oahu, Hawaii].

Alpheus gracilis—D.M. and A.H. Banner, 1982:60, fig. 13.

DIAGNOSIS.—(Sulcatus Group). Body not unusually compressed or setose; rostrum sharp, not reaching as far as distal margin of 1st antennular segment, rounded dorsally, not carinate, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or paired large acute teeth overhanging posterior ends of adrostral furrows, anterior margin unarmed mesial to orbital hoods but deeply incised lateral to base of rostrum, orbital hood armed with sharp marginal spine directed slightly mesiad, adrostral furrows shallowly rounded; 2nd antennular segment slightly longer than wide; basal antennal segment (basicerite) armed with strong and prominent tooth not reaching level of tip of unusually long stylocerite; antennal scale with lateral margin faintly concave, distolateral spine fairly strong and reaching beyond distal margin of blade; anterior pereopods with small acute distal tooth on inferior flexor margin; major chela compressed; 2¹/₂ times as long as wide, dactyl not curved much beyond longitudinal axis of palm, not double-ended, bearing moderately developed plunger, palm with 1 tooth beside dactylar articulation, without longitudinal carina near margin proximal to fixed finger, with shallow, rounded transverse depression or "saddle" proximal to adhesive plaque and with slight constriction in margin proximal to fixed finger; minor chela 4¹/₂ times as long as wide, not "balaeniceps" in either sex, tooth on margin of palm at articulation with dactyl; 2nd pereopod with proximal article more than twice as long as 2nd; 3rd pereopod with dactyl biunguiculate or not, propodus with 10 spines on flexor margin, carpus with rounded distal tooth on extensor margin, merus and ischium unarmed; maximum carapace length to base of rostrum about 7 mm.

RANGE.—Red Sea, eastern and possibly South Africa to Thailand, Philippines, Japan, Indonesia, Queensland, Australia, and Pacific islands, including Hawaii and Society Islands.

***35. *Alpheus hailstonei* Coutière, 1905**

Alpheus Hailstonei Coutière, 1905:879, pl. 74: fig. 18 [type locality: Maldive Islands (3 localities)].

Alpheus Hailstonei, var. *laetabilis* De Man, 1908:98 [type locality: 8 Indonesian localities; 27 to 120+ meters].

Alpheus Hailstonei, var. *assimulans* De Man, 1908:99 [type locality: 3 Indonesian localities; 54 to 113 meters].

Crangon hailstonei var. *paucispinata* A.H. Banner, 1953:51, fig. 16 [type locality: off Kauai Island, Hawaii; Hanamaulu warehouse, N. 44°30', W. 2.6 miles; 125 to 165 meters].

Alpheus hailstonei.—D.M. and A.H. Banner, 1982:38, fig. 6.

DIAGNOSIS.—(Macrocheles Group). Body not unusually

compressed or setose; rostrum sharp, not nearly reaching as far as distal margin of 1st antennular segment, rounded dorsally, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle or paired large acute teeth on gastric region, anterior margin rather deeply sinuous mesial to orbital hoods, slanting gradually into rostral margin, region not flattened, orbital hood armed with acute marginal tooth, adrostral furrows short and shallow; 2nd antennular segment 3–4 times as long as wide; basal antennal segment (basicerite) with well-developed ventrolateral tooth not overreaching stylocerite; antennal scale with lateral margin concave, distolateral spine not unusually strong but considerably overreaching narrowly tapered distal margin of blade; 1st pereopods with merus armed with acute distal tooth on inferior flexor margin; major chela nearly 2¹/₂ times as long as wide, dactyl strongly curved toward flexor side of chela, not double-ended, bearing high sharp crest on extensor margin, bulbous distally, without plunger, palm with acute tooth each side of dactylar articulation, carina supporting tooth on mesial side of dactylar articulation interrupted by transverse notch, without "saddle" proximal to adhesive plaque, with subrectangular shoulder on margin proximal to fixed finger; minor chela 4¹/₂ times as long as wide, dactyl subequal to palm in length, not "balaeniceps" in either sex; 2nd pereopod with proximal carpal article about 1³/₄ times as long as 2nd; 3rd pereopod with dactyl usually somewhat biunguiculate, propodus with 11 pairs of spines on flexor margin, merus unarmed, ischium with movable spine; maximum carapace length to base of rostrum about 8 mm.

MATERIAL.—PHILIPPINES. Off Jolo Island, Sulu Archipelago; sta 5138; 6°06'N, 120°58'50"E; 35 m; sand, coral; 14 Feb 1908 (1055–1115); 12' Agassiz beam trawl, 2 mud bags: 1 ovig female [4.9].

RANGE.—Kenya, Madagascar, Seychelles, Maldive Islands, Australia, Indonesia, Philippines, Japan, and Hawaii; 27 to 536 meters (the aberrant Philippine specimens reported by D.M. and A.H. Banner, 1978:223 were found in dead coral heads in no more than 5 meters).

REMARKS.—The *Albatross* Philippine specimen has the second antennular segment slightly less than 3 times as long as wide (compared with the usual 3–4 times and 1.8–2.2 times in the three Philippine specimens reported by D.M. and A.H. Banner, 1978:223, from barely 5 meters deep). It also has the antennal peduncle (carpocerite) fully 5 times as long as wide (compared with the usual nearly 7 times and slightly more than 4 times in the Banner Philippine material).

***36. *Alpheus hippothoe* De Man, 1888**

Alpheus Hippothoe De Man, 1888b:268, pl. 17: figs. 1–5 [type locality: Sullivan Island (Lanbi Kyun) and King Island Bay (Padaw Aw), Mergui Archipelago, Burma].

Alpheus hippothoe.—D.M. and A.H. Banner, 1982:195, fig. 59.

DIAGNOSIS.—(Edwardsii Group). Body not unusually com-

pressed or setose; rostrum slender, reaching level of distal margin of 1st antennular segment, dorsal carina rounded, extending posteriorly to posterior gastric region, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without flattened teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood unarmed, nearly transverse, not flattened, orbital hood unarmed, adrostral furrows moderately deep; 2nd antennular segment $2\frac{2}{3}$ times as long as wide; basal antennular segment (basicerite) bearing acute lateral tooth not reaching level of tip of stylocerite; antennular scale with lateral margin deeply concave in proximal $\frac{1}{2}$, distolateral spine strong, considerably overreaching narrow blade; 1st pereopods with merus armed with acute distal tooth on inferior flexor margin, somewhat reduced in minor cheliped; major chela compressed, $2\frac{1}{3}$ times as long as wide, dactyl not noticeably curved in longitudinal plane, not double-ended, plunger rather poorly developed, truncate, palm without prominent longitudinal carina near margin proximal to fixed finger, with "saddle" proximal to adhesive plaque, proximal shoulder rounded but overhanging "saddle," shoulder proximal to fixed finger strong, rounded, at right angle to palm; minor chela about $2\frac{2}{3}$ times as long as wide, dactyl slightly shorter than palm, without setiferous longitudinal crest; 2nd pereopod with proximal carpal article about twice as long as 2nd; 3rd pereopod with dactyl simple, not biunguiculate, propodus bearing about 14 spines on flexor margin, carpus with both margins projecting distally, merus with strong acute tooth near distal end of flexor margin, ischium with strong movable spine; maximum carapace length to base of rostrum about 12 mm.

MATERIAL.—PHILIPPINES. Visayan Sea north of Cebu: sta 5401; $11^{\circ}24'45''N$, $124^{\circ}06'E$; 55 m; fine sand; 16 Mar 1909 (1005–1032); 6' McCormick trawl: 2 males [10.1, 10.1]. Near Siasi, Sulu Archipelago: sta 5147; $5^{\circ}41'40''N$, $120^{\circ}47'10''E$; 38 m; coral sand, shells; 16 Feb 1908 (1127–1147); 12' Agassiz beam trawl, mud bag: 1 female [4.4].

RANGE.—Red Sea, Madagascar, Seychelles, South Africa, Indian Ocean, Malaysia, Indonesia, Philippines, Japan, Fiji and Tonga islands; intertidal to 55 meters.

REMARKS.—See "Remarks" under *A. serenei*.

*37. *Alpheus hyphalus*, new species

FIGURES 4, 5

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum rather narrow, reaching level of distal margin of 1st antennular segment (Figure 4a), dorsal carina prominent but blunt, not extending posteriorly beyond midgastric region, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without flattened teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood unarmed, concave near rostral margin, orbital hood unarmed, adrostral furrows moderately deep; 2nd antennular

segment twice as long as wide; basal antennular segment (basicerite) with small, sharp ventrolateral spine not nearly reaching level of tip of stylocerite (Figure 4b); antennular scale with lateral margin rather deeply concave, distolateral spine stout, considerably overreaching narrow blade; 1st pereopods with merus unarmed (Figure 4g,h,k,l); major chela somewhat compressed, about $2\frac{1}{3}$ times as long as wide, dactyl only slightly skewed from longitudinal axis of palm but with rather strong, blunt, sinuous carina on extensor margin, not double-ended, with well-developed plunger (Figure 4f), palm with strong longitudinal ridge near margin proximal to fixed finger (Figure 4e), with "saddle" proximal to adhesive plaque, proximal shoulder blunt but slightly overhanging "saddle," shoulder proximal to fixed finger strong, rounded, slightly projecting, mesial surface with sharp ridge subparallel with dorsal margin below distal end of depression associated with "saddle," similar ridge on opposite surface less sharp; minor chela (Figures 4i,j) about 3 times as long as wide, dactyl about as long as palm, weakly "balaeniceps" in male; 2nd pereopod (Figure 5d) with proximal carpal article nearly $1\frac{1}{2}$ times as long as 2nd; 3rd pereopod (Figure 5b) with dactyl pointed, simple, propodus bearing about 9 spines on flexor margin, carpus only slightly produced on each side of distal margin, merus unarmed, ischium with movable spine; carapace length to base of rostrum 7.0 mm.

MATERIAL.—PHILIPPINES. Verde Island Passage: sta 5292; $13^{\circ}38'45''N$, $121^{\circ}01'12''E$; 296 m; fine black sand; $11.3^{\circ}C$; 23 Jul 1908 (1437–1457); 12' Agassiz beam trawl, mud bag: 1 male [7.0], holotype (USNM 205662).

TYPE LOCALITY.—Same as above.

RANGE.—Known only from the unique male holotype from Verde Island Passage, Philippines; 296 meters.

REMARKS.—This species appears to be an offshore relative of *A. pacificus*; it differs from that species in the longer rostrum, more elongate distolateral spine of the antennular scale, somewhat different sculpture on the major chela, and the form of the minor chela of the male.

ETYMOLOGY.—The name, derived from the Greek *hyphalos* ("under the sea"), alludes to the considerable depth at which the single representative of the species was found, compared with the usually intertidal habitat of the possibly related *A. pacificus*.

38. *Alpheus ladronis* A.H. Banner, 1956

Alpheus ladronis A.H. Banner, 1956:360, fig. 20 [type locality: Saipan, Mariana Islands].—D.M. and A.H. Banner, 1978:223.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum small, acute, not nearly reaching level of distal margin of 1st antennular segment, distinctly carinate in midline as far as posterior margins of eyes, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or strong paired acute teeth overhanging posterior ends of adrostral furrows, anterior

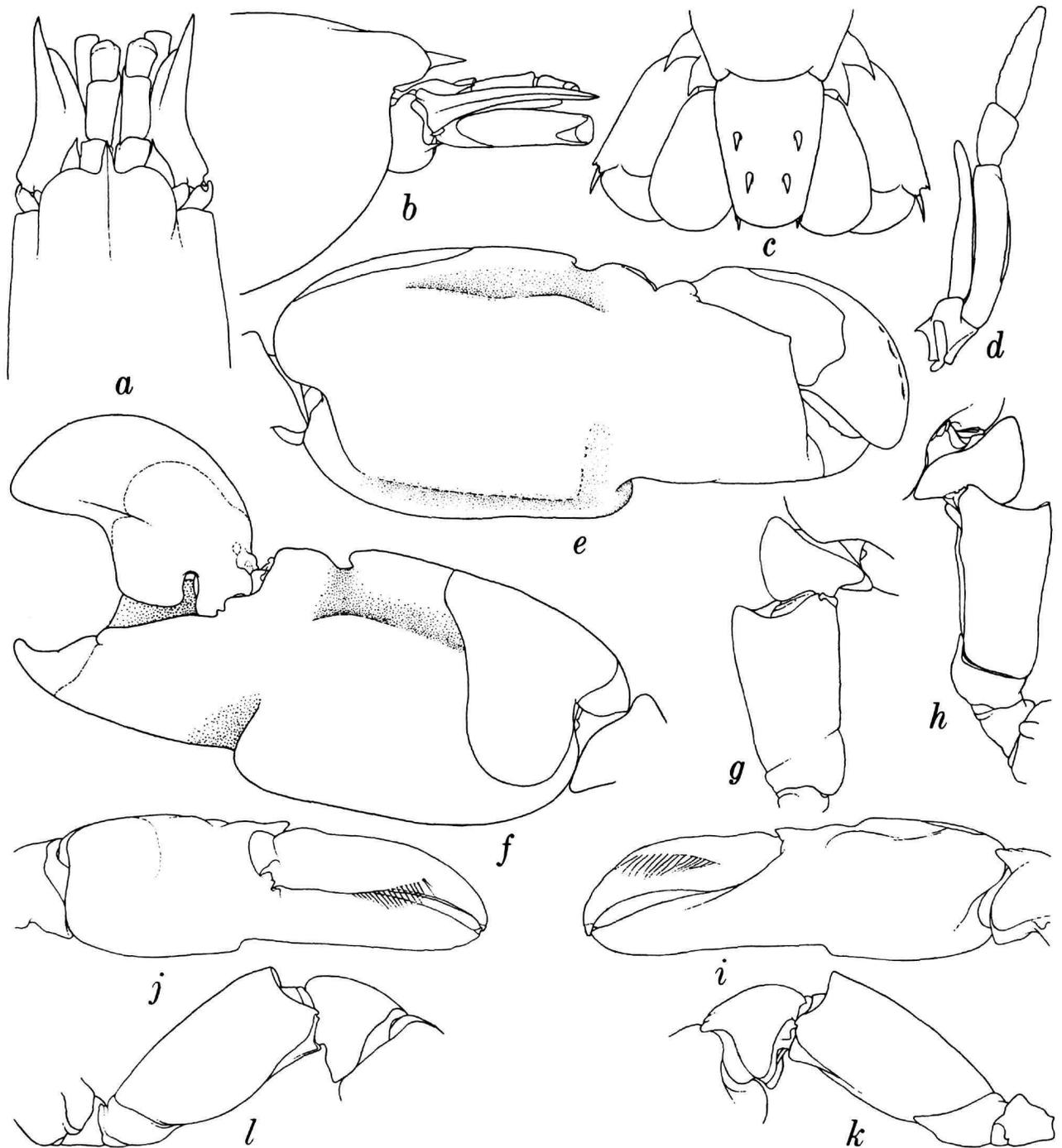


FIGURE 4.—*Alpheus hyphalus*, new species, male holotype from *Albatross* sta 5292, carapace length 7.0 mm: *a*, anterior carapace and appendages, dorsal aspect; *b*, same, lateral aspect; *c*, telson and uropods, dorsal aspect; *d*, right 3rd maxilliped; *e*, left 1st (major) chela, mesial aspect; *f*, same, lateral aspect; *g*, left 1st (major) cheliped, proximal segments, mesial aspect; *h*, same, lateral aspect; *i*, right 1st (minor) chela, mesial aspect; *j*, same, lateral aspect; *k*, right 1st (minor) cheliped, proximal segments, mesial aspect; *l*, same, lateral aspect.

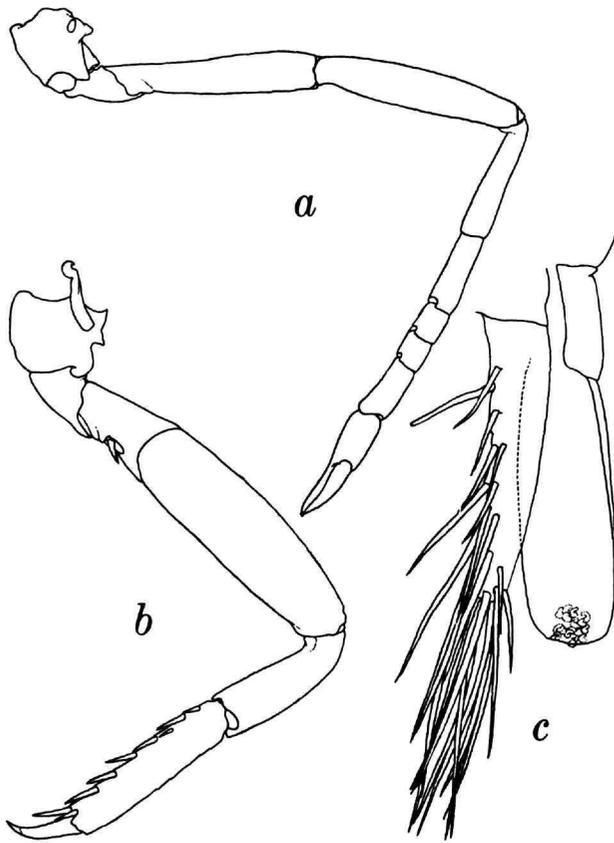


FIGURE 5.—*Alpheus hyphalus*, new species, male holotype from Albatross sta 5292, carapace length 7.0 mm: a, right 2nd pereopod; b, right 3rd pereopod; c, right appendices masculina and interna.

margin mesial to orbital hoods unarmed, nearly transverse, meeting rostral margin at obtuse angle, orbital hoods unarmed, adrostral furrows shallowly rounded; 2nd antennular segment fully $1\frac{1}{2}$ times as long as wide; basal antennal segment (basicerite) armed with small acute lateral tooth not nearly reaching level of tip of stylocerite; antennal scale with lateral margin nearly straight, distolateral spine strong but not unusually stout, overreaching distal end of tapered blade; major cheliped with chela compressed, fully $2\frac{1}{2}$ times as long as wide, fingers narrowly acute, dactyl not double-ended, palm without longitudinal carina near margin proximal to fixed finger, with shallow "saddle" proximal to adhesive plaque, proximal shoulder low, not overhanging "saddle," shoulder on margin proximal to fixed finger much stronger, merus with conspicuous subterminal tooth on inferior flexor margin; minor cheliped with chela 4 times as long as wide, dactyl slightly longer than palm, not "balaeniceps"; 2nd pereopod with proximal carpal article nearly $1\frac{1}{2}$ times as long as 2nd; 3rd pereopod with dactyl pointed, simple, propodus bearing 8 slender spines on flexor margin, carpus with extensor margin

projecting distally, merus and ischium unarmed; maximum carapace length probably about 5 mm.

RANGE.—Philippines, Marianas, and Samoa; shallow water.

39. *Alpheus leptochirus* Coutière, 1905

A[lpheus] leptochirus Coutière, 1905:914, pl. 87: fig. 54 [type locality: Maldiv Islands (2 localities)].

Alpheus leptochirus.—D.M. and A.H. Banner, 1978:223.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum slender, reaching nearly to level of distal margin of 1st antennular segment, distinctly carinate in midline as far as posterior limits of orbital hoods, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or strong paired acute teeth overhanging posterior ends of adrostral furrows, anterior margin mesial to orbital hoods unarmed and rather deeply incised each side of rostrum, orbital hoods unarmed, adrostral furrows rather deep; 2nd antennular segment less than $1\frac{1}{2}$ times as long as wide; basal antennal segment (basicerite) armed with lateral tooth; antennal scale with lateral margin not deeply concave, distolateral spine strong but not unusually stout, overreaching distal end of tapered blade; 1st pereopods with distal tooth on inferior flexor margin of merus; major chela compressed, 3 to $3\frac{1}{2}$ times as long as wide, dactyl not double-ended, with shallow "saddle" proximal to adhesive plaque, proximal shoulder low, not overhanging "saddle," shoulder on margin proximal to fixed finger not very strong; minor chela 5 to $5\frac{1}{2}$ times as long as wide, dactyl shorter than palm, "balaeniceps" in male only; 2nd pereopod with proximal carpal article as long as or slightly shorter than 2nd; 3rd pereopod with dactyl very slender, simple, not biunguiculate, propodus bearing 7 slender spines on flexor margin, carpus with extensor margin projecting slightly distally, merus and ischium unarmed; maximum carapace length to base of rostrum perhaps about 5 mm.

RANGE.—Maldiv Islands, Seychelles, Réunion, and, perhaps, Philippines. The records from Hawaii by A.H. Banner (1953:133) and the Marianas by the same author (1956:362) need to be confirmed (see "Remarks" below).

REMARKS.—A.H. Banner (1953:134) was fully aware that the three specimens dredged in 30 to 60 meters off Diamond Head, Oahu, Hawaii, might represent a distinct species. I have had the opportunity to examine one of these specimens—an ovigerous female with a carapace length of 4.2 mm—and I have found that it differs from Coutière's description in the following particulars: the rostral carina is rounded, rather than "presque tranchante"; the margins of the ocular hoods are sinuously transverse and laterally angular, rather than regularly convex; the shoulder proximal to the "saddle" on the major chela arises almost vertically from and almost overhangs the "saddle"; and the third pereopod has the ischium armed with a long lateral spine. Only the availability of additional material will permit a determination as to whether these differences fall

within the range of variability of *A. leptochirus*, but one of the discrepancies listed by Banner (1953:134) is invalid. He noted that the second carpal article of the second pereopod is 1.1 times as long as the first, rather than 0.7 as long; in his description of this appendage, Coutière (1905:915) stated: "Les 2 premiers segments du carpe sont egaux en longueur, parfois meme le 2me est le plus long."

40. *Alpheus leviusculus leviusculus* Dana, 1852

Alpheus Edwardsii var. *leviusculus* Dana, 1852b:543 [type locality: Wake Island, North Pacific].

Alpheus leviusculus.—Dana, 1855, pl. 34: fig. 3a–f.

Alpheus Bouvieri var. *Bastardi* Coutière, 1898c:133, fig. 1a [type locality: the type series apparently included material from the Gulf of Aden, Madagascar (2 localities), and Panama].

Alpheus leviusculus leviusculus.—D.M. and A.H. Banner, 1982:246, fig. 77.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum triangular, short, not nearly reaching level of distal margin of 1st antennular segment, rounded in dorsal midline, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or strong paired acute teeth overhanging posterior ends of adrostral furrows, anterior margin mesial to orbital hoods unarmed, nearly transverse, concave near rostral margin, orbital hoods unarmed, adrostral furrows broad and shallow; 2nd antennular segment no more than $1\frac{1}{3}$ times as long as wide; basal antennal segment (basicerite) with strong lateral tooth not quite reaching level of tip of stylocerite; antennal scale with lateral margin nearly straight, distolateral spine not especially stout, overreaching distal margin of fairly wide blade, sometimes considerably; 1st pereopod without distal tooth on inferior flexor margin of merus; major chela somewhat compressed, fully $2\frac{1}{2}$ times as long as wide, dactyl nearly straight in longitudinal plane, not double-ended, bearing well-developed plunger, palm without longitudinal carina near margin proximal to fixed finger, with "saddle" proximal to adhesive plaque, shoulder proximal to "saddle" rounded or forming right angle with surface of palm, shoulder on margin proximal to fixed finger low and rounded; minor chela fully $3\frac{1}{2}$ times as long as wide, dactyl slightly shorter than palm, usually clearly "balaeniceps" in male; 2nd pereopod with proximal carpal article not quite $1\frac{1}{2}$ times as long as 2nd; 3rd pereopod with dactyl simple, sometimes with slight swelling on flexor margin, propodus bearing about 9 spines on flexor margin, carpus with extensor margin projecting at articulation with propodus, merus unarmed, ischium usually without movable spine; maximum carapace length about 10 mm.

RANGE.—Red Sea, eastern Africa, Indian Ocean, Indonesia, and Pacific islands at least as far eastward as Wake Island.

REMARKS.—The presence or absence of an ischial spine on the third and fourth pereopods does not seem to be as diagnostic of this species as it is of most members of the genus. Specimens in the Smithsonian collections from Hong Kong show no trace of such a movable spine, but those from the Indian Ocean have small but distinct ones.

*41. *Alpheus lobidens* De Haan, 1849

Alpheus lobidens De Haan, 1849:179 [type locality: Japan (probably near Nagasaki, according to Holthuis in A.H. and D.M. Banner, 1975:431)].—D.M. and A.H. Banner, 1981:29.

Alpheus crassimanus Heller, 1862b:526 [type locality: Nicobar Islands].

Alpheus inopinatus Holthuis and Gotlieb, 1958:42, figs. 8, 9 [type locality: Herzliya, Israel].

Alpheus lobidens polynesica A.H. and D.M. Banner, 1975:429, fig. 3A–H, J–L [type locality: Kaneohe Bay, Oahu, Hawaii].

Alpheus lobidens lobidens.—D.M. and A.H. Banner, 1982:252, fig. 78s.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum acute, triangular, reaching nearly to level of distal margin of 1st antennular segment, dorsal carina rather sharp, not extending posteriorly beyond orbital hoods, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without flattened teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood unarmed, somewhat incised near rostral margin, adrostral furrows moderately deep; 2nd antennular segment about twice as long as wide; basal antennal segment (basicerite) armed with small ventrolateral tooth not nearly reaching level of tip of stylocerite; antennal scale with lateral margin variably concave, distolateral spine stout, overreaching blade; 1st pereopods with or without distal tooth on inferior flexor margin of merus; major chela somewhat compressed, about $2\frac{1}{2}$ times as long as wide, dactyl not noticeably curved in longitudinal plane, not double-ended, having well-developed plunger, palm with longitudinal groove but no carina near margin proximal to fixed finger, with "saddle" proximal to adhesive plaque, shoulder proximal thereto usually rounded, sometimes abrupt, but not overhanging "saddle," shoulder proximal to fixed finger always well developed but varying from rounded to angular; minor chela 3 to $4\frac{3}{4}$ times as long as wide, dactyl subequal to palm in length, strongly "balaeniceps" in male only; 2nd pereopod with proximal carpal article $1\frac{1}{4}$ to $1\frac{2}{3}$ times as long as 2nd; 3rd pereopod with dactyl pointed, simple, propodus usually bearing about 10 spines on flexor margin, carpus not produced distally at propodal articulation, merus unarmed, ischium usually bearing movable spine; maximum carapace length to base of rostrum about 19 mm.

MATERIAL.—PHILIPPINES. Olongapo, Subic Bay, Luzon [14°50'N, 120°16'E]; shore; 7 Jan 1908 (1400–1515); 2 males [6.6, 8.3] 3 ovig females [8.0–10.7].—Tilik, Lubang Island [13°49'N, 120°12'E]; beach; sand, mud; 14 Jul 1908 (1430–1700); 1 ovig female [10.1].

RANGE.—Entire Indo-Pacific region from the Red Sea to Hawaii, as well as eastern and central Mediterranean; intertidal to 25 meters.

REMARKS.—In regard to the determination by A.H. and D.M. Banner (1975:431) that *A. crassimanus* is a junior synonym of *A. lobidens*, it may be of interest to recall the remarks of Coutière (1899:14). He noted that the type specimen of *A. lobidens* in the Museum at Leiden was in such poor condition that it was impossible to determine the sex of the

specimen satisfactorily and whether it represents the species called *A. strenuus* by Dana or *A. crassimanus* of Heller. He decided, however, that it was a female and therefore a senior synonym of Dana's species, in which the *balaeniceps* dactyl of the minor chela occurs in both sexes.

Because of the delays often associated with the publication of major works, the detailed revision of this species and the relegation of *A. inopinatus* and the subspecies *polynesica* to its synonymy—which was to have appeared “in a check-list of the alpheidids of the Red Sea at some time in the future” according to D.M. and A.H. Banner (1982:241, footnote)—were actually published during the preceding year (D.M. and A.H. Banner, 1981:29).

*42. *Alpheus lottini* Guérin, 1829

Cancer sublucanus Forskål, 1775:94 [type locality: Juddah, Saudi Arabia; the name was suppressed under the plenary powers in Opinion 1367 of the International Commission on Zoological Nomenclature (1985:361)].

Alpheus Lottini Guérin, 1829, pl. 3: fig. 3.

Alpheus Lottinii.—Guérin, 1838:38 [type locality: New Ireland, Bismarck Archipelago].

A[lpheus] ventrosus H. Milne Edwards, 1837:352 [type locality: Mauritius].

A[lpheus] laevis Randall, 1840:141 [type locality: Hawaii].

Alpheus Thetis White, 1847:75 [Australia; nomen nudum].

Crangon latipes A.H. Banner, 1953:82, fig. 27 [type locality: off Waikiki Reef, Oahu, Hawaii; 6 meters].

Alpheus lottini.—D.M. and A.H. Banner, 1982:65, fig. 15.

DIAGNOSIS.—(Sulcatus Group). Body somewhat but not extraordinarily compressed, not twice as high as wide, not setose; rostrum reaching to about level of distal margin of 1st antennular segment, base flattened, abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without paired teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood short, transverse, unarmed, submarginal area not flattened, orbital hood armed with sharp tooth directed anteromesial from surface of hood, not marginal, adrostral furrows narrow and rather deep; second antennular segment usually about $1\frac{3}{4}$ times as long as wide; basal antennal segment (basicerite) with strong, acute ventrolateral tooth nearly or quite overreaching stylocerite; antennal scale with lateral margin faintly sinuous, nearly straight, distolateral spine rather stout, overreaching distal margin of tapered blade; 1st pereopods with inferior flexor margin of merus terminating distally in strong but blunt projection; major chela compressed, about $2\frac{1}{2}$ times as long as wide, dactyl not strongly arched, veering only slightly from longitudinal plane of chela, not double-ended, bearing reasonably well-developed plunger, palm totally devoid of sculpture; minor chela $2\frac{1}{2}$ to 3 times as long as wide, dactyl subequal to palm in length, fairly slender, rather strongly hooked distally, not “*balaeniceps*” in either sex; 2nd pereopod with proximal carpal article nearly or fully twice as long as 2nd; 3rd pereopod with dactyl stout, laterally compressed, tip bluntly hoof-like, surrounded by ridge of soft chitin, propodus bearing 5–7 rather stout spines on flexor margin, carpus with both extensor and flexor margins

produced distally, merus and ischium unarmed; maximum carapace length to base of rostrum about 13 mm.

MATERIAL.—PHILIPPINES. Southwest of Manila Bay, Luzon: sta 5109; $14^{\circ}03'45''N$, $120^{\circ}16'30''E$; 18m; coral; 15 Jan 1908 (1026–1038); 9' *Albatross-Blake* beam trawl (trawl immediately torn on coral): 5 males [5.0–6.6] 2 ovig females [3.8–5.2]. Cagmanaba Bay, Burias Pass, southeastern Luzon [$13^{\circ}03'N$, $123^{\circ}18'E$]; coral heads; 11 Mar 1908: 1 male [7.5] 1 ovig female [8.7]. Palag Bay, Lagonoy Gulf, eastern Luzon [$13^{\circ}44'N$, $123^{\circ}56'E$]; from coral; 16 Jun 1909: 1 male [6.8] 1 ovig female [7.8]. Marungas Island, Sulu Archipelago [$6^{\circ}06'N$, $120^{\circ}58'E$]; shore, coral head; 19 Feb 1908: 1 male [5.5] 2 females [3.0, 5.7], 1 ovig [5.7].

RANGE.—Red Sea to South Africa, eastward to the Philippines, Indonesia, Australia, to Hawaii, the Galapagos Islands, and the American mainland from the Gulf of California to Colombia; *A. lottini* is found only in association with living pocilloporid corals, which are commonly confined to sublittoral depths to about 50 meters.

*43. *Alpheus macellarius*, new species

FIGURES 6, 7

DIAGNOSIS.—(Brevirostris Group). Body not unusually compressed or setose; rostrum slender, not reaching anteriorly quite as far as distal margin of 1st antennular segment (Figure 6a), bluntly carinate in midline posteriorly to slightly beyond bases of orbital hoods, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or paired acute teeth overhanging posterior ends of adrostral furrows, anterior margin unarmed and transverse mesial to orbital hoods, curving gradually into rostral margin, region not noticeably depressed, orbital hoods unarmed and uncarinate, adrostral furrows comparatively shallow; 2nd antennular segment about $2\frac{1}{4}$ times as long as wide; basal antennal segment (basicerite) armed with strong lateral tooth not reaching level of tip of stylocerite (Figure 4b); antennal scale with lateral margin concave near midlength, convex distally, distolateral spine strong, slightly overreaching distal margin of blade; major cheliped with chela (Figure 4d) oval in cross section, 3 times as long as wide, dactyl straight in longitudinal plane, not double-ended, plunger much reduced, defined only by proximal angle, palm without teeth either side of dactylar articulation, sculpture limited to narrow, transverse notch or “saddle” proximal to adhesive plaque; merus (Figure 4e) armed with distal tooth on inferior flexor margin; minor cheliped with chela (Figure 4f) 5 times as long as wide, dactyl not broadened or “*balaeniceps*” in either sex, nearly $1\frac{1}{2}$ times as long as palm, merus (Figure 4g) without fixed distal tooth on inferior flexor margin; 2nd pereopod (Figure 4h) with proximal article of carpus $1\frac{1}{3}$ times as long as 2nd; 3rd pereopod (Figure 4i) with dactyl (Figure 4j) subspatulate, propodus bearing series of fine spines on flexor margin, merus unarmed, ischium bearing movable spine; maximum carapace length about 12 mm.

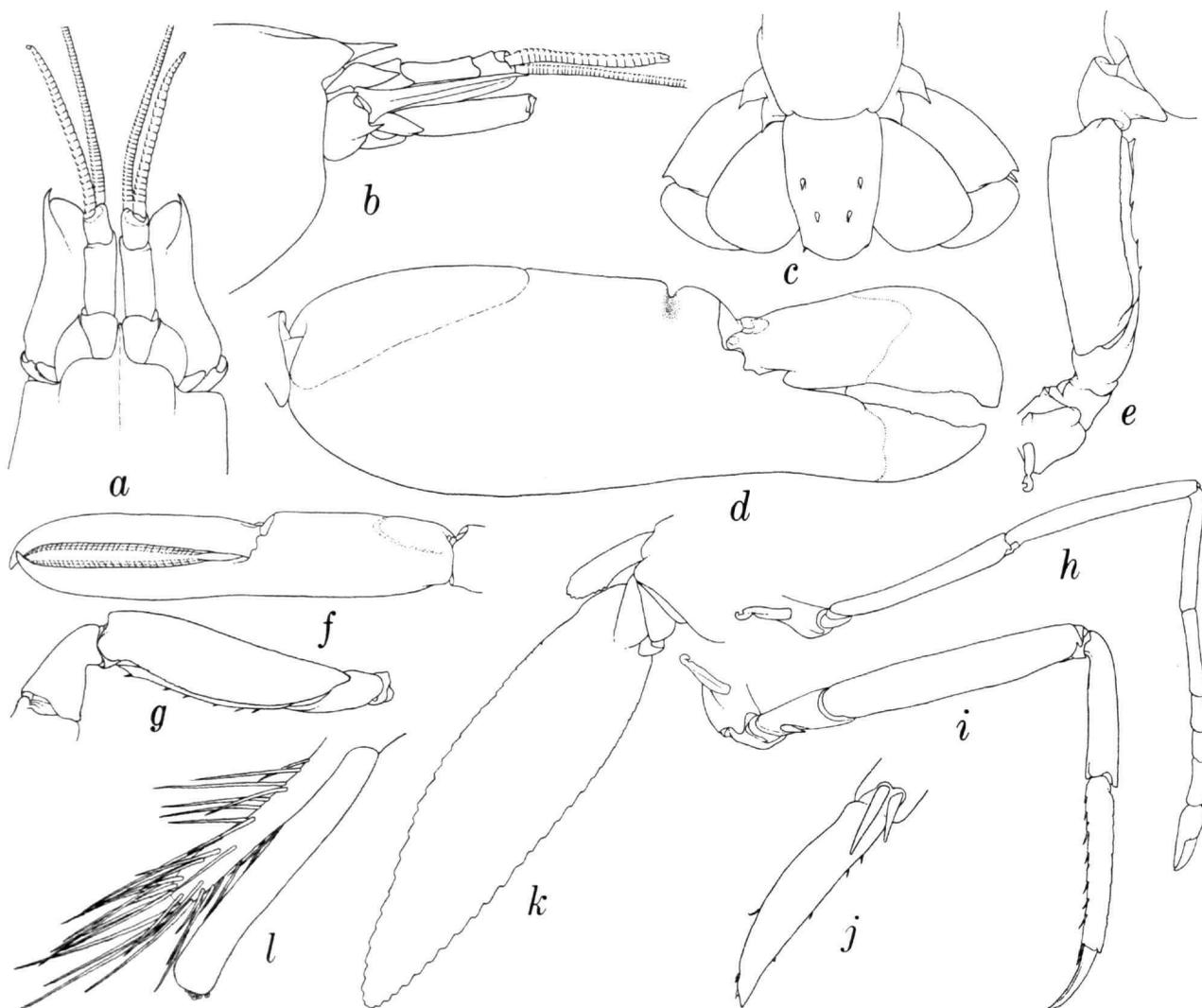


FIGURE 6.—*Alpheus macellarius*, new species, male holotype from Cebu Market, carapace length 11.2 mm: *a*, anterior carapace and appendages, dorsal aspect; *b*, same, lateral aspect; *c*, telson and uropods, dorsal aspect; *d*, right 1st (major) chela; *e*, right 1st (major) cheliped, proximal segments, lateral aspect; *f*, left 1st (minor) chela; *g*, left 1st (minor) cheliped, proximal segments, lateral aspect; *h*, right 2nd pereopod; *i*, right 3rd pereopod; *j*, same, dactyl; *k*, right 1st pleopod, posterior aspect; *l*, right appendices masculina and interna, anterior aspect.

MATERIAL.—PHILIPPINES. Dupon Bay, Leyte [10°55'N, 124°25'E]; 17 Mar 1909 (1900–2200); electric light: 1 female [6.8]. Cebu Market [10°18'N, 123°54'E]; 20 Mar 1909: 2 males [10.9, 11.2], larger is holotype (USNM 205663).

TYPE LOCALITY.—Vicinity of Cebu City, Cebu, Philippines.

RANGE.—Known only from the three *Albatross* specimens cited above from the south central Philippines.

REMARKS.—Of the approximately 33 members of the *Brevirostris* Group currently recognized, including the incompletely described *A. miyakei* Miya, 1974 (the sole species of the group with spinose orbital hoods), only 14 agree with *A.*

macellarius in having a distinct transverse, distally delimited groove or “saddle” on the palm of the major chela proximal to the adhesive plaque at the dactylar articulation. Of these 14, the following five species may be eliminated from identification with *A. macellarius* by the styloform rather than spatulate or subspatulate dactyls of the third and fourth pereopods: *A. barbatus*, *A. miersi*, *A. pubescens* De Man, 1908, *A. savuensis* De Man, 1908, and *A. talismani* Coutière, 1898d. Three species—*A. brevicristatus* De Haan, 1849, *A. brevirostris* (Olivier, 1811), and *A. cythereus* A.H. and D.M. Banner, 1966b—are distinguished by the presence of prominent

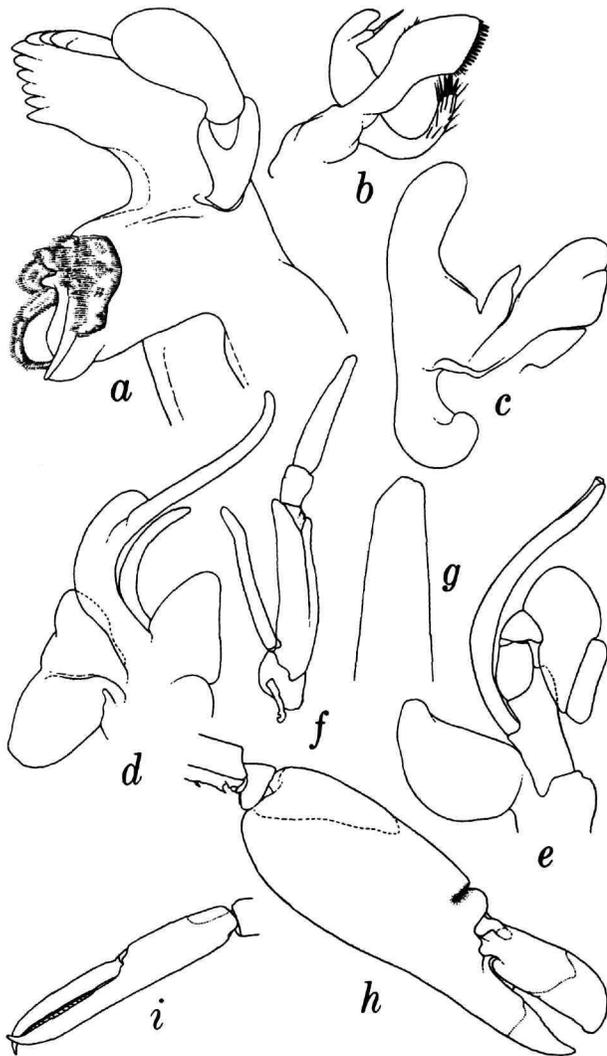


FIGURE 7.—*Alpheus macellarius*, new species, a–g, male paratype from Cebu Market, carapace length 10.9 mm; h, i, female paratype from Dupon Bay, Leyte, carapace length 6.8 mm: a, right mandible; b, right 1st maxilla; c, right 2nd maxilla; d, right 1st maxilliped; e, right 2nd maxilliped; f, right 3rd maxilliped; g, same, distal end; h, right 1st (major) chela; i, left 1st (minor) chela.

longitudinal ridges or carinae on the major chela. Two more—*A. bellulus* Miya and Miyake, 1969, and *A. moretensis* D.M. and A.H. Banner, 1982 (together with *A. cythereus*, *A. pubescens*, and *A. sauvensis*)—have the dactyl of the minor chela “balaeniceps,” at least in the male. Of the four remaining species, *A. djeddensis* Coutière, 1897d, differs from *A. macellarius* chiefly in the form and proportions of the chelae of the first pereopods, both chelae being less than three times as long as wide, compared with fully three times as long as wide in the major chela and more than five times as long as

wide in the minor chela of *A. macellarius*; *A. homochirus* (Yu, 1935) has the major chela four and one-half times as long as wide and the fingers twice as long as the palm, compared with about one and one-half times as long as the palm in the Philippine species; *A. platyunguiculatus* (A.H. Banner, 1953) has the minor chela less than four times as long as wide, compared with fully five times, and the proximal article of the carpus of the second pereopod no more than one-half, rather than longer than, the second article; finally, *A. rapax* Fabricius, 1798, which seems to be closely related to *A. macellarius*, apparently differs in the presence of flattened strips and accompanying delimiting longitudinal ridges or lines on the superior and inferior surfaces and the omission of any suggestion of the obtuse longitudinal ridge and accompanying depression sometimes present on the lateral surface of the major chela, compared with the complete absence of any such longitudinal sculpture in the new species, as well as in the more bowed and hairier fingers of the minor chela. The discussion of the extreme variability of *A. rapax* in D.M. and A.H. Banner (1982:176) indicates that *A. macellarius* may prove to be a variant of that species, but comparison of the Philippine specimens with one from the Andaman Sea identified by A.H. Banner as *A. rapax* has served to minimize the credibility of that possibility.

ETYMOLOGY.—From the Latin word for “of the meat or provision market,” in allusion to the source of the holotype of the species.

*44. *Alpheus macroskeles* Alcock and Anderson, 1894

FIGURE 8

Alpheus macroskeles Alcock and Anderson, 1894:153 [type locality (restricted by “type” selection by Alcock, 1901:141, documented by A.H. and D.M. Banner, 1981:232): Bay of Bengal, 490 meters].—D.M. and A.H. Banner, 1978:224, fig. 1.

DIAGNOSIS.—(Brevirostris Group). Body not unusually compressed or setose; rostrum narrow, sharp, not nearly reaching as far as distal margin of 1st antennular segment, feebly carinate in midline, carina disappearing on anterior gastric region, base not abruptly delimited from adrostral furrows; carapace with or without median tubercle on gastric region, without flattened teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood variably incised, submarginal region not flattened, orbital hoods unarmed, adrostral furrows not very deep; 2nd antennular segment about $3\frac{1}{2}$ times as long as wide; basal antennal segment (basicerite) with slender ventrolateral spine not reaching level of tip of stylocerite; antennal scale with lateral margin rather weakly concave, distolateral spine not especially strong, overreaching distal margin of blade by varying extent; 1st pereopods with merus armed with acute distal tooth on flexor margin and stronger tooth near distal end of extensor margin; major chela subcylindrical, about 7 times as long as wide, dactyl sometimes overreached by fixed finger,

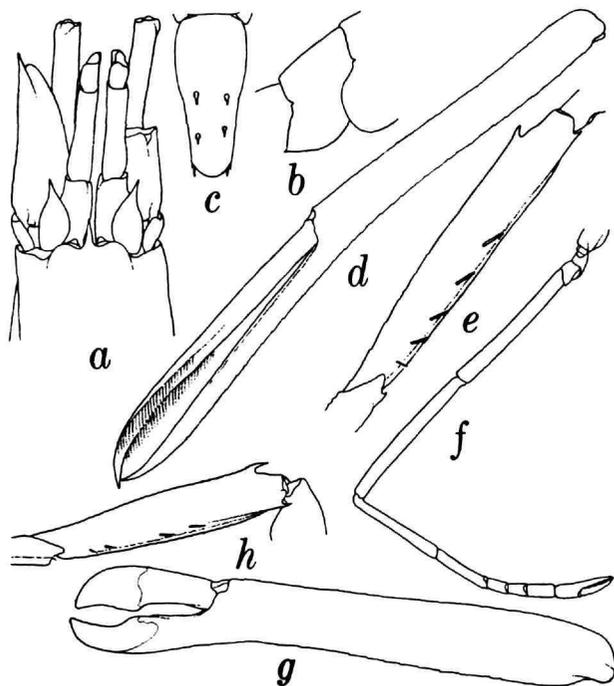


FIGURE 8.—*Alpheus macroskeles*, a-f, male from *Albatross* sta 5624, carapace length 8.3 mm; g,h, male from *Albatross* sta 5625, carapace length 8.1 mm: a, anterior carapace and appendages, dorsal aspect; b, 5th abdominal somite; c, telson, dorsal aspect; d, left 1st (minor) chela, flexor aspect; e, merus of left 1st (minor) cheliped, mesial aspect; f, left 2nd pereopod; g, left 1st (major) chela, flexor aspect; h, merus of left 1st (major) cheliped.

not double-ended, plunger little developed, palm without sharp tooth either side of dactylar articulation, without longitudinal carina or "saddle" proximal to adhesive plaque, without shoulder on margin proximal to fixed finger; minor chela 10–14 times as long as wide, dactyl $2/3$ to fully as long as palm, "balaeniceps" in male, palm somewhat granulate; 2nd pereopod with proximal carpal article $1\frac{2}{3}$ to twice as long as 2nd; 3rd pereopod with dactyl subspatulate, carpus with blunt distal lobe on extensor margin, merus unarmed, ischium bearing movable spine; maximum carapace length about 10 mm.

MATERIAL.—PHILIPPINES. Babuyan Channel, north of Luzon: sta 5328; 18°29'N, 121°39'E; 274 m; blue mud; 12.2°C; 19 Nov 1908 (0944–1004); 12' Tanner beam trawl, mud bag: 1 female [8.2]. 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: 1 male [7.5] (identification?). 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 female [8.2]. Samar Sea, east of Masbate: sta 5396; 11°57'N, 124°12'24"E; 251 m; green mud; 15 Mar 1909 (0945–1005); 12' Agassiz beam trawl, mud bag: [8.1] (identification?). West of Leyte: 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 ovig female [6.9]. 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 male [9.8] (identification?); 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 ovig female [8.2].

INDONESIA. West of Halmahera: sta 5624; 0°12'15"N, 127°29'30"E; 527 m; fine sand, mud; 29 Nov 1909 (1058–1118); 12' Agassiz beam trawl: 1 male [8.3]; sta 5625; 0°07'00"N, 127°28'00"E; 421 m; gray mud, fine sand; 29 Nov 1909 (1416–1437); 12' Agassiz beam trawl: 1 male [8.1].

RANGE.—Perhaps the only authentic records of *A. macroskeles* are those mentioned by Alcock and Anderson (1894) in the Bay of Bengal and the Andaman Sea in depths of 265 to 494 meters. The ovigerous female tentatively identified by De Man (1911:403) from the Bali Sea in 330 meters lacked both chelipeds and differed in minor respects from the descriptions of *A. macroskeles*; the present study indicates that specimens of this species cannot be distinguished from those of *A. nonalter* without recourse to at least one of the first chelipeds (see "Remarks" under the latter species). The specimen recorded from the Red Sea by Balss (1915:23) came from a depth of only 58 meters, which might cast some doubt on the identification, yet D.M. and A.H. Banner (1978:224) found "excellent agreement" between paratypes of *A. macroskeles* and specimens from only 77 meters in the South China Sea. At the other extreme, Calman (1939:208) assigned to this species 18 specimens from depths of 528 to more than 1061 meters in the Gulf of Aden.

REMARKS.—The two males from *Albatross* stations 5117 and 5197 (Balayan Bay and Bohol Strait, respectively) lack both first chelipeds and their identity with *A. macroskeles* is therefore questionable (see "Remarks" under *A. nonalter*.)

45. *Alpheus maindroni* Coutière, 1898

Alpheus *Maindroni* Coutière, 1898c:133, figs. 2, 2' [type locality: the type series came from 2 localities: Masqat (Muscat), Gulf of Oman, and Djibouti, Gulf of Aden].

Alpheus maindroni.—D.M. and A.H. Banner, 1982:203, fig. 62; 1985:19.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum triangular, not nearly reaching distal margin of 1st antennular segment, bluntly carinate in midline, carina not extending posteriorly beyond bases of eyes, base of rostrum not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or paired acute teeth overhanging posterior ends of adrostral furrows, anterior margin mesial to orbital hoods unarmed but convexly produced anteriorly, meeting rostral margin at less than right angle, orbital hoods unarmed, adrostral furrows shallow; 2nd antennular segment $1\frac{1}{2}$ times as long as wide; basal antennal segment (basicerite) armed with acute ventral tooth not nearly reaching level of tip of stylocerite; antennal

scale with lateral margin slightly concave, distolateral spine stout, considerably overreaching distal margin of blade; 1st pereopods with merus armed with acute tooth on inferior flexor margin; major chela compressed $2\frac{1}{2}$ times as long as wide, dactyl straight in longitudinal plane, not double-ended, bearing very well developed plunger, palm without longitudinal carina near margin proximal to fixed finger, with reduced "saddle" forming shallow, poorly delimited, oblique depression proximal to adhesive plaque, shoulder on margin proximal to fixed finger rounded; minor chela 3 times as long as wide, dactyl slightly longer than palm, not "balaeniceps" in either sex; 2nd pereopod with proximal carpal article more than twice as long as 2nd; 3rd pereopod with dactyl pointed, simple, propodus bearing 9 spines on flexor margin, carpus slightly projecting distally on both extensor and flexor margins, merus and ischium unarmed; maximum carapace length about 9 mm.

RANGE.—Gulf of Aden, Gulf of Oman, Mozambique, Madagascar, Philippines, Indonesia, and Australia, Caroline and Marshall islands; shallow water.

***46. *Alpheus malabaricus* (Fabricius, 1775)**

FIGURE 9

Astacus Malabaricus Fabricius, 1775:415 [type locality: Malabar Coast, southwestern India].

Alpheus macrodactylus Ortmann, 1890:473, pl. 36: fig. 10, 10e [type locality: Sydney].

Alpheus dolichodactylus Ortmann, 1890:473, pl. 36: fig. 11 [type locality: Tokyo Wan, Japan].

Alpheus dolichodactylus, var. *leptopus* De Man, 1910:289 [type locality: the type series came from 4 *Siboga* stations in the vicinity of the Lesser Sunda Islands, Indonesia; 18–289 meters].

Alpheus malabaricus mackayi A.H. Banner, 1959:149, fig. 12 [type locality: Wailupe fish pond, Oahu, Hawaii].

Alpheus malabaricus malabaricus.—A.H. and D.M. Banner, 1966b:145, fig. 55.

Alpheus malabaricus songkla A.H. and D.M. Banner, 1966b:147, fig. 56 [type locality: Lake Songkla, Songkla, Thailand].

Alpheus mackayi.—A.H. and D.M. Banner, 1975:428, fig. 2A–H.

Alpheus malabaricus trefzae D.M. and A.H. Banner, 1982:207, fig. 64 [type locality: Brammo Bay, Dunk Island, Queensland, Australia; low tide].

Alpheus mazatlanicus Wicksten, 1983:46, figs. 7, 8 [type locality: Laguna del Caimanero, Sinaloa, Mexico].

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum variable in length and proportionate width, rarely if ever reaching as far as distal margin of 1st antennular segment, median carina moderately sharp to rounded, not reaching posteriorly beyond limits of orbital hoods, base not abruptly delimited from adrostral furrows; carapace without tooth or tubercle on gastric region or paired acute teeth overhanging posterior ends of adrostral furrows, anterior margin mesial to orbital hoods variably incised to nearly transverse, orbital hoods unarmed, adrostral furrows, relatively shallow and short; 2nd antennular segment about twice as long as wide; basal antennal segment (basicerite) armed with acute ventrolateral spine not nearly reaching level of tip of stylocerite; antennal scale with lateral margin

moderately concave to nearly straight, distolateral spine strong but not unusually stout, distinctly overreaching distal margin of blade or not; 1st pereopods with merus armed with acute distal tooth on inferior flexor margin; major chela compressed, $2\frac{1}{2}$ to $3\frac{1}{2}$ times as long as wide, dactyl straight in longitudinal plane, not double-ended, plunger moderately well-developed to barely distinguishable, palm with longitudinal furrow but no carina near margin proximal to fixed finger, with "saddle" proximal to adhesive plaque, shoulder proximal to "saddle" obtusely rounded to slightly projecting and overhanging "saddle"; minor chela $4\frac{1}{2}$ to $7\frac{1}{2}$ times as long as wide, dactyl from less than $1\frac{1}{2}$ to more than 3 times as long as palm, not "balaeniceps" in either sex, 2nd pereopod with proximal carpal article from slightly longer than to twice as long as 2nd; 3rd pereopod with dactyl subspatulate, propodus with or without series of spinules on flexor margin, carpus with blunt distal projection on extensor margin, short acute distal tooth on flexor margin, merus unarmed, ischium with movable spine; maximum carapace length to base of rostrum about 13 mm.

MATERIAL.—PHILIPPINES. "Little Harbor at Luneta, Manila Harbor," Luzon; 12 Dec 1907: 4 males [5.2–9.2] 3 females [4.2–7.4], 1 ovig [7.4]. Alimango River, Burias Island [13°06'N, 122°57'E]; sand, mud; 5 Mar 1909 (0900–1200); 130' seine (2 hauls), dynamite (5 shots): 1 female [7.0].

RANGE.—East Africa to Mexico; intertidal to at least 289 meters.

REMARKS.—Admittedly superficial study of the *A. malabaricus* complex has suggested to me that the species—like the Atlantic *A. floridanus* Kingsley, 1878 (see Chace, 1972:65)—is highly variable and widely ranging. A large number of taxa could be envisioned by recognizing the almost innumerable combinations of variable characters (see Wicksten, 1983:47, table E). For instance, the specimen from Burias Island illustrated in Figure 9 is nearly identical with the Australian specimen identified and illustrated by D.M. and A. H. Banner (1982:210, fig. 65) as *A. macrodactylus*, except for the more elongate first chelipeds. The character that seems most clearly to distinguish *A. macrodactylus* from a form like *A. malabaricus trefzae* (see D.M. and A.H. Banner, 1982:208, fig. 64f) is the much better developed plunger on the dactyl of the major chela, but a specimen from off Cochin, southwestern India, identified as *A. malabaricus malabaricus* by A.H. Banner has a plunger virtually identical with the one shown in Figure 9d, combined with a minor chela like the one illustrated from a specimen of *A. malabaricus dolichodactylus* by De Man, 1911 (1915), pl. 23: fig. 105f. A.H. and D.M. Banner (1975:428) elevated *A. malabaricus mackayi* A.H. Banner, 1959, to species status because the rostrum is much smaller than it is in typical *A. malabaricus* and the fingers of the minor chela are only one and one-half, rather than two and one-half or more, times as long as the palm, but the rostrum is no smaller than it is in *A. malabaricus trefzae* and the fingers of the minor chela no shorter, in relation to the palm, than they are in *A. malabaricus songkla*.

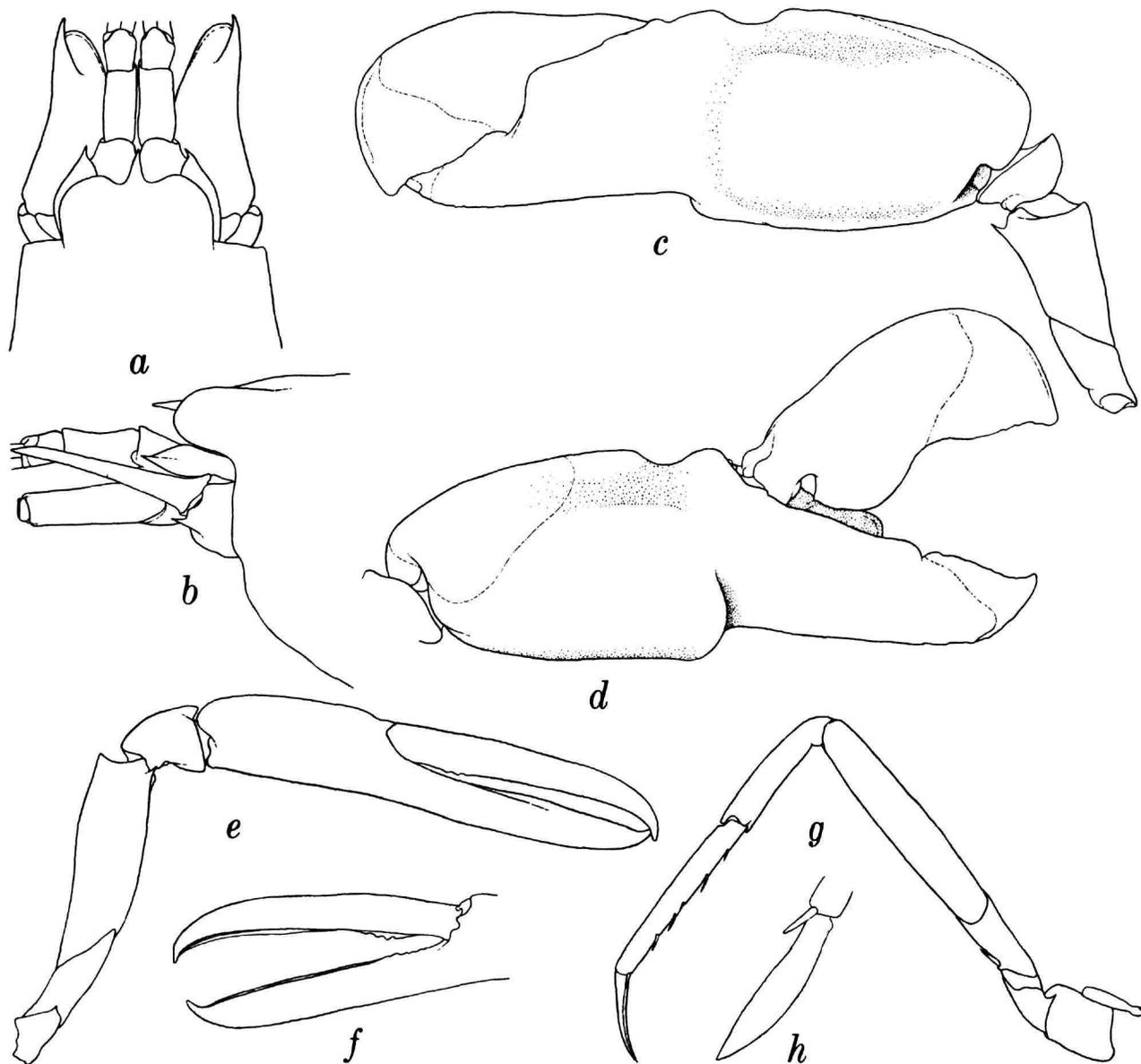


FIGURE 9.—*Alpheus malabaricus*, female from Alimango River, Burias Island, carapace length 7.0 mm: *a*, anterior carapace and appendages, dorsal aspect; *b*, same, lateral aspect; *c*, right 1st (major) cheliped, mesial aspect; *d*, same, chela, lateral aspect; *e*, left 1st (minor) cheliped, lateral aspect; *f*, same, fingers, mesial aspect; *g*, left 3rd pereopod; *h*, same, dactyl, flexor aspect.

It is quite possible that the evidence for the variability theory derived from the number of variations that are both sympatric and widespread geographically may eventually prove to be false, but such conclusions should be supported by the study of more material than is currently available.

***47. *Alpheus malleodigitus* (Bate, 1888)**

Betaeus malleodigitus Bate, 1888:565, pl. 101: fig. 5 [type locality: Levuka, Fiji Islands].

A[lpheus] phrygianus Coutière, 1905:886, pl. 77: fig. 25 [type locality: 2 sites in the Maldive Islands and 1 in Madagascar].

Alpheus Danae Coutière, 1905:887, pl. 77: fig. 26 [type locality: Maldive Islands].

Alpheus persicus Nobili, 1905:238 [type locality: Persian Gulf].

Alpheus malleodigitus, var. *gracilicarpus* De Man, 1909a:99 [type locality: 2 stations in the Sulu Archipelago, Philippines, and 2 in vicinity of Lesser Sunda Islands, Indonesia; 8–54 meters].

Alpheus malleodigitus.—A.H. and D.M. Banner, 1966a:162–175, figs. 8c,d, 9–18.—D.M. and A.H. Banner, 1982:92, fig. 22m–o.—A.H. and D.M. Banner, 1983:44.

DIAGNOSIS.—(Obesomanus Group). Body neither unusually compressed nor densely setose; rostrum very small, subrectangular, not reaching nearly as far as distal margin of 1st antennular segment, sharply carinate, carina disappearing rather abruptly into somewhat flattened triangular area somewhat sharply delimited from posterior ends of adrostral furrows; carapace without median tooth or tubercle posterior to base of rostrum and without paired acute teeth overhanging posterior ends of adrostral furrows, anterior margin transverse and unarmed mesial to orbital hoods, submarginal region not flattened, adrostral furrows rather deep; 2nd antennular segment usually at least 3 times as long as wide; basal antennal segment (basicerite) unarmed; antennal scale with lateral margin moderately concave, distolateral spine stout, far overreaching distal margin of blade; 1st pereopods with merus unarmed on mesial flexor margin; major chela subcircular in cross section, about $2\frac{3}{4}$ times as long as wide, dactyl straight in longitudinal plane, double-ended, bearing well-developed, truncated plunger, palm with rather extensive depression or broad furrow on lateral side of extensor surface immediately posterior to adhesive plaque and smaller lateral depression near base of fixed finger; minor chela about $3\frac{1}{2}$ times as long as wide, dactyl about $\frac{1}{2}$ as long as palm, not “balaeniceps” in either sex; 2nd pereopod with proximal carpal article $\frac{1}{2}$ as long as to subequal with 2nd; 3rd pereopod with dactyl simple, propodus bearing about 8 stout spines on flexor margin, carpus with short distal tooth on extensor margin, longer one on flexor margin, merus with subdistal tooth on flexor margin, ischium without movable spine; maximum carapace length to base of rostrum about 9 mm.

MATERIAL.—PHILIPPINES. Marungas Island, Sulu Archipelago [6°06'N, 120°58'E]; $1\frac{1}{4}$ to $2\frac{1}{2}$ m; scattered coral and sand; 10 Feb 1908 (1330–1500); diving, coral heads taken ashore; 2 females [7.4, 7.7], 1 ovig [7.7].

RANGE.—Red Sea and eastern Africa to Hong Kong, Japan, Philippines, Indonesia, and Australia, eastward to the Society Islands but not Hawaii; on and in corals, usually in surf zone.

REMARKS.—See “Remarks” under *A. microstylus*.

*48. *Alpheus microstylus* (Bate, 1888)

Betaeus microstylus Bate, 1888:566, pl. 101: fig. 6 [type locality: Albany Island, Cape York, Australia].

Alpheus microstylus.—A.H. and D.M. Banner, 1983:45, fig. 6a–f.

DIAGNOSIS.—(Obesomanus Group). Body neither unusually compressed nor densely setose; rostrum very small, rarely

absent, not reaching as far as distal margin of 1st antennular segment, sharply carinate, carina disappearing rather abruptly into somewhat flattened triangular area roughly delimited from posterior ends of adrostral furrows; carapace without median tooth or tubercle posterior to base of rostrum and without paired acute teeth overhanging posterior ends of adrostral furrows, anterior margin transverse or concave and unarmed mesial to orbital hoods, submarginal region not flattened, adrostral furrows rather deep; 2nd antennular segment usually no more than 3 times as long as wide; basal antennal segment (basicerite) unarmed; antennal scale with lateral margin somewhat concave, distolateral spine stout, usually overreaching distal margin of blade by moderate amount; 1st pereopods with merus usually unarmed on mesial flexor margin; major chela subcircular in cross section, about $2\frac{1}{2}$ times as long as wide, dactyl straight in longitudinal plane, double-ended, bearing well-developed, truncated plunger, palm with extensive depression immediately proximal to adhesive plaque and with sinuous furrow on fixed finger; minor chela about $2\frac{1}{2}$ times as long as wide, dactyl less than $\frac{1}{2}$ as long as palm, not “balaeniceps” in either sex; 2nd pereopod with proximal carpal article $\frac{1}{3}$ to $\frac{1}{2}$ as long as 2nd; 3rd pereopod with dactyl simple, propodus bearing about 8 stout spines on flexor margin, carpus with short distal tooth on extensor margin, longer one on flexor margin, merus with subdistal tooth on flexor margin, ischium bearing inconspicuous small movable spine; maximum carapace length to base of rostrum about 9 mm.

MATERIAL.—PHILIPPINES. Port Gubat, southeastern Luzon [12°55'N, 124°09'E]; tide pool; 23 Jun 1909 (1303–1700); 1 female [8.3].

RANGE.—Red Sea and eastern Africa to Indonesia, Vietnam, Philippines, Indonesia, Australia, and Caroline, Mariana, and Samoan islands.

REMARKS.—In their review of the alpheids of the western Indian Ocean, A.H. and D.M. Banner (1983) offered an analysis of the material available to them of *A. malleodigitus*, *A. microstylus*, and *A. obesomanus*. Although the species differed widely in geographic distribution, *A. malleodigitus* being most common in the western Indian Ocean, Thailand, and the Central Pacific, *A. microstylus* rare everywhere except the western Indian Ocean, and *A. obesomanus* common in Australia, the Philippines, and Thailand, they were “certain that further studies such as those we have made with preserved specimens, supplemented with crude field observations, will not resolve the question posed.” They concluded: “Although we are inclined towards the concept of a single variable species [*A. obesomanus*], we have no proof and we therefore leave the three nominal species standing.”

49. *Alpheus miersi* Coutière, 1898

Alpheus gracilipes.—Miers, 1884:287 [not *Alpheus gracilipes* Stimpson, 1860:31].

Alpheus rapax var. *Miersi* Coutière, 1898e:166, fig. 1 [type locality: the 2 specimens mentioned by Miers (1884:287) were found on the beach at Port

Molle and at Flinders Island, both on the Coral Sea coast of Queensland, Australia).

[?]A[*Alpheus*] *gracilipes* var. *serratus* Coutière, 1898e:167 [name erroneously credited to Miers for specimen from Flinders Island, see "Remarks"].

A[*Alpheus*] *Miersi*.—Coutière, 1905:903, pl. 83: fig. 42, pl. 84: fig. 42b–i.

Alpheus miersi.—D. M. and A. H. Banner, 1982:168, fig. 51.

DIAGNOSIS.—(Brevirostris Group). Body neither unusually compressed nor densely setose; rostrum triangular, not reaching as far as distal margin of 1st antennular segment, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without paired teeth overhanging posterior ends of adrostral furrows, anterior margin unarmed and slightly concave mesial to orbital hoods, latter unarmed; 2nd antennular segment little more than twice as long as wide; basal antennal segment (basicerite) armed with rather prominent acute ventrolateral tooth not reaching level of apex of stylocerite; antennal scale with lateral margin slightly concave, distolateral spine overreaching distal margin of blade; 1st pereopods with merus armed with small distal tooth on inferior flexor margin; major chela subcylindrical, about $3\frac{1}{4}$ times as long as wide, dactyl not double-ended, palm without teeth either side of dactylar articulation, without longitudinal carina on mesial surface parallel with "dorsal" margin, with narrow transverse groove or "saddle" proximal to adhesive plaque, without shoulder on margin proximal to fixed finger; minor chela slightly or considerably more than 4 times as long as wide, dactyl subequal to palm in length, "balaeniceps" in male only; 2nd pereopod with 2 proximal articles subequal in length; 3rd pereopod with dactyl simple, propodus bearing 7 spines on flexor margin; carpus projecting distally on extensor margin, merus with small tooth at distal end of flexor margin, ischium bearing prominent movable spine; maximum carapace length about 8 mm.

RANGE.—Somalia, Madagascar, Seychelles, Maldives and Laccadive islands, Sri Lanka, Philippines, Japan, Indonesia, and Australia; intertidal.

REMARKS.—Coutière (1898e:166) noted the following "Les différences légères qui séparent cette variété [*Miersi*] de *A. rapax* sont encore atténuées chez un autre spécimen nommé par Miers *A. gracilipes* var. *serratus* (Zool. de l'Alert," 1884:287), où le seul caractère distinctif consiste dans les dactylopodites non lancéoles." I can find no evidence that Miers ever used this name, which may have come to Coutière's attention from a specimen label on the syntype from Flinders Island when he examined British Museum material. If deemed an available name, it should be credited to Coutière, who apparently first published it. Inasmuch as Coutière mentioned among the characters of *A. rapax miersi*, "Les dactylopodites des pattes 3, 4, 5 sont comprimés latéralement en forme de griffe et ne montrent pas la forme aplatie et lancéolée caractéristique de *A. rapax*," it seems probable that he meant to indicate that *A. gracilipes serratus* agrees with *A. rapax* and perhaps disagrees with *A. miersi* in all characters mentioned except the nonlanceolate dactyls. This would seem to represent

an acceptable description of a species-group animal at the time of publication. It is possible, therefore, that "*serratus*" is an available name for an Australian representative of the genus *Alpheus*, and homonymy does not seem to be involved, but I am unable to find a currently known shrimp to which the name is applicable.

50. *Alpheus mitis* Dana, 1852

Alpheus mitis Dana, 1852a:22 [type locality: Balabac Strait]; 1852b:549; 1855, pl. 35: fig. 1.

DIAGNOSIS.—(Diadema Group). Body not unusually compressed or setose; rostrum reaching nearly to level of distal margin of 1st antennular segment, carina low, rounded; carapace without median tooth or tubercle on gastric region, without paired teeth overhanging posterior ends of adrostral furrows, anterior margin unarmed, transverse mesial to orbital hood, orbital hood unarmed, adrostral furrows shallow; 2nd antennular segment nearly twice as long as wide; basal antennal segment (basicerite) armed with acute ventrolateral tooth not reaching anteriorly as far as tip of stylocerite; antennal scale with lateral margin slightly concave, distolateral spine moderately strong, overreaching distal margin of blade; 1st pereopods with distal tooth on inferior flexor margin of merus; major chela oval in cross section, about 3 times as long as wide, dactyl little skewed, not double-ended, palm without sculpture, slightly less than twice as long as high, fingers slightly more than $\frac{1}{2}$ as long as palm; minor chela about 4 times as long as wide, fingers slightly shorter than palm; 2nd pereopod with proximal carpal article slightly longer than 2nd; 3rd pereopod with dactyl simple, neither biunguiculate nor subspatulate, propodus with 6–7 spines on flexor margin, carpus produced distally on extensor margin, merus unarmed, ischium bearing movable spine; maximum carapace length to base of rostrum about 7 mm.

RANGE.—If *A. mitis* is distinct from *A. paracrinitus*, it is apparently known with certainty only from the unique missing holotype from Balabac Strait.

REMARKS.—See "Remarks" under *A. paracrinitus*. The final sentence in the original description—"An femina *A. Lottinii*?" (Dana, 1852a:22)—would suggest that the holotype of *A. mitis* was a female.

*51. *Alpheus nonalter* Kensley, 1969

FIGURE 10

Alpheus nonalter Kensley, 1969:172, fig. 15 [type locality: northeast of Durban, South Africa; 118 meters].—A.H. and D.M. Banner, 1981:232.

DIAGNOSIS.—(Brevirostris Group). Body not unusually compressed or setose; rostrum narrow, sharp, not nearly reaching as far as distal margin of 1st antennular segment, bluntly carinate in midline, carina disappearing on anterior gastric region, base not abruptly delimited from adrostral furrows; carapace with or without median tubercle on gastric

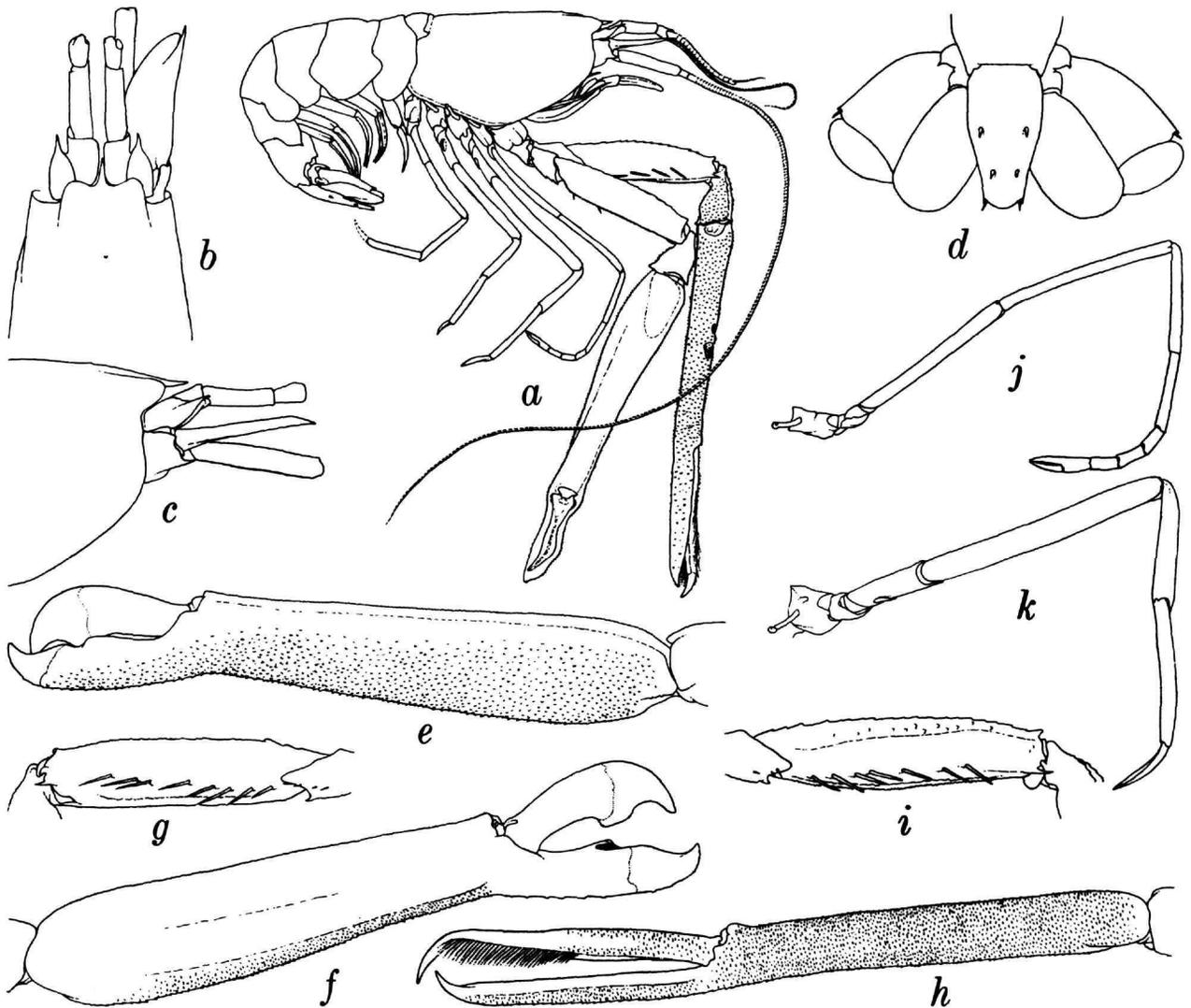


FIGURE 10.—*Alpheus nonalter*, male from *Albatross* sta 5397, carapace length 9.0 mm: *a*, lateral aspect; *b* anterior carapace and appendages, dorsal aspect; *c*, same, lateral aspect; *d*, telson and uropods, dorsal aspect; *e*, right 1st (major) chela, extensor aspect; *f*, same, flexor aspect; *g*, merus of right 1st (major) cheliped, mesial aspect; *h*, left 1st (minor) chela, flexor aspect; *i*, merus of left 1st (minor) cheliped, mesial aspect; *j*, right 2nd pereopod; *k*, right 3rd pereopod.

region, without paired flattened teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood variably incised, submarginal region not flattened, orbital hoods unarmed, adrostral furrows not very deep; 2nd antennular segment about 3 times as long as wide; basal antennal segment (basicerite) with sharp ventral spine not reaching level of tip of stylocerite; antennal scale with lateral margin slightly sinuous, distolateral spine not especially strong, overreaching distal margin of blade to varying extent; 1st pereopods with merus armed with sharp distal spine on

flexor margin; extensor margin unarmed; major chela about 6 times as long as wide, dactyl sometimes overreached by fixed finger, not double-ended, plunger little developed, palm without sharp tooth either side of dactylar articulation, without "saddle" proximal to adhesive plaque but with 5 rather obscure longitudinal carinae or ridges forming 4 facets on 3 of 4 surfaces, without shoulder on margin proximal to fixed finger; minor chela 10–14 times as long as wide, dactyl at least $\frac{2}{3}$ as long as palm, "balaeniceps" in male, palm granulate; 2nd pereopod with proximal carpal article distinctly longer than

2nd; 3rd pereopod with dactyl subspatulate, carpus produced distally on extensor margin, merus unarmed, ischium bearing movable spine; maximum carapace length to base of rostrum at least 9 mm.

MATERIAL.—PHILIPPINES. Samar Sea, east of Masbate: 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 male [9.0]. West of Leyte: sta 5409; 10°38'N, 124°13'08"E; 346 m; green mud; 18 Mar 1909 (0951–1021); 12' Agassiz beam trawl, mud bag: 1 male [5.8].

RANGE.—Eastern Africa from Mozambique and Madagascar to Natal, Hong Kong, and the Philippines; 86–346 meters.

REMARKS.—There is no doubt that *A. nonalter* is a valid species that is distinguishable from *A. macroskeles* by the subrectangular cross-sectional configuration and the longitudinal carination of the major chela and the absence of a subdistal tooth on the extensor margin of the merus of both first chelipeds, but I have been unable to find any correlation between these features and any of the following variable characters: the depth of the sinus separating the rostrum from each orbital hood, the distinctness of the median postrostral tubercle on the carapace, the sharpness of the posteroventral angle of the pleuron of the fifth abdominal somite, the length of the distolateral spine of the antennal scale, the form of the dactyl of the major chela, the proportionate lengths of the fingers of the minor chela, the proportions of the merus of the anterior pair of chelipeds and the number of acicular spines near the flexor margin of that segment, the proportionate lengths of the two proximal articulations of the carpus of the second pereopod, and the presence of spines on the flexor margin of the propodus of the third pereopod. It is therefore virtually impossible to distinguish specimens of either of these species that lack both members of the anterior pair of chelipeds.

*52. *Alpheus obesomanus* Dana, 1852

Alpheus obeso-manus Dana, 1852a:21 [type locality: Fiji Islands]; 1852b:547; 1855, pl. 34: fig. 7.

Alpheus Lutini Coutière, 1905:885, pl. 76: fig. 24 [type locality: Maldive and Samoan islands and "l'île Tague"].

Alpheus obesomanus.—D.M. and A.H. Banner, 1982:89, fig. 22a–1.—A.H. and D.M. Banner, 1983:53, fig. 6g,h.

DIAGNOSIS.—(Obesomanus Group). Body neither unusually compressed nor densely setose; rostrum very small, rarely absent, not reaching as far as distal margin of 1st antennular segment, sharply carinate, carina disappearing posteriorly into somewhat flattened area roughly delimited from posterior ends of adrostral furrows; carapace without median tooth or tubercle posterior to base of rostrum and without paired acute teeth overhanging posterior ends of adrostral furrows, anterior margin transverse or concave and unarmed mesial to orbital hoods, submarginal region not flattened, adrostral furrows rather deep; 2nd antennular segment $1\frac{1}{2}$ to 3 times as long as wide; basal antennal segment (basicerite) unarmed; antennal scale with lateral margin somewhat concave, distolateral spine stout, usually overreaching distal margin of greatly reduced

blade to considerable extent; 1st pereopods with merus usually unarmed on mesial flexor margin; major chela oval in cross section, nearly $2\frac{1}{2}$ times as long as wide, dactyl straight in longitudinal plane, double-ended, palm with extensive depression immediately proximal to adhesive plaque; minor chela $3\frac{1}{2}$ to 5 times as long as wide, dactyl less than $\frac{1}{2}$ as long as palm, not "balaeniceps" in either sex; 2nd pereopod with proximal carpal article $\frac{1}{4}$ to $\frac{1}{2}$ as long as 2nd; 3rd pereopod with dactyl simple, propodus bearing about 6 spines on flexor margin, carpus acutely produced distally on both margins, strongly so on flexor side, merus with strong distal tooth on flexor margin, ischium bearing inconspicuously small movable spine; maximum carapace length to base of rostrum about 8 mm.

MATERIAL.—PHILIPPINES. Marungas Island, Sulu Archipelago [6°06'N, 120°58'E]; 19 Feb 1908; shore, coral head: 1 male [4.0] 2 ovig females [4.8. 5.2].

RANGE.—Red Sea, eastern Africa, and Madagascar to the Society Islands, including Japan and Australia, but not Hawaii.

REMARKS.—See "Remarks" under *A. microstylus*.

53. *Alpheus ovaliceps* Coutière, 1905

Alpheus ovaliceps Coutière, 1905:888, pl. 77: fig. 27 [type locality: Minicoy, Laccadive Islands].—D.M. and A.H. Banner, 1978:227; 1982:98, fig. 24.

DIAGNOSIS.—(Crinitus Group). Body not unusually compressed or setose; rostrum acute, not reaching level of distal margin of 1st antennular segment, carina rounded, reaching somewhat posterior to eyes, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or acute teeth overhanging posterior ends of adrostral furrows, anterior margin partially convex and unarmed mesial to orbital hoods, region somewhat flattened, orbital hood unarmed, with semblance of oblique, sinuous dorsal carina, adrostral furrows distinct; 2nd antennular segment about $1\frac{1}{2}$ times as long as wide; basal antennal segment (basicerite) armed with long ventrolateral tooth overreaching stylocerite; antennal scale with lateral margin concave, distolateral spine not unusually stout, considerably overreaching distal margin of blade; 1st pereopods with merus lacking distinct distal tooth on inferior flexor margin; major chela slightly compressed, about $2\frac{1}{2}$ times as long as wide, dactyl not curved in longitudinal plane but both fingers bent slightly toward flexor aspect of chela, not double-ended, bearing rather strong plunger directed proximad, palm without sculpture except for slight sinus proximal to adhesive plaque; minor chela about 3 times as long as wide, dactyl about equal to palm in length, not "balaeniceps" in either sex; 2nd pereopod with proximal carpal article slightly longer than 2nd; 3rd pereopod with dactyl simple, not biunguiculate or spatulate, propodus bearing 6 pairs of spines on flexor margin, carpus with acute distal tooth on flexor margin, merus unarmed, ischium bearing movable spine; maximum carapace length to base of rostrum about 7 mm.

RANGE.—Kenya, Laccadive Islands, Philippines, and Austra-

lia to Society Islands; intertidal to subtidal.

54. *Alpheus pachychirus* Stimpson, 1860

Alpheus pachychirus Stimpson, 1860:30 [type locality: Ryukyu Islands].—D.M. and A.H. Banner, 1982:102, figs. 23j,k, 26.

DIAGNOSIS.—(Crinitus Group). Body neither unusually compressed nor densely setose; rostrum much reduced, not reaching nearly as far as distal margin of 1st antennular segment, dorsal carina low, reaching posteriorly beyond eyes, not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region and without paired teeth overhanging posterior ends of adrostral furrows, anterior margin transverse and unarmed mesial to orbital hoods, region somewhat flattened, orbital hoods unarmed, adrostral furrows shallow; 2nd antennular segment $2\frac{1}{3}$ times as long as wide; basal antennal article (basicerite) bearing very small ventrolateral tooth not nearly reaching level of tip of stylocerite; antennal scale with lateral margin faintly sinuous, distolateral spine not especially stout, slightly overreaching distal margin of rather broad blade; major cheliped with chela slightly compressed, $3\frac{1}{3}$ times as long as wide, dactyl not curved in longitudinal plane but both fingers bent slightly toward flexor aspect of chela, not double-ended, bearing strong, distally truncate plunger directed somewhat proximad and connected by flange with distal end of dactyl, palm without sculpture except for slight depression proximal to adhesive plaque, merus with sharp distal tooth on inferior flexor margin; minor cheliped with chela about $2\frac{1}{3}$ times as long as broad, dactyl broadly "balaeniceps" in male only, narrowly tapering in female, merus unarmed; 2nd pereopod with proximal carpal article nearly twice as long as 2nd; 3rd pereopod with dactyl simple, propodus bearing about 9 spines on flexor margin, carpus with acute distal tooth on flexor margin, ischium with movable spine; maximum carapace length to base of rostrum about 9 mm.

RANGE.—Red Sea and eastern Africa to Indonesia, Philippines, Ryukyus, Australia, and Pacific Ocean islands as far eastward as Society Islands; intertidal to 36 meters, in algal tubes.

*55. *Alpheus pacificus* Dana, 1852

Alpheus pacificus Dana, 1852a:21 [type locality: Hawaii]; 1852b:544; 1855, pl. 34: fig. 5.—D.M. and A.H. Banner, 1982:217, fig. 68.

Alpheus gracilidigitus Miers, 1884:287 [type locality: Totoya, Fiji Islands, and Hawaii].

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum sharply acute, not reaching as far as distal margin of 1st antennular segment, dorsal carina rounded, not extending posteriorly beyond orbital hoods, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or paired teeth overhanging posterior ends of adrostral furrows, anterior

margin between rostrum and orbital hood rather distinctly incised, unarmed, orbital hood unarmed, adrostral furrows moderately deep; 2nd antennular segment fully twice as long as wide; basal antennal segment (basicerite) armed with broad lateral tooth reaching about to level of tip of stylocerite; antennal scale with lateral margin concave in proximal $\frac{1}{2}$, distolateral spine not unusually stout, slightly overreaching tapered blade; 1st pereopods with merus unarmed on inferior flexor margin; major chela compressed, about $2\frac{1}{4}$ times as long as wide, dactyl not noticeably curved in longitudinal plane, not double-ended, bearing reasonably well-developed, obliquely truncate plunger, palm without prominent longitudinal carina near margin proximal to fixed finger, with "saddle" proximal to adhesive plaque, proximal shoulder rounded, overhanging "saddle," shoulder proximal to fixed finger heavy, rounded; minor chela about $3\frac{3}{4}$ times as long as wide, fingers $1\frac{1}{2}$ to $2\frac{1}{4}$ times as long as palm, dactyl not "balaeniceps" in either sex; 2nd pereopod with proximal carpal article slightly longer than 2nd; 3rd pereopod with dactyl pointed, simple, propodus with about 8 spines on flexor margin, carpus with extensor margin somewhat produced distally, inferior distal angle subacutely produced, merus unarmed; maximum carapace length to base of rostrum at least 15 mm.

MATERIAL.—PHILIPPINES. Guihulñgan, Negros [10°07'N, 123°16'E]; shore; sand, gravel, grassy; 2 April 1908 (0800–1100); 150' seine: 1y male [4.8].

RANGE.—Red Sea and eastern Africa to Clipperton Island, eastern Pacific; intertidal to 20 meters.

56. *Alpheus paracrinitus* Miers, 1881

Alpheus paracrinitus Miers, 1881:365, pl. 16: fig. 6 [type locality: Goree Island, Senegal].—D.M. and A.H. Banner, 1982:129, fig. 35; 1985:21.

Alpheus paracrinitus, var. *Bengalensis* Coutière, 1905:901, pl. 82: fig. 37 [type locality: Minicoy, Laccadive Islands].

Crangon togatus Armstrong, 1940:2, fig. 1 [type locality: La Piedra Prieta reef, Barahona, Dominican Republic].

DIAGNOSIS.—(Diadema Group). Body not unusually compressed or setose; rostrum variable, not overreaching distal margin of 1st antennular segment, carina low, rounded; carapace without median tooth or tubercle on gastric region, without paired teeth overhanging posterior ends of adrostral furrows, anterior margin unarmed, sinuous or transverse mesial to orbital hood, orbital hood unarmed, adrostral furrows shallow; 2nd antennular segment about twice as long as wide; basal antennal segment (basicerite) armed with acute ventrolateral tooth not reaching level of tip of stylocerite; antennal scale with lateral margin nearly straight, distolateral spine slightly overreaching distal margin of blade; 1st pereopods with or without tooth on inferior flexor margin of merus; major chela oval in cross section, about 3 times as long as wide, dactyl little skewed, not double-ended, palm without sculpture, slightly more than twice as long as high, fingers slightly less than $\frac{1}{2}$ as long as palm; minor chela about 4 times as long as

wide, fingers slightly longer than palm, dactyl occasionally "balaeniceps" in male; 2nd pereopod with proximal carpal article little more than $\frac{1}{2}$ as long as to slightly longer than 2nd; 3rd pereopod with dactyl simple, propodus with 6–8 spines on flexor margin, carpus distally bluntly produced on both extensor and flexor margins, merus unarmed, ischium bearing small movable spine; maximum carapace length to base of rostrum about 7 mm.

RANGE.—Pantropical; intertidal to 18 meters.

REMARKS.—In their review of the western Indian Ocean alpheids, A.H. and D.M. Banner (1983:55) concluded that the specimens that they had previously identified as *A. mitis* are assignable to the variable and wide-ranging *A. paracrinitus*, if indeed the two species are distinguishable from each other. On the basis of the proportions of the first chelae depicted by Dana (1855, pl. 35: fig. 1), the Banners decided that "the question of the separation of the two species must at present be left unanswered, and we continue to use the name *A. paracrinitus*." Consideration might also be accorded the accuracy of Dana's fig. 1a on pl. 35, which suggests that the distolateral spine of the antennal scale may extend farther beyond the distal margin of the blade (not shown in Dana's figure) than it usually does in *A. paracrinitus*.

57. *Alpheus paradentipes* Coutière, 1905

Alpheus paradentipes Coutière, 1905:880, pl. 74: fig. 17 [type locality: Miladummadulu and Male atolls, Maldives Islands].—A.H. Banner, 1953:72, figs. 23, 24.

DIAGNOSIS.—(Macrocheles Group). Body not unusually compressed or setose; rostrum acute, not reaching nearly as far as distal margin of 1st antennular segment, carina low and short, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without paired acute teeth overhanging posterior ends of adrostral furrows, anterior margin concave and unarmed mesial to orbital hood, meeting rostrum at nearly right angle, region slightly flattened, rostral hoods armed with spines overreaching rostrum, adrostral furrows short, not deep; 2nd antennular segment nearly 3 times as long as wide; basal antennular segment (basicerite) armed with distinct lateral tooth not nearly reaching level of tip of stylocerite; antennal scale with lateral margin concave, distolateral spine elongate, far overreaching distal margin of tapered blade, but not especially stout; major cheliped with chela somewhat compressed, about 3 times as long as wide, dactyl directed somewhat toward ventral side of chela, not double-ended, palm with strong, carinate tooth each side of dactylar articulation, carina supporting tooth on mesial side of articulation interrupted by transverse incision, without longitudinal carina near margin proximal to fixed finger, without "saddle" or distal sinus on palm proximal to adhesive plaque, with nearly rectangular shoulder on margin proximal to fixed finger; minor chela nearly 5 times as long as wide, fingers about as long as palm, dactyl not "balaeniceps" in either

sex, palm with strong tooth on each side at dactylar articulation; 2nd pereopod with proximal carpal article about $1\frac{1}{2}$ times as long as 2nd; 3rd pereopod with dactyl biunguiculate, propodus bearing about 8 pairs of spines on flexor margin, carpus distally produced on extensor margin, merus with strong distal tooth on flexor margin, ischium unarmed; maximum carapace length to base of rostrum probably about 4 mm.

RANGE.—Eastern Africa to Hawaii; offshore to a depth of at least 170 meters, sometimes living in sponges.

*58. *Alpheus paralcione* Coutière, 1905

Alpheus paralcione Coutière, 1905:895, pls. 80, 81: fig. 34 [type locality: 4 localities in the Maldives and Laccadive islands].—D.M. and A.H. Banner, 1982:113, fig. 30.—A.H. and D.M. Banner, 1983:57, fig. 8.

A[lpheus] Providencei Coutière, 1908:208 [type locality: Providence Island, Seychelles; 91–143 meters].

Crangon laysani Edmondson, 1925:17, fig. 3 [type locality: Laysan Island, Hawaii].

DIAGNOSIS.—(Crinitus Group). Body neither unusually compressed nor densely setose; rostrum represented by minute angle protruding but little beyond anterior margin of carapace, distinct, low median carina extending posteriorly to base of orbital hoods, rostral base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle posterior to base of rostrum and without paired teeth overhanging posterior ends of adrostral furrows, anterior margin faintly sinuous, unarmed, and somewhat flattened mesial to orbital hoods, orbital hoods unarmed, adrostral furrows shallow; 6th abdominal somite tridentate on posterior margin; 2nd antennular segment (basicerite) armed with sharp ventrolateral tooth not reaching level of tip of stylocerite; antennal scale with lateral margin concave in proximal $\frac{1}{2}$, distolateral spine stout, far overreaching distal margin of narrowly tapered blade; 1st pereopods with merus bearing distal tooth on inferior flexor margin; major chela broadly oval in cross section, $2\frac{1}{3}$ times as long as wide, dactyl slightly curved in longitudinal plane, not double-ended, bearing short, truncated plunger, palm without sculpture; minor chela 3 to 4 times as long as wide, dactyl of male slightly longer than palm and wide, but not "balaeniceps," in proximal $\frac{1}{2}$ of length, of female subequal to palm in length and very slender; 2nd pereopod with proximal carpal article less than $\frac{1}{2}$ as long as 2nd; 3rd pereopod with dactyl variably biunguiculate, propodus bearing 9 spines on flexor margin, carpus with both margins distally produced and 1 to 4 spines on flexor margin, merus bearing acute distal tooth on flexor margin, ischium bearing movable spine; maximum carapace length to base of rostrum about 7 mm.

MATERIAL.—PHILIPPINES. Southwest of Manila Bay, Luzon: sta 5108; 14°05'05"N, 120°19'45"E; 24 m; coral; 15 Jan 1908 (0834–0835); 9' *Albatross-Blake* beam trawl, mud bags (dredging cable fouled on gin block; trawl not dragged on bottom): 1 ovig female [4.9]. Davao Gulf, Mindanao: sta 5249; 7°06'06"N, 125°40'08"E; 42 m; coral, sand; 18 May 1908 (1102–1109); 6' Johnston oyster dredge: 1 male [3.3];

sta 5250; 7°05'07"N, 125°39'45"E; 42 m; coral, sand; 18 May 1908 (1124–1127); 6' Johnston oyster dredge: 1 male [3.7]. Off Jolo Island, Sulu Archipelago: sta 5145; 6°04'30"N, 120°59'39"E; 42 m; coral sand, shells; 15 Feb 1908 (1344–1359); 12' Agassiz beam trawl, mud bag: 1 male [4.7]; sta 5555; 5°51'15"N, 120°58'35"E; 62 m; coarse sand; 18 Sep 1909 (1109–1113); 6' McCormick trawl: 1 ovig female [5.3]. Near Siasi, Sulu Archipelago: sta 5146; 5°46'40"N, 120°48'50"E; 44 m; coral sand, shells; 16 Feb 1908 (1011–1031); 12' Agassiz beam trawl, mud bag: 1 ovig female [4.2]; sta 5147; 5°41'40"N, 120°47'10"E; 38 m; coral sand, shells; 16 Feb 1908 (1127–1147); 12' Agassiz beam trawl, mud bag: 1 male [4.2].

RANGE.—Madagascar to Indonesia, Philippines, Japan, Australia, and Pacific islands to Hawaii; immediate subtidal to 165 meters.

***59. *Alpheus pareuchirus pareuchirus* Coutière, 1905**

Alpheus pareuchirus Coutière, 1905:906, pl. 84: fig. 43. [type locality: Male Atoll, Maldive Islands].

Alpheus pareuchirus var. *Leucothea* De Man, 1911:420, pl. 23: fig. 102 [type locality: the type series came from 6 different *Siboga* stations in the Sulu Archipelago and Indonesia].

Alpheus pareuchirus pareuchirus.—D.M. and A.H. Banner, 1982: 276, fig. 85a–k.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum prominent, not reaching as far as distal margin of 1st antennular segment, dorsal carina strong, blunt, not extending posteriorly beyond limits of orbital hoods, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or paired teeth overhanging posterior ends of adrostral furrows, anterior margin mesial to orbital hoods unarmed, meeting rostral margin at about right angle, orbital hoods unarmed, adrostral furrows reasonably deep; 2nd antennular segment almost twice as long as wide; basal antennal segment (basicerite) armed with sharp ventrolateral tooth not reaching level of tip of stylocerite; antennal scale with lateral margin slightly concave, distolateral spine overreaching narrowly tapering blade; 1st pereopods with merus armed with acute distal tooth on inferior flexor margin; major chela somewhat compressed, nearly $2\frac{1}{2}$ times as long as wide, dactyl slightly curved in longitudinal plane, not double-ended, bearing short, truncated plunger, palm without longitudinal carina near margin proximal to fixed finger, with "saddle" proximal to adhesive plaque, shoulder proximal to "saddle" bluntly acute and overhanging "saddle," shoulder on margin proximal to fixed finger very low and obtuse; minor chela nearly $3\frac{3}{4}$ times as long as wide, dactyl nearly as long as palm, "balaeniceps" in male only; 2nd pereopod with proximal carpal article slightly shorter or slightly longer than 2nd; 3rd pereopod with dactyl simple, propodus bearing 9–14 spines on flexor margin, carpus distally produced on extensor margin, merus unarmed, ischium with movable spine; maximum carapace length to base of rostrum

about 10 mm.

MATERIAL.—PHILIPPINES. Near Siasi, Sulu Archipelago; sta 5147; 5°41'40"N, 120°47'10"E; 38 m; coral sand, shells; 16 Feb 1908 (1127–1147); 12' Agassiz beam trawl, mud bag: 1 ovig female [4.2].

RANGE.—Red Sea, Madagascar, Seychelles, Maldives, Thailand, Indonesia, Philippines, Australia, and Caroline Islands; in depths of more than 3 meters.

***60. *Alpheus parvirostris* Dana, 1852**

Alpheus parvi-rostris Dana, 1852a:22 [type locality: Balabac Strait]; 1852b:551.

Alpheus parvirostris.—Dana, 1855, pl. 35: fig. 3.—D.M. and A.H. Banner, 1982:185, fig. 56.—A.H. and D.M. Banner, 1983:60, fig. 9.

Alpheus lineifer Miers, 1875:343 [type locality: Samoa Islands].

Alpheus euchiroides Nobili, 1906:257 [type locality: Marutea, Tuamotu Archipelago].

Alpheus braschi Boone, 1935:131, fig. 10, pl. 34 [type locality: Pago Pago, Samoa Islands].

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum slender, sharp, nearly or quite reaching level of distal margin of 1st antennular segment, dorsal carina blunt, not extending posteriorly beyond orbital hoods, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without paired teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood unarmed, produced anteriorly to form flattened, convex prominence, orbital hoods unarmed, adrostral furrows moderately deep anteriorly; 2nd antennular segment fully $1\frac{3}{4}$ times as long as wide; basal antennal segment (basicerite) strong, considerably overreaching stylocerite; antennal scale with lateral margin rather decidedly sinuous, distolateral spine fairly stout, considerably overreaching distal margin of narrow blade; 1st pereopods with merus armed with strong, sharp distal tooth on inferior flexor margin; major chela somewhat compressed, about $2\frac{1}{2}$ times as long as wide, dactyl not noticeably curved in longitudinal plane, not double-ended, bearing well-developed plunger directed proximally, palm without longitudinal carina near margin proximal to fixed finger, with "saddle" proximal to adhesive plaque in form of distinct but narrow oblique groove with rounded proximal and distal shoulders; minor chela about 3 times as long as wide, fingers slightly shorter than palm, not "balaeniceps" in either sex; 2nd pereopod with proximal carpal article considerably longer than 2nd; 3rd pereopod with dactyl simple, propodus bearing about 10 spines on flexor margin, carpus with both margins projecting distally as acute teeth; merus with acute distal tooth on flexor margin; ischium with movable spine, maximum carapace length to base of rostrum no more than 6 mm.

MATERIAL.—PHILIPPINES. Southwest of Manila Bay, Luzon: sta 5108; 14°05'05"N, 120°19'45"E; 24 mm; coral; 15 Jan 1908 (0834–0835); 9' *Albatross-Blake* beam trawl, mud bag (dredging cable fouled on gin block; trawl not dragged on

bottom): 1 major cheliped.

RANGE.—Red Sea, eastern and South Africa to Japan, Philippines, Indonesia, and Australia to the Tuamotu Archipelago but not Hawaii; abundant on reef flats in dead coral, occasionally in living coral and sponges, to a depth of 32 meters.

REMARKS.—It is rather surprising that this paradoxically misnamed but readily recognizable species, which was taken at numerous Philippine stations by the Banners, is represented in the *Albatross* collections by only a single major cheliped.

***61. *Alpheus parvus* De Man, 1909**

FIGURE 11

Alpheus parvus De Man, 1909a:102 [type locality: anchorage off Lirung, Pulau Salebabu, Indonesia; 36 meters]; 1911:358, pl. 15: fig. 74.

DIAGNOSIS.—(Crinitus Group). Body neither unusually compressed nor densely setose; rostrum sharp, not reaching as far as distal margin of 1st antennular segment, sharply carinate anteriorly, carina becoming blunt and somewhat obscure posteriorly but extending nearly to posterior $\frac{1}{3}$ of carapace, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region and without paired teeth overhanging posterior ends of adrostral furrows, anterior margin sinuous, unarmed, and submarginally flattened mesial to orbital hoods, orbital hoods slightly produced but unarmed, adrostral furrows rather deep immediately posterior to flattened submarginal area; 2nd antennular segment about twice as long as wide; basal antennal segment (basicerite) armed with sharp ventrolateral tooth not reaching level of end of stylocerite; antennal scale with lateral margin concave, distolateral spine fairly stout, overreaching narrowly tapered blade; 1st pereopods with merus armed with sharp, spine-like distal tooth on inferior flexor margin; major chela compressed, about $2\frac{1}{2}$ times as long as wide, dactyl bent slightly toward flexor side of chela, not double-ended, bearing reduced plunger bluntly produced proximad, palm without distinct sculpture except for deep longitudinal sulcus on flexor surface proximal to adhesive plaque; minor chela nearly 3 times as long as wide in male, 4 times in female, dactyl about as long as palm, broader in male than female but not "balaeniceps" in either sex; 2nd pereopod with proximal carpal article $\frac{2}{3}$ to $\frac{4}{5}$ as long as 2nd; 3rd pereopod with dactyl simple, propodus armed with 7 to 11 spines on flexor margin, merus with strong, acute distal spine on flexor margin, ischium bearing strong movable spine; maximum carapace length to base of rostrum at least 4 mm.

MATERIAL.—PHILIPPINES. Southwest of Manila Bay, Luzon: sta 5108; $14^{\circ}05'05''N$, $120^{\circ}19'45''E$; 24 m; coral; 15 Jan 1908 (0834–0835); 9' *Albatross-Blake* beam trawl, mud bag (dredging cable fouled on gin block; trawl not dragged on bottom): 2 males [3.3, 3.8].

RANGE.—Apparently known previously only from the ovigerous female holotype without the major cheliped, from a depth of 36 meters, off Pulau Salebabu in the northern Molucca

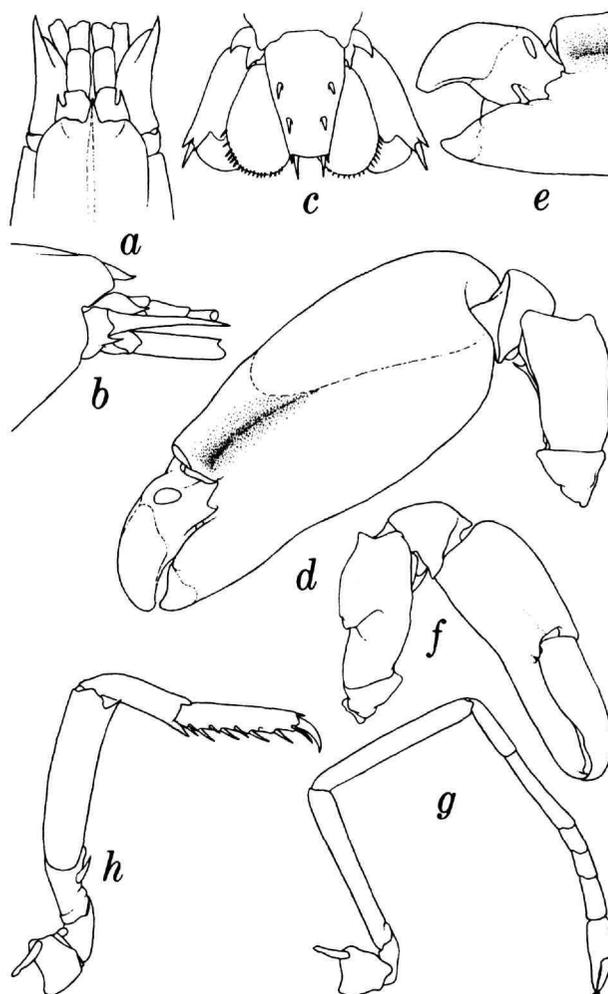


FIGURE 11.—*Alpheus parvus*, male from *Albatross* sta 5108, carapace length 3.8 mm: a, anterior carapace and appendages, dorsal aspect; b, same, lateral aspect; c, telson and uropods, dorsal aspect; d, left 1st (major) cheliped; e, same, fingers; f, right 1st (minor) cheliped; g, right 2nd pereopod; h, right 3rd pereopod.

Sea, southeast of Mindanao.

***62. *Alpheus polyxo* De Man, 1909**

Alpheus Polyxo De Man, 1909a:108 [type locality: Banda anchorage, Moluccas, Indonesia; 18–36 meters].

Alpheus polyxo.—D.M. and A.H. Banner, 1982:274, fig. 84.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum sharply acute, reaching to about distal margin of 1st antennular segment, dorsal carina high, rounded, extending posteriorly onto anterior gastric region, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or paired teeth overhanging posterior ends of adrostral furrows, anterior

margin between rostrum and orbital hood unarmed, incised, orbital hood unarmed but projecting subrectangularly in mesial part, adrostral furrows well-marked; 2nd antennular segment about $2\frac{1}{2}$ times as long as wide; basal antennal segment (basicerite) armed with sharp ventrolateral tooth not nearly reaching level of tip of stylocerite; antennal scale with lateral margin concave, distolateral spine not unusually stout, distinctly overreaching tapered blade; 1st pereopods with merus armed with small distal tooth on inferior flexor margin; major chela somewhat compressed, fully twice as long as wide, dactyl not noticeably curved in longitudinal plane, not double-ended, having very short, truncated plunger well defined only proximally, palm without prominent longitudinal carina near margin proximal to fixed finger, with "saddle" proximal to adhesive plaque, proximal shoulder blunt, overhanging "saddle," shoulder proximal to fixed finger strong, slightly projecting but not acute; minor chela $3\frac{3}{4}$ to 4 times as long as wide, fingers shorter than or equal to palm in length, dactyl "balaeniceps" in male only; 2nd pereopod with proximal carpal article twice as long as 2nd; 3rd pereopod with dactyl biunguiculate, propodus with about 10 spines on flexor margin, carpus with distal flexor margin bluntly produced distally, merus unarmed, ischium with small movable spine; maximum carapace length to base of rostrum about 11 mm.

MATERIAL.—PHILIPPINES. Southwest of Manila Bay, Luzon: sta 5109; $14^{\circ}03'45''N$, $120^{\circ}16'30''E$; 18 m; coral; 15 Jan 1908 (1026–1038); 9' *Albatross-Blake* beam trawl (trawl immediately torn on coral): 1 female [6.2]. Off Romblon Island, Sibuyan Sea: sta 5179; $12^{\circ}38'15''N$, $122^{\circ}12'30''E$; 68 m; hard sand; $24.3^{\circ}C$; 25 Mar 1908 (1049–1104); 12' Agassiz beam trawl, 3 mud bags: 1 male [6.7] 1 ovig female [10.0]. Near Siasi, Sulu Archipelago: sta 5147; $5^{\circ}41'40''N$, $120^{\circ}47'10''E$; 38 m; coral sand, shells; 16 Feb 1908 (1127–1147); 12' Agassiz beam trawl, mud bag: 1 male [6.2] 1 female [8.9].

RANGE.—Madagascar, Philippines, Indonesia, and Australia; in subtidal dead coral to 130 meters.

REMARKS.—In neither of the two small males in the *Albatross* collections is the dactyl of the minor chela distinctly "balaeniceps" in form.

63. *Alpheus proseuchirus* De Man, 1908

Alpheus proseuchirus De Man, 1908:111 [type locality: 2 *Siboga* stations in and near entrance to Teluk Kuandang, north coast of Celebes, Indonesia; 72 and 75 meters]; 1911:407, pl. 22: fig. 96.—A.H. and D.M. Banner, 1981:233.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum sharp, reaching nearly as far as distal margin of 1st antennular segment, flat dorsally, sharply delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or strong paired teeth overhanging posterior ends of adrostral furrows, anterior margin mesial to orbital hood unarmed, transversely concave, meeting rostral margin at more than right angle, orbital hoods

unarmed, adrostral furrows deep and narrow; 2nd antennular segment twice as long as wide; basal antennal segment (basicerite) armed with very small spine; antennal scale with lateral margin slightly concave, distolateral spine distinctly overreaching distal margin of tapered blade; 1st pereopods with merus armed with acute distal tooth on inferior flexor margin; major chela 3 times as long as wide, dactyl not double-ended, palm with "saddle" proximal to adhesive plaque, shoulder proximal to "saddle" broadly acute and slightly overhanging "saddle," shoulder on opposite margin proximal to fixed finger rather weak; minor chela $4\frac{2}{3}$ times as long as wide in male, $4\frac{4}{5}$ times as long as wide in female, fingers subequal in length to palm in male, nearly $1\frac{1}{2}$ times as long in female, "balaeniceps" in male only; 2nd pereopod with proximal carpal article $1\frac{1}{2}$ times as long as 2nd; 3rd pereopod with dactyl simple, subspatulate, propodus bearing 7 spines on flexor margin, carpus slightly produced distally on extensor margin, merus unarmed, ischium with movable spine; maximum carapace length to base of rostrum about 8 mm.

RANGE.—Philippines and Indonesia; 22–134 meters.

*64. *Alpheus pustulosus* A.H. and D.M. Banner, 1968

Alpheus pustulosus A.H. and D.M. Banner, 1968:143, fig. 2 [type locality: south of Hong Kong; $21^{\circ}N$, $114^{\circ}E$; 55–73 meters; mud and sand]; 1981:233.

DIAGNOSIS.—(Brevirostris Group). Body not unusually compressed or setose; rostrum not reaching as far as distal margin of 1st antennular segment, strongly but bluntly carinate in midline, carina not extending far posteriorly, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or paired teeth overhanging posterior ends of adrostral furrows, anterior margin transverse or concave and unarmed mesial to orbital hood, curving directly onto rostral margin, region not unusually flattened, orbital hoods unarmed, adrostral furrows deep anteriorly; 2nd antennular segment $2\frac{1}{4}$ times as long as wide; basal antennal segment (basicerite) armed with sharp ventrolateral tooth not nearly reaching level of tip of stylocerite; antennal scale with lateral margin very slightly concave, distolateral spine not unusually stout, slightly overreaching distal margin of blade; 1st pereopods with merus armed with small distal tooth on inferior flexor margin; major chela compressed, 4 times as long as wide, dactyl not double-ended, bearing very short plunger defined only proximally, palm without teeth either side of dactylar articulation, sculpture limited to flattened margin proximal to fixed finger and shallow depression extending proximally from fixed finger on one lateral surface, surface obscurely pustulate; minor chela about 8 to 9 times as long as wide, dactyl slightly shorter than palm, "balaeniceps" in male; 2nd pereopod with proximal carpal article $\frac{5}{6}$ as long as 2nd; 3rd pereopod with dactyl simple, subspatulate, propodus bearing 7 or 8 spinules on flexor margin, carpus and merus unarmed, ischium with small movable spine; maximum carapace length more than 7 mm.

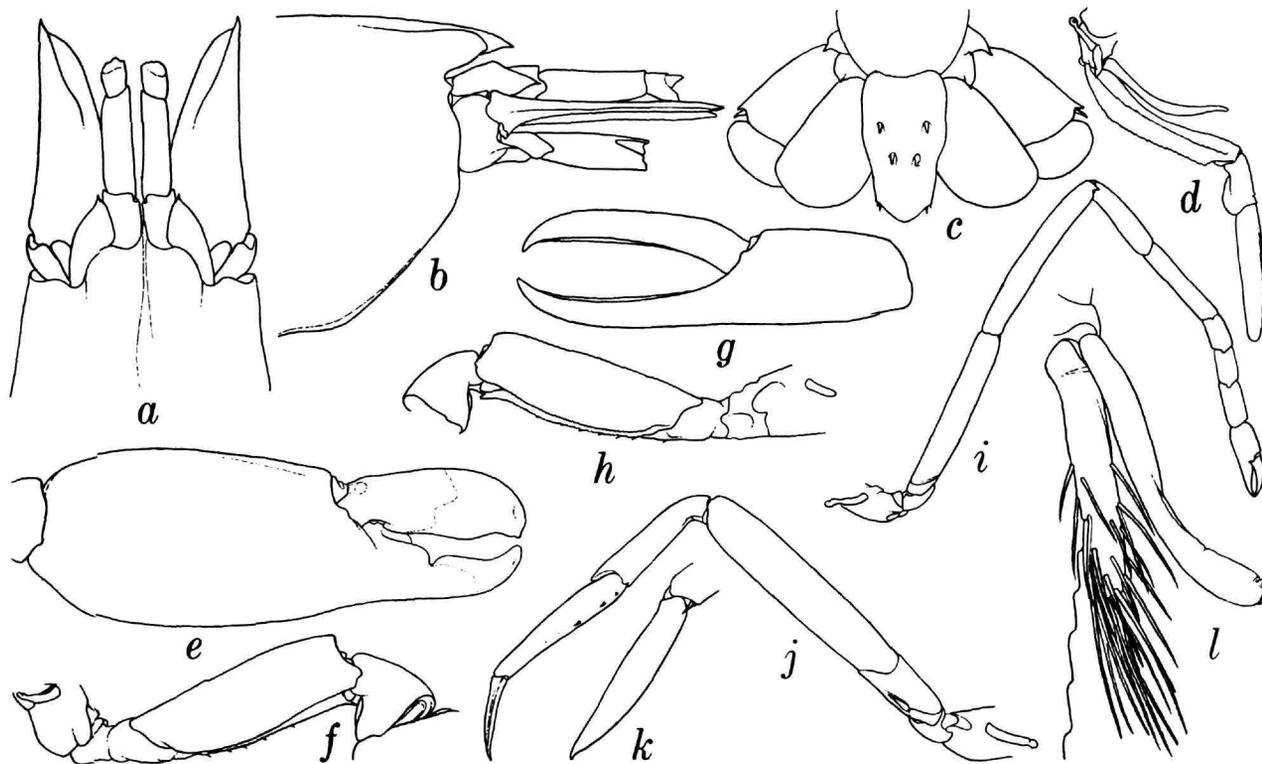


FIGURE 12.—*Alpheus quasirapacida*, new species, *a, b*, ovigerous female paratype from *Albatross* sta 5159, carapace length 12.8 mm; *c–l*, male holotype from same station, carapace length 10.1 mm: *a*, anterior carapace and appendages, dorsal aspect; *b*, same, lateral aspect; *c*, telson and uropods, dorsal aspect; *d*, right 3rd maxilliped; *e*, right 1st (major) chela; *f*, right 1st (major) cheliped, proximal segments; *g*, left 1st (minor) chela; *h*, left 1st (minor) cheliped, proximal segments; *i*, right 2nd pereopod; *j*, left 3rd pereopod; *k*, same, dactyl, flexor aspect; *l*, right appendices masculina and interna.

MATERIAL.—PHILIPPINES. Southeastern Visayan Sea near Guintacan Island; 11°16'45"N, 123°55'45"E; 130 m; green mud; 3 Apr 1908 (1112–1132); 12' Agassiz beam trawl, 3 mud bags; 1 male [7.2].

RANGE.—Known from only two localities, both in the Philippines, in addition to the type locality in the northern South China Sea south of Hong Kong; 55–134 meters.

REMARKS.—The *Albatross* specimen lacks the major cheliped, and the anterior margin of the carapace is transverse, rather than concave, between the rostrum and the orbital hoods, but comparison with the holotype has engendered little doubt that it belongs to the same species, especially because of the similar form of the third maxilliped and minor cheliped. The pustules on the major and minor chelae, from which the name of the species was derived, are apparent only at rather high magnification and with optimum lighting. This is apparently the largest of the five specimens, all males, thus far recorded of *A. pustulosus*; the holotype has a carapace length of 5.0 mm, and the two paratypes are slightly smaller, notwithstanding the greater total lengths cited with the original description,

a discrepancy that is almost certainly attributable to the somewhat fragmentary condition of the type series.

***65. *Alpheus quasirapacida*, new species**

FIGURE 12

DIAGNOSIS.—(Brevirostris Group). Body not unusually compressed or setose; rostrum narrowly acute, not reaching anteriorly nearly as far as distal margin of 1st antennular segment (Figure 12*a*), bluntly but strongly carinate in midline, carina widening posteriorly and disappearing on midgastric region, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or paired teeth overhanging posterior ends of adrostral furrows, anterior margin unarmed and concave mesial to orbital hoods, curving gradually into rostral margin, region somewhat depressed submarginally, orbital hoods unarmed and uncarinated, adrostral furrows deep; 2nd antennular segment about 3 times as long as wide; basal antennal segment (basicerite) with sharp ventrolateral tooth not reaching level of tip of

stylocerite (Figure 12b); antennal scale with lateral margin slightly concave, distolateral spine strong, overreaching distal margin of tapered blade; 1st pereopods with acute distal tooth and series of short, inconspicuous spines on inferior flexor margin of merus, extensor margin unarmed (Figure 12f,h); major chela (Figure 12e) rather strongly compressed, $2\frac{3}{4}$ times as long as wide, dactyl nearly straight in longitudinal plane, not double-ended, carinate on extensor margin, plunger much reduced, defined only by proximal angle, palm without tooth either side of dactylar articulation, sculpture limited to slightly flattened area in distal half proximal to adhesive plaque, without "saddle"; minor chela (Figure 12g) slightly more than 4 times as long as wide, fingers with numerous long setae on opposable and extensor margins, nearly $1\frac{1}{2}$ times as long as palm, dactyl bluntly carinate on extensor margin but not "balaeniceps" in male; 2nd pereopod (Figure 12i) with proximal carpal article little more than $\frac{4}{5}$ as long as 2nd; 3rd pereopod (Figure 12j) with dactyl (Figure 12k) subspatulate, propodus bearing about 3 obscure submarginal spines in proximal half of flexor margin, merus unarmed, ischium bearing strong movable spine; maximum carapace length to base of rostrum more than 13 mm.

MATERIAL.—PHILIPPINES. Off Tawitawi, Sulu Archipelago: sta 5159; $5^{\circ}11'50''N$, $119^{\circ}54'E$; 18 m; coarse sand; 21 Feb 1908 (1008–1010); 9' Johnston oyster dredge: 1 male [10.1] holotype (USNM 205666) 1 ovig female [12.8].

TYPE LOCALITY.—Off Tawitawi, Sulu Archipelago, Philippines, as cited above.

RANGE.—Known only from the pair of specimens from the type locality.

REMARKS.—Neither one of the pair of specimens representing this species—the only caridean shrimps obtained at this unexplainably brief station—is undamaged. The rostrum and anterior gastric region of the male holotype are mutilated, but the anterior pair of chelipeds and at least one member of each of the remaining pairs of pereopods are present. The carapace of the ovigerous female paratype is intact but both of the anterior chelipeds are missing.

These specimens were at first assigned to *A. rapacida* De Man, 1908, a species recorded from the eastern Mediterranean, Red Sea, Madagascar, southeastern Africa, Singapore, Thailand, Vietnam, near Hong Kong, Indonesia, Australia, and Hawaii, in depths of 2–56 meters. That original reaction to the identity of the species may well prove to be proper after more intensive study of the question. The *Albatross* specimens differ from typical material of *A. rapacida* in only two characters: the failure of the dorsal rostral carina to extend posteriorly to near the midlength of the carapace and the proportion of the major chela being less than three, rather than nearly four, times as long as wide. In my report on the western Atlantic alpheids (Chace, 1972:66), I assigned to a single species, *A. floridanus* Kingsley, 1878, specimens in which the major chela varied from less than three to more than six times as long as wide, and D.M. and A.H. Banner (1982:162) included in *A. rapacida*

specimens from Madagascar and Hawaii in which there was a small transverse groove in the palm of the major chela proximal to the adhesive plaque, apparently similar to a condition illustrated by Tiwari (1963, pl. 22b) in a specimen from Vietnam that also displayed a dactyl very unlike that usually found in *A. rapacida*. My chief purpose in assigning these specimens to a distinct species is to draw attention to the differences between what may be the first Philippine representation of *A. rapacida* and material previously assigned to that species.

ETYMOLOGY.—The Latin word *quasi* ("simulating") is attached as a prefix to the specific name of the species that the possibly previously unknown shrimp seems to most closely resemble.

*66. *Alpheus serenei* Tiwari, 1963

Alpheus serenei Tiwari, 1963:310, figs. 27, 28 [type locality: "Station Cauda, Nhatrang Bay, Vietnam"; coral reef, 3–4 meters].—D.M. and A.H. Banner, 1981:38; 1982:196, fig. 60.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum sharp, reaching, at most, level of distal margin of 1st antennular segment, dorsal carina strong anteriorly, continuing posteriorly, sometimes obscurely, to about midlength of carapace, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without paired teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood unarmed, partially convex, dorsally flattened, adrostral furrows rather shallow; 2nd antennular segment $2\frac{1}{2}$ times as long as wide; basal antennal segment (basicerite) armed with rather strong ventral tooth not reaching level of tip of stylocerite; antennal scale with lateral margin concave, distolateral spine fairly strong, considerably overreaching narrowly tapering blade; 1st pereopods with merus armed with distal tooth on inferior flexor margin; major chela somewhat compressed, about $2\frac{1}{4}$ times as long as wide, dactyl not much curved in longitudinal plane, not double-ended, with plunger very short, truncate, subacutely produced proximally, palm without prominent longitudinal carina near margin proximal to fixed finger, with "saddle" proximal to adhesive plaque, proximal shoulder bluntly acute, overhanging "saddle," shoulder proximal to fixed finger strong, rounded, not projecting; minor chela about $3\frac{1}{2}$ times as long as wide, dactyl subequal to palm in length, laterally carinate in male but not distinctly "balaeniceps" in either sex; 2nd pereopod with proximal carpal article nearly twice as long as 2nd; 3rd pereopod with dactyl often obscurely biunguiculate, propodus bearing 16 spines on flexor margin, carpus with strong, acute distal tooth on flexor margin, blunt distal tooth on extensor margin, merus with acute subdistal tooth on flexor margin, ischium with strong movable spine; maximum carapace length to base of rostrum about 11 mm.

MATERIAL.—PHILIPPINES. Visayan Sea north of Cebu: sta

5401; 11°24'45"N, 124°06'E; 55 m; fine sand; 16 Mar 1909 (1005–1032); 6' McCormick trawl: 2 ovig females [9.9, 10.5]. San Juanico Strait between Samar and Leyte: sta 5205; 11°19'30"N, 124°58'05"E; 15 m; 13 Apr 1908 (0928); 12' Agassiz beam trawl, 3 mud bags (fouled bottom; trawl lost; mud bag only recovered; sounding with hand lead): 1 male [7.4] 1 ovig female [8.0]. Off Jolo Island, Sulu Archipelago: sta 5174; 6°03'45"N, 120°57'E; 37 m; coarse sand; 5 Mar 1908 (1551–1557); 9' Johnston oyster dredge: 1 male [9.1] 1 ovig female [9.4]; sta 5555; 5°51'15"N, 120°58'35"E; 62 m; coarse sand; 18 Sep 1909 (1109–1113); 6' McCormick trawl: 1 male [8.7] 1 ovig female [9.0].

RANGE.—Red Sea, eastern Africa, Madagascar, Singapore, Gulf of Thailand, Viet Nam, Philippines, Indonesia, Australia; 1–62 meters.

REMARKS.—The median dorsal carina on the carapace may be so obscure that it can be seen only by partially drying the surface. As noted by D.M. and A.H. Banner (1982:197), the flattened frontal region of the carapace anteromesial to the orbital hoods may be the most distinctive character of this species, but I have not seen enough material of *A. hippothoe* and *A. serenei* to be certain of the validity of the latter species.

***67. *Alpheus soela* D.M. and A.H. Banner, 1987**

FIGURES 13, 14

Alpheus soela D.M. and A.H. Banner, 1987:21, fig. 1 [type locality: West of La Grange Bay, Western Australia; 18°41'S, 120°07'E; 430 m].

DIAGNOSIS.—(Sulcatus Group). Body not unusually compressed or setose; rostrum narrowly acute, not reaching as far as distal margin of 1st antennular segment, dorsally rounded, not carinate in midline, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region, without paired teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood incised, not flattened, orbital hood armed with sharp spine, adrostral furrows shallow; 2nd antennular segment about 3½ times as long as wide; basal antennal segment (basicerite) armed with strong, sharp lateral spine not quite reaching level of tip of stylocerite; antennal scale with lateral margin slightly concave, distolateral spine not very stout, overreaching distal margin of tapered blade; 1st pereopod with merus armed with inconspicuous, acute distal tooth on inferior flexor margin; major chela moderately compressed proximally, twisted, tapering to subcylindrical distal part of palm, about 4 times as long as wide, dactyl little divergent from longitudinal plane of chela, not double-ended, with vestigial plunger defined only proximally, palm with small sharp tooth on "dorsal" side of dactylar articulation, without longitudinal carina near margin proximal to fixed finger but with distinct blunt carina on opposite margin extending proximad from adhesive plaque, without shoulder on margin proximal to fixed finger, longitudinal sulcus on "ventral" surface extending short distance proximad from adhesive plaque; minor chela about

8½ times as long as wide in male, about 6 times as long as wide in female, dactyl fully as long as palm, "balaeniceps" in both sexes; 2nd pereopod with proximal carpal article about 1¾ times as long as 2nd; 3rd pereopod with dactyl simple with subdistal notch in extensor margin, propodus with about 9 spinules in single row on flexor margin, carpus with extensor margin extended distally, merus unarmed, ischium with movable spine; maximum carapace length to base of rostrum about 18 mm.

MATERIAL.—PHILIPPINES. Babuyan Channel, north of Luzon: sta 5325; 18°34'15"N, 121°51'15"E; 410 m; green mud; 11.8°C; 12 Nov 1908 (1113–1132); 12' Tanner beam trawl, mud bag: 1 ovig female [7.9]. Balayan Bay, southern Luzon: 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 (1440–1553 or 0904–0940); 25' Agassiz beam trawl: 1 male [13.7]. West of Leyte: sta 5406; 10°49'03"N, 124°22'30"E; 545 m; mud; 17 Mar 1909 (1141–1208); 12' Agassiz beam trawl: 1 male [16.4], 2 females [14.0, 14.3]; sta 5407; 10°51'38"N, 124°20'54"E; 640 m; green mud; 17 Mar 1909 (1328–1348); 12' Agassiz beam trawl: 1 male [11.3]. 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 females [12.2 (with branchial parasite), 17.8].

RANGE.—Philippines and Indian Ocean off Western Australia; 293 or 391 to 640 meters.

***68. *Alpheus spatulatus* A.H. and D.M. Banner, 1968**

Alpheus spatulatus A.H. and D.M. Banner, 1968:146, fig. 3 [type locality: northwestern South China Sea east of Hainan; 19°17'N, 112°81'E; 95 meters].—D.M. and A.H. Banner, 1978:229.—A.H. and D.M. Banner, 1981:233.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum overreaching 1st antennular segment, dorsally transversely convex, without median carina, base abruptly delimited from but not overhanging adrostral furrows; carapace without median tooth or tubercle on gastric region or paired teeth overhanging posterior ends of adrostral furrows, anterior margin rather narrowly incised or notched and unarmed between rostrum and orbital hoods, latter unarmed, adrostral furrows narrow and comparatively deep; 2nd antennular segment nearly 3 times as long as wide; basal antennal segment (basicerite) bearing small, sharp ventrolateral tooth not nearly reaching level of tip of stylocerite; antennal scale with lateral margin moderately concave, distolateral spine somewhat reduced, barely overreaching rather broad blade; 1st pereopods with merus armed with acute distal tooth on inferior flexor margin; major chela compressed, 3 times as long as wide, dactyl straight in longitudinal plane, not double-ended, plunger distinct only proximally, opposable surface concave, palm without carina near margin proximal to fixed finger, with "saddle" proximal to adhesive plaque, shoulder proximal to

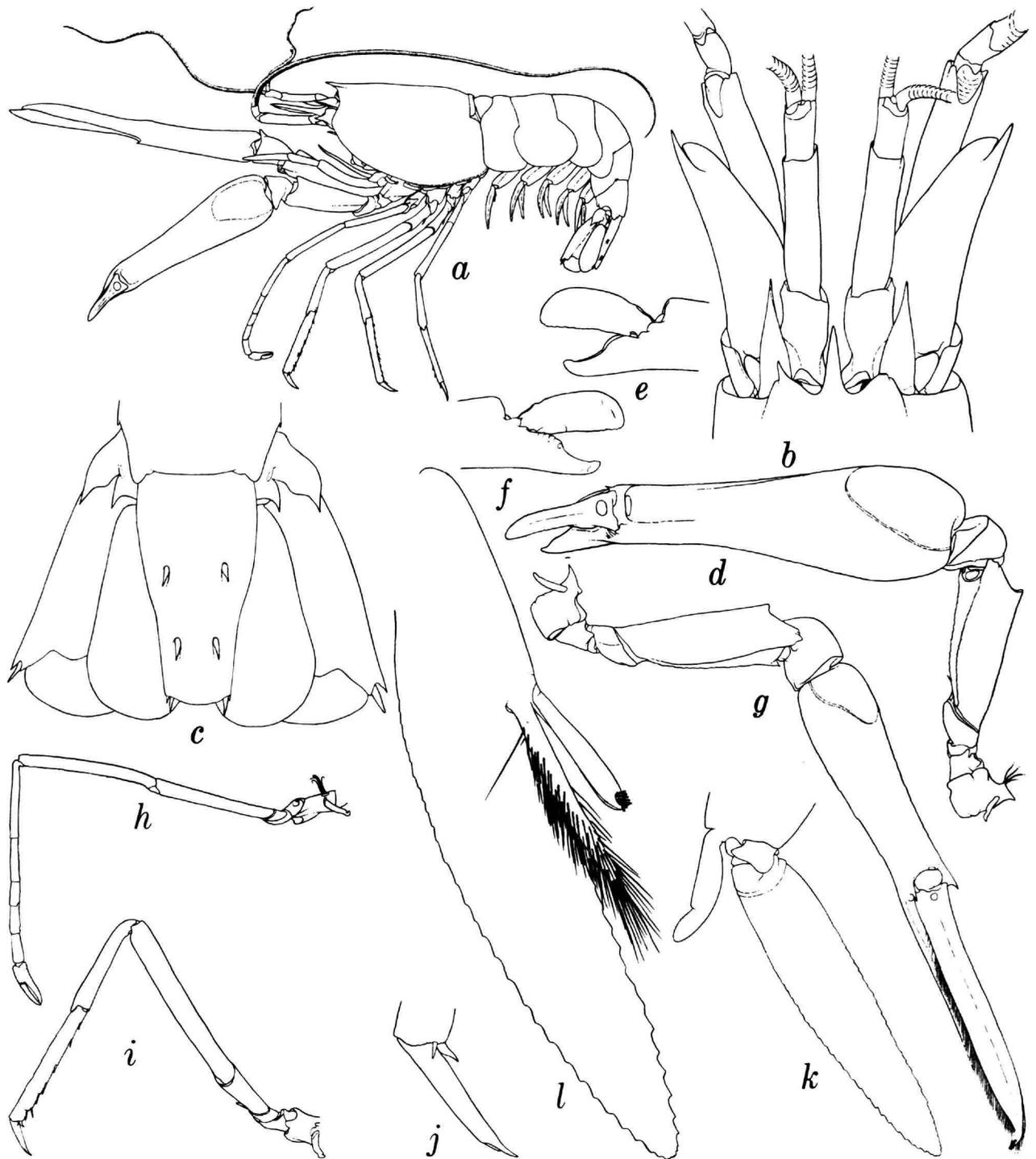


FIGURE 13.—*Alpheus soela*, male from *Albatross* sta 5406, carapace length 16.4 mm: *a*, lateral aspect; *b*, anterior margin and appendages, dorsal aspect; *c*, telson and uropods, dorsal aspect; *d*, left 1st (major) cheliped; *e*, same, fingers, flexor aspect; *f*, same, extensor aspect; *g*, right 1st (minor) cheliped; *h*, left 2nd pereopod; *i*, left 3rd pereopod; *j*, same, dactyl; *k*, right 1st pleopod; *l*, right 2nd pleopod, endopod.

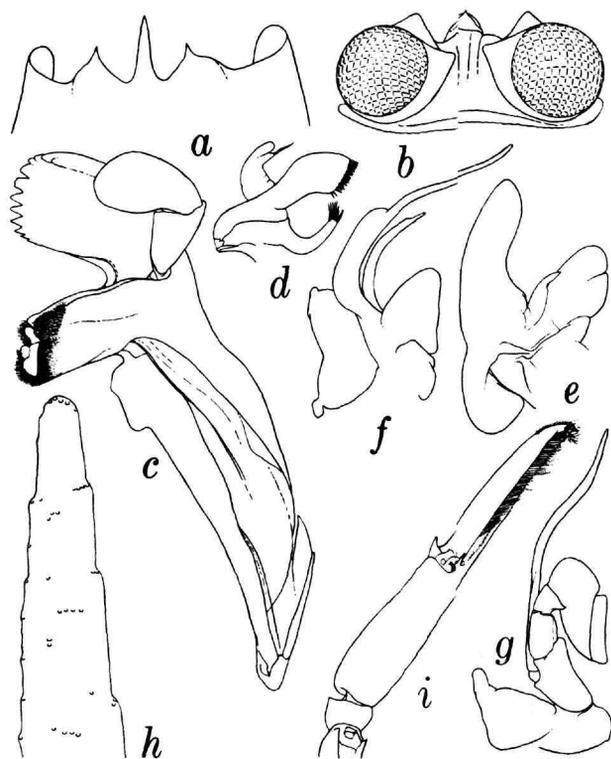


FIGURE 14.—*Alpheus soela*, female from *Albatross* sta 5406, carapace length 14.3 mm: a, frontal margin of carapace; b, ophthalmic somite; c, right mandible; d, right 1st maxilla; e, right 2nd maxilla; f, right 1st maxilliped; g, right 2nd maxilliped; h, right 3rd maxilliped, denuded heavily setose distal end, lateral aspect; i, right 1st (minor) chela.

“saddle” subacutely projecting over “saddle,” no distinct shoulder on margin proximal to fixed finger; minor chela nearly 6 times as long as wide, dactyl little longer than palm, probably not “balaeniceps” in either sex; 2nd pereopod with proximal carpal article about twice as long as 2nd; 3rd pereopod with dactyl subspatulate, propodus with 7 spines on flexor margin, carpus not much produced distally on either margin, merus unarmed, ischium with small movable spine; maximum carapace length to base of rostrum about 14 mm.

MATERIAL.—PHILIPPINES, Lingayen Gulf, western Luzon: sta 5442; 16°30'36"N, 120°11'06"E; 82 m; coral sand; 10–11 May 1909 (1858–0532); 25' Agassiz beam trawl (apparently drifted 15.5 miles S, 12°E from original position): 2 females without major chelipeds [13.2, 14.1], 1 ovig [14.1].

RANGE.—The species is known thus far only from the South China Sea. The type series came from the northwestern part between east of Hainan and south of Hong Kong. The pair of specimens reported by D.M. and A.H. Banner in 1978 were found in the southern part of the Sea north of western Sarawak. The single specimen recorded by A.H. and D.M. Banner in 1981 was taken by *Vauban* at station 72, which lies virtually in the entrance to Manila Bay, rather than off the Lubang

Islands, as reported in 1978. The other Philippine record is reported herein from the Lingayen Gulf, which is also part of the South China Sea. The depth range is 48–127 meters.

69. *Alpheus splendidus* Coutière, 1897

A[lpheus] splendidus Coutière, 1897a:236 [type locality: Djibouti, Republic of Djibouti; under stones at low tide].

Alpheus pomatoceros A.H. and D.M. Banner, 1966b:93, fig. 32 [type locality: Lam Chong Klan, Ko Samui, Thailand; coral head in 2–3 meters on outer reef front].

Alpheus splendidus.—D.M. and A.H. Banner, 1982:56, fig. 12.

DIAGNOSIS.—(Sulcatus Group). Body not unusually compressed or setose; rostrum acute, prominent, slightly overreaching 1st antennular segment, rounded dorsally, extending posteriorly as sharp carina to near midlength of carapace, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or paired teeth overhanging posterior ends of adrostral furrows, anterior margin unarmed mesial to orbital hoods, joining rostral margin at less than right angle, orbital hood armed with sharp tooth arising from dorsal part of hood, not marginal, adrostral furrows moderately deep; 2nd antennular segment about 1¹/₄ times as long as wide; basal antennal segment (basicerite) armed with strong lateral tooth nearly reaching level of tip of stylocerite; antennal scale with lateral margin slightly concave, distolateral spine strong, overreaching distal margin of blade; anterior pereopods with merus armed with acute distal tooth on inferior flexor margin; major chela compressed, 2³/₄ times as long as wide, slightly twisted, but dactyl lying in longitudinal plane, not double-ended, plunger well developed, palm with tooth on at least one side of dactylar articulation, without longitudinal carina near margin proximal to fixed finger, without distinct “saddle” proximal to adhesive plaque but with longitudinal furrow on central third of that margin and shallow longitudinal sulcus on distal part of lateral surface; minor chela 4¹/₃ times as long as wide, dactyl slightly longer than palm, not “balaeniceps” in either sex, palm with acute tooth on one side of dactylar articulation; 2nd pereopod with proximal carpal article more than twice as long as 2nd; 3rd pereopod with dactyl simple, propodus with 10 spines on flexor margin, carpus with both extensor and flexor margins projecting distally, merus and ischium unarmed; maximum carapace length to base of rostrum 14 mm.

RANGE.—Red Sea, eastern Africa, Seychelles, Malaysia, Thailand, Hong Kong, Philippines, Indonesia, and Queensland, Australia; intertidal to 2–3 meters.

70. *Alpheus spongiarum* Coutière, 1897

A[lpheus] spongiarum Coutière, 1897a:236 [type locality: Djibouti, Republic of Djibouti].

A[lpheus] paraculeipes Coutière, 1905:894, pls. 79, 80: fig. 32 [type locality: the type series was collected on 4 different atolls of the Maldives Islands].

Alpheus spongiarum.—D.M. and A.H. Banner, 1982:116, fig. 31.

DIAGNOSIS.—(Crinitus Group). Body neither unusually

compressed nor densely setose; rostrum equilaterally triangular, not reaching level of distal margin of 1st antennular segment, carinate posteriorly to level of base of eyes, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region and without paired teeth overhanging posterior ends of adrostral furrows, anterior margin transverse and unarmed mesial to orbital hoods, region not especially flattened, orbital hoods unarmed, adrostral furrows shallow; 2nd antennular segment twice as long as wide; basal antennal segment (basicerite) unarmed; antennal scale with lateral margin slightly concave, distolateral spine stout, blade vestigial; 1st pereopods with merus armed with small acute distal tooth on inferior flexor margin; major chela broadly oval in cross section, about $2\frac{1}{4}$ times as long as wide, dactyl not double-ended; minor chela nearly $3\frac{1}{2}$ times as long as wide, dactyl about $\frac{2}{3}$ as long as palm, not "balaeniceps" in either sex; 2nd pereopod with proximal carpal article $\frac{1}{2}$ as long as 2nd; 3rd pereopod with dactyl usually obscurely biunguiculate, propodus bearing 8 spines on flexor margin, carpus with both extensor and flexor margins projecting distally, merus with strong distal tooth on flexor margin; maximum carapace length to base of rostrum about 6 mm.

RANGE.—Madagascar, Seychelles, Réunion, Gulf of Aden, Maldives and Laccadive islands, Sri Lanka, Singapore, Japan, Philippines, Indonesia, and Australia; intertidal to 42 meters, in sponges.

71. *Alpheus stanleyi* Coutière, 1908

Alpheus *Stanleyi* Coutière, 1908:207 [type locality: Amirante Isles; 55 meters].

Alpheus Stanleyi var. *dearmatus* De Man, 1910:287 [type locality: two Indonesian localities: Wunoh Bay, Pulau Waigeo, and Banda anchorage, Kepulauan Banda. 18–36 meters]; 1911:367, pl. 17: fig. 78.

Alpheus stanleyi.—Coutière, 1921:423, pl. 63: fig. 18.

Alpheus cloudi A.H. Banner, 1956:352, fig. 16 [type locality: about 0.6 mile off Muchot Point, south side of Saipan Harbor, Mariana Islands; 2–4 meters].

Alpheus stanleyi.—D.M. and A.H. Banner, 1978:230, fig. 2a–c.—A.H. and D.M. Banner, 1983:65.

DIAGNOSIS.—(Crinitus Group). Body neither unusually compressed nor densely setose; rostrum broadly triangular, not reaching as far as distal margin of 1st antennular segment, sharply carinate anteriorly, carina widening and disappearing on anterior gastric region, base not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region and without paired teeth overhanging posterior ends of adrostral furrows, anterior margin transverse or concave mesial to orbital hoods, frontal region flattened, orbital hoods unarmed, adrostral furrows not especially deep; 2nd antennular segment variable, 2 to $3\frac{1}{2}$ times as long as wide; basal antennal segment (basicerite) armed with rather strong lateral tooth not reaching level of tip of stylocerite; antennal scale with lateral margin variably concave, distolateral spine stout, considerably overreaching convex distal margin

of blade; 1st chelipeds with or without distal tooth on inferior flexor margin; major chela more or less sexually dimorphic, about twice as long as wide in males, up to more than 3 times as long as wide in females, broadly oval in cross section, dactyl not truly double-ended, palm without apparent sculpture except for faint depression in margin immediately posterior to adhesive plaque and slight lateral longitudinal sulcus extending posteriorly from near dactylar articulation; minor chela 2 to 3 times as long as wide, dactyl not especially slender, but not "balaeniceps" in either sex, subequal to palm in length; 2nd pereopod with proximal carpal article barely to distinctly longer than 2nd; 3rd pereopod with dactyl variably biunguiculate, sometimes obscurely so, propodus with about 8 spines on flexor margin, carpus distally produced at extensor and flexor angles, merus with distal tooth on flexor margin, ischium bearing small movable spine; maximum carapace length to base of rostrum about 8 mm.

RANGE.—Western and central Indian Ocean, Philippines, Indonesia, Caroline, Fiji, and Samoa islands; littoral to 60 meters, in sponges.

72. *Alpheus staphylinus* Coutière, 1908

Alpheus staphylinus Coutière, 1908:204 [type locality: Salomon Islands, Chagos Archipelago]; 1921:418, pl. 62: fig. 13.

Alpheus staphylinus.—D.M. and A.H. Banner, 1978:232; 1985:32.

(?)*Alpheus staphylinus*.—D.M. and A.H. Banner, 1982:42, fig. 7.

DIAGNOSIS.—(Macrocheles Group). Body not unusually compressed or setose; rostrum acute, not reaching level of distal margin of 1st antennular segment, not carinate, not abruptly delimited from surface of carapace; carapace without median tooth or tubercle or paired teeth on gastric region, anterior margin concave and unarmed mesial to orbital hood, curving gradually into rostral margin, region not depressed, orbital hood armed with acute marginal tooth, adrostral furrows absent; 2nd antennular segment nearly twice as long as wide; basal antennal segment (basicerite) not reaching level of tip of stylocerite; antennal scale with lateral margin slightly concave to nearly straight, distolateral spine strong, considerably overreaching distal margin of blade; 1st pereopods with merus armed with distal acute tooth on inferior flexor margin; major chela about 3 times as long as wide, dactyl diverging little from longitudinal plane, not double-ended, without prominent crest on extensor margin, distally rounded, plunger consisting of conical tooth with rounded apex, palm with acute tooth each side of dactylar articulation, carina supporting tooth on mesial side of dactylar articulation interrupted by notch, without "saddle" on broadly rounded margin proximal to adhesive plaque, rounded shoulder on margin proximal to fixed finger; minor chela nearly $5\frac{1}{2}$ times as long as wide, dactyl subequal in length to palm, not "balaeniceps" or carinate on extensor margin in male; 2nd pereopod with proximal carpal article about $1\frac{3}{4}$ times as long as 2nd; 3rd pereopod with dactyl simple, slender, propodus with 9 spines on flexor margin,

merus unarmed, ischium with movable spine; maximum carapace length to base of rostrum about 5 mm.

RANGE.—Mombasa, Kenya, Chagos Archipelago, Ryukyu Islands, Philippines, Indonesia, and possibly Murray Island, Torres Strait; sublittoral.

***73. *Alpheus strenuus strenuus* Dana, 1852**

[?] *Alpheus Rhode* White, 1847:74 [Philippine Islands, nomen nudum].—A.H. and D.M. Banner, 1977b:280.

Alpheus Doris White, 1847:75 [Torres Strait; nomen nudum].—A.H. and D.M. Banner, 1977b:281.

Alpheus strenuus Dana, 1852a:21 [type locality: Tongatapu, Tonga Islands]; 1852b:543, pl. 34: fig. 4.

Alpheus strenuus var. *angulatus* Coutière, 1905:914 [type locality: Hulele, Male Atoll, Maldive Islands].

Alpheus strenuus strenuus.—D.M. and A.H. Banner, 1982:225, fig. 71.—A.H. and D.M. Banner, 1983:68.—D.M. and A.H. Banner, 1985:32.

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum narrowly acute, not reaching level of distal margin of 1st antennular segment, dorsal carina rounded, not extending posteriorly beyond orbital hoods, base widening slightly but not abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region or paired teeth overhanging posterior ends of adrostral furrows, anterior margin mesial to orbital hood unarmed, sinuous, orbital hood unarmed, adrostral furrows rather shallow; 2nd antennular segment $1\frac{2}{3}$ to $2\frac{1}{2}$ times as long as wide; basal antennal segment (basicerite) armed with sharp ventrolateral tooth not reaching level of tip of stylocerite; antennal scale with lateral margin concave, of distolateral spine slightly convex, spine moderately stout, slightly overreaching somewhat tapered blade; 1st pereopods with merus armed with acute distal tooth on inferior flexor margin; major chela somewhat compressed, $2\frac{1}{3}$ times as long as wide, dactyl not noticeably curved in longitudinal plane, not double-ended, having well-developed plunger, palm with longitudinal sulcus on mesial surface near margin proximal to fixed finger but no true carina bordering it, with "saddle" proximal to adhesive plaque, proximal shoulder blunt, but usually slightly overhanging "saddle," shoulder proximal to fixed finger strong, slightly projecting but not acute; minor chela $3\frac{1}{3}$ to $4\frac{1}{3}$ times as long as wide, dactyl distinctly "balaeniceps" in both sexes, $\frac{2}{3}$ as long as palm; 2nd pereopod with proximal carpal article subequal in length to 2nd; 3rd pereopod with dactyl simple, propodus with about 10 spines on flexor margin, carpus with distal extensor angle projecting, merus unarmed, ischium with movable spine; maximum carapace length to base of rostrum 38 mm.

MATERIAL.—PHILIPPINES. Mactan Island, Bohol Strait [10°18'N, 123°58'E]; 31 Aug 1909; tidepools: 1 ovig female [10.8]. Mahinog, Camiguin Island, Mindanao Sea [9°09'N, 124°47'E]; 3 Aug 1909; tidepools: 5 males [10.0–14.8, 1 with abdominal parasite] 5 females [10.5–19.3], 4 ovig. [11.0–19.3]. Nasipit, Mindanao [8°57'N, 125°19'E]; 1 Aug 1909;

tidepool: 1 male [8.0] 3 ovig females [8.2–11.4].

INDONESIA. Great Toba, Selat Butung, Celebes [4°33'S, 122°42'E]; tidepools; 15 Dec 1909: 11 males [9.0–19.2] 10 females [12.8–22.7], 7 ovig [14.0–22.7].

RANGE.—Red Sea to Society Islands, not including Hawaii; usually littoral (see A.H. and D.M. Banner, 1983:68, for discussion of habitat). The specimen from the Galapagos Islands identified by Schmitt (1939:26) as *Crangon strenuus* is a male (carapace length 4.8 mm) of *Alpheus leviusculus* or the close relative of that species that has been recorded from those Islands.

74. *Alpheus sulcatus* Kingsley, 1878

Alpheus sulcatus Kingsley, 1878:193 [type locality: the two syntypes of this species came from Bahía de Panamá and Zorritos, Peru].—D.M. and A.H. Banner, 1982:79, fig. 20.—Wicksten, 1983:46.

Alpheus macrochirus Richters, 1880:164, pl. 17: figs. 31–33 [type locality: Île aux Fouquets, Mauritius].

Alpheus luciae Barnard, 1947:389 [type locality: Lake Saint Lucia, Zululand, Natal, South Africa].

DIAGNOSIS.—(Sulcatus Group). Body not unusually compressed or setose; rostrum triangular, not reaching nearly as far as distal margin of 1st antennular segment, rounded dorsally, base abruptly delimited from adrostral furrows; carapace without median tooth or tubercle on gastric region and without paired teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood nearly transverse, unarmed, adrostral furrows rather deep, somewhat flattened anteriorly, orbital hood unarmed; 2nd antennular segment about twice as long as wide; basal antennal segment (basicerite) armed with strong ventrolateral tooth overreaching stylocerite; antennal scale with lateral margin nearly straight, distolateral spine overreaching distal margin of tapered blade; 1st pereopods without distinct distal tooth on inferior flexor margin of merus; major chela compressed, fully $2\frac{1}{2}$ times as long as wide, setose mesially, dactyl rather strongly arched, not double-ended, bearing well-developed plunger, palm without sharp tooth either side of dactylar articulation, without longitudinal carina near margin proximal to fixed finger, without distinct "saddle" proximal to adhesive plaque or shoulder on margin proximal to fixed finger, longitudinal sulcus near margin proximal to adhesive plaque; minor chela about 3 times as long as wide, setose mesially, dactyl not especially slender, fully as long as palm, not "balaeniceps" in either sex; 2nd pereopod with proximal carpal article longer than 2nd; 3rd pereopod with dactyl biunguiculate or simple, propodus bearing 8 spines on flexor margin, carpus with extensor margin bluntly projecting distally, merus unarmed, ischium bearing movable spine; maximum carapace length to base of rostrum about 20 mm.

RANGE.—Southeastern Africa to Philippines, Indonesia, Japan, and Australia to Society and Galapagos islands and Pacific American mainland from Gulf of California to Peru,

western Africa from equator to southern Angola, (not Red Sea, Japan, Hawaii, or western Atlantic); intertidal to 24 meters.

***75. *Alpheus suluensis*, new species**

FIGURES 15, 16

DIAGNOSIS.—(Edwardsii Group). Body not unusually compressed or setose; rostrum slender, sharp, reaching nearly to level of distal margin of 1st antennular segment (Figure 15a), dorsally rounded, blunt ridge rather prominent posteriorly but not extending much beyond eyes, base not abruptly delimited from adrostral furrows; carapace without tooth or tubercle on gastric region, without paired teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood sinuous, concave mesially, orbital hood unarmed, adrostral furrows moderately deep; 2nd antennular segment about twice as long as wide; basal antennal segment (basicerite) with sharp ventrolateral tooth not nearly reaching level of tip of stylocerite (Figure 15b); antennal scale with lateral margin concave at midlength, distolateral spine strong, considerably overreaching narrow blade, laterally convex; 1st pereopods with merus armed with sharp distal tooth on inferior flexor margin (Figure 15g,i); major chela somewhat compressed, nearly $2\frac{1}{2}$ times as long as wide, dactyl not noticeably skewed from longitudinal plane, with rather strong, blunt, curved carina on extensor margin, not double-ended, plunger truncated, sharply demarcated only proximally (Figure 15e), palm with obscure submarginal sulcus but no strong longitudinal ridge near margin proximal to fixed finger (Figure 15f), with "saddle" proximal to adhesive plaque, proximal shoulder bluntly acute, overhanging "saddle," shoulder proximal to fixed finger strong, obtuse slightly projecting; minor chela (Figure 15h) nearly 6 times as long as wide, dactyl slightly shorter than palm, laterally slightly carinate but not "balaeniceps" in either sex; 2nd pereopod (Figure 16a), with proximal carpal article $1\frac{1}{2}$ times as long as 2nd; 3rd pereopod (Figure 16b) with dactyl pointed, simple, propodus bearing about 10 spines on flexor margin, carpus with extensor margin slightly produced distally, merus unarmed, ischium with movable spine; carapace length to base of rostrum 8.3 mm.

MATERIAL.—PHILIPPINES. Near Siasi, Sulu Archipelago: sta 5147; 5°41'40"N, 120°47'10"E; 38 m; coral sand, shells; 16 Feb 1908 (1127–1147); 12' Agassiz beam trawl, mud bag; 1 male [7.2] holotype USNM 205668) 1 ovig female [8.3].

TYPE LOCALITY.—Known only from the pair of specimens from off Siasi, Sulu Archipelago; 38 meters.

REMARKS.—Of the approximately 76 currently recognized species and subspecies in the Edwardsii Group of *Alpheus*, *A. suluensis* agrees with eight taxa in one or more of the following characters: (1) base of rostrum not abruptly delimited from adrostral furrows, (2) carapace not carinate in midline from rostrum nearly to midlength or without median tooth or

tubercle on gastric region, (3) first pereopods with distal tooth on inferior flexor margin of merus, (4) major chela less than three times as long as wide, (5) minor chela with dactyl no longer than palm and not "balaeniceps" in either sex, (6) second pereopod with proximal carpal article longer than second, and (7) third pereopod with dactyl subconical, not subspatulate, merus unarmed, and ischium bearing movable spine. *Alpheus suluensis* differs from *A. batesi* in having the rostrum and second antennular segment distinctly longer, the antennal scale with its lateral margin sinuous rather than nearly straight, the major chela wider and more strongly sculptured, the second pereopod with the proximal carpal article one and one-half rather than nearly twice as long as the second, and the third pereopod more slender. It seems to be distinguished from *A. buchianorum* A.H. and D.M. Banner, 1983, from the Seychelles in having the dorsal rostral carina blunt rather than sharp, the first pereopods with a much stronger distal tooth on the inferior flexor margin of the merus, the major and minor chelae not profusely setose on their mesial surfaces, and the third pereopod with the merus four and one-half rather than about three times as long as wide. The distinction of *A. suluensis* from *A. haanii* Ortmann, 1890, cannot be fixed from present knowledge of that Japanese species; D.M. and A.H. Banner (1982:273) indicated that the holotype of *A. haanii* "falls within the ranges" of *A. edwardsii*, but the minor chela of *A. haanii* is unknown; *A. suluensis* seems to have a much less massive plunger on the dactyl of the major chela than does *A. edwardsii*. From *A. hululensis* Coutière, 1905 from the Maldives, *A. suluensis* differs in the stronger and overhanging shoulder proximal to the "saddle" on the major chela, in comparison with the illustration of that appendage in Crosnier and Forest (1966, fig. 25b); on the other hand, the anterior appendages of *A. suluensis* correspond remarkably well with the illustration by Crosnier and Forest (1966, fig. 26c) of the female specimen from the Red Sea assigned to *A. bouvieri* var. *hululensis* by Coutière (1905:1909), but that specimen, which lacks the major cheliped, may probably be distinguished from *A. suluensis* by the strong dorsal rostral carina mentioned by Crosnier and Forest (1966:284). *Alpheus suluensis* clearly differs from *A. ladronis* in the much more prominent rostrum, antennal scales, and shoulder proximal to the "saddle" on the major chela. From *A. maindroni*, it differs in the longer rostrum and the major chela provided with a transverse rather than an oblique "saddle" and a less well developed, truncate plunger on the dactyl. From *A. parvirostris*, it is separated by the nonangulate orbital hoods, the much smaller tooth on the basal antennal segment, the transverse rather than oblique "saddle" and the less well developed, truncate plunger on the dactyl of the major chela, and, usually, by the absence of a distal tooth on the flexor margin of the merus of the third pereopod. Finally, *A. suluensis* may be separated from *A. viridari* (Armstrong, 1949) from the western Atlantic by the greater relative length of the distolateral spine of the antennal scale and by the overhanging shoulder proximal to the "saddle" and the absence of a notch in the

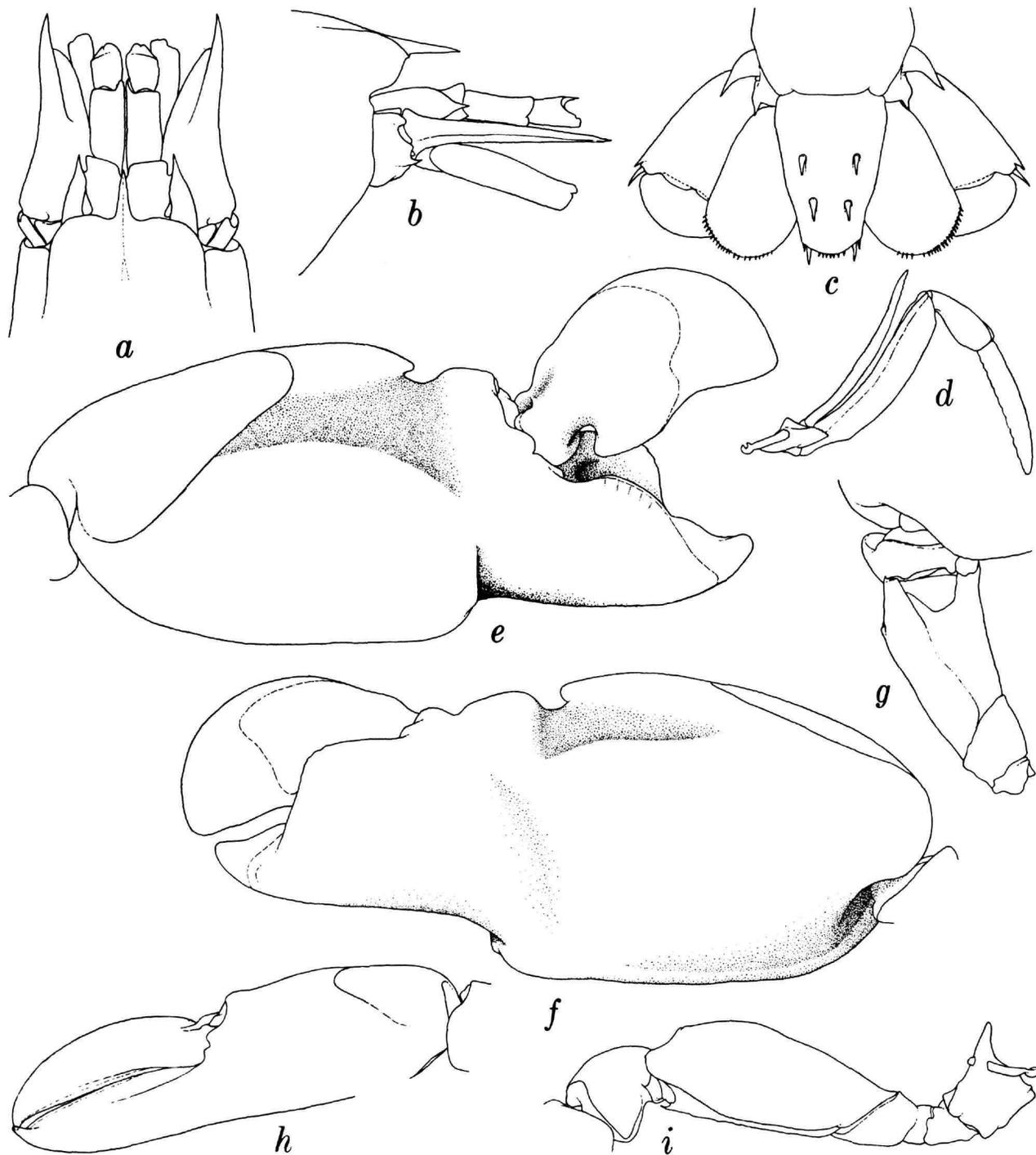


FIGURE 15.—*Alpheus suluensis*, new species, male holotype from *Albatross* sta 5147, carapace length 7.2 mm: *a*, anterior carapace and appendages, dorsal aspect; *b*, same, lateral aspect; *c*, telson and uropods, dorsal aspect; *d*, right 3rd maxilliped; *e*, right 1st (major) chela (detached but probably from holotype); *f*, same, opposite aspect; *g*, right 1st (major) cheliped, proximal segments; *h*, left 1st (minor) chela; *i*, left 1st (minor) cheliped, proximal segments.

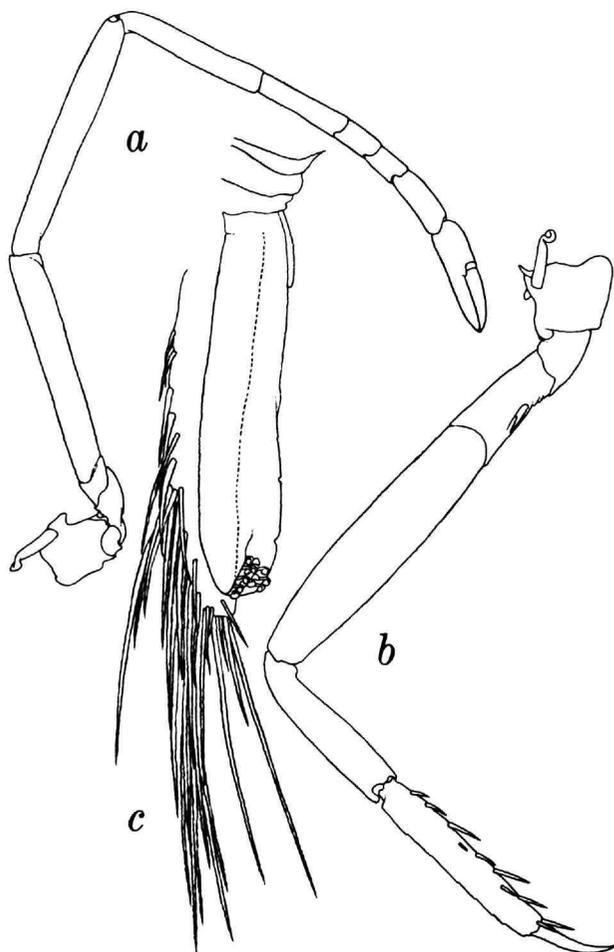


FIGURE 16.—*Alpheus suluensis*, new species, male holotype from *Albatross* sta 5147, carapace length 7.2 mm; a, right 2nd pereopod; b, left third pereopod; c, right appendices interna and masculina.

opposable margin of the fixed finger of the major chela.

ETYMOLOGY.—The suggested specific name is derived from the Archipelago embracing the type locality of the species and the predominant inhabitants for whom the region was named.

76. *Alpheus villosus* (Olivier, 1811)

Palaemon diversimanus Olivier, 1811:663 [type locality: Australia].

Palaemon villosus Olivier, 1811:664 [type locality: "la mer des Indes"; D.M. and A.H. Banner (1982:52) noted that the holotype bore "the label in the vial of 'Port du Roi Georges,' presumably King George Sound at Albany, W.A."].

Alpheus villosus.—D.M. and A.H. Banner, 1982:49, fig. 10.

DIAGNOSIS.—(Sulcatus Group). Body not unusually compressed but covered with short stiff setae together with a few long setae; rostrum triangular, reaching as far as distal margin

of 1st antennular segment, sharply carinate in midline, carina extending posteriorly to midlength of carapace, base of rostrum not abruptly delimited from adrostral furrows; carapace with acute median tooth on gastric region, without paired teeth overhanging posterior ends of adrostral furrows, anterior margin between rostrum and orbital hood armed with triangular tooth, orbital hood bearing acute tooth overhanging margin; 2nd antennular segment about twice as long as wide; basal antennal segment (basicerite) armed with strong ventrolateral tooth far overreaching stylocerite; antennal scale with lateral margin concave, distolateral spine distinctly overreaching distal margin of narrow blade; 1st pereopods with merus armed with small acute distal tooth on inferior flexor margin; major chela compressed, nearly $2\frac{1}{4}$ times as long as wide, dactyl bent, distally truncate, not double-ended but overhanging end of fixed finger, palm with acute tooth either side of dactylar articulation, without longitudinal carina near margin proximal to fixed finger, without distinct transverse "saddle" proximal to adhesive plaque but with longitudinal groove over entire length of margin proximal to plaque, obscure shoulder on margin proximal to fixed finger; minor chela about $2\frac{3}{4}$ times as long as wide, dactyl not very slender, nearly equal to palm in length, not "balaeniceps" in either sex, palm granulate and setose on mesial surface; 2nd pereopod with proximal carpal article twice as long as 2nd; 3rd pereopod with dactyl biunguiculate, propodus armed with 14 spines on flexor margin, carpus with sharp distal tooth on flexor margin, merus armed with strong distal tooth on flexor margin, ischium bearing movable spine; maximum carapace length to base of rostrum about 22 mm.

RANGE.—Mascarene Islands, Sulu Archipelago, and Australia; intertidal to 44 meters, in coral. Although Kensley (1972:54, fig. 25p,q) included *A. villosus* in his illustrated key to the shrimps and prawns of southern Africa, it was not incorporated in the checklist published later (Kensley, 1981:17–50), and that author has informed me that he has not seen material of the species from the African continent.

Aretopsis De Man, 1910

Aretopsis De Man, 1910:310 [type species, by monotypy: *Aretopsis amabilis* De Man, 1910:311; gender feminine].

DIAGNOSIS.—Body not unusually compressed; rostrum distinct, blunt apically in lateral aspect; carapace without high carina throughout length of dorsal midline; abdomen with triangular flap articulated at posterolateral angle of 6th somite; telson not terminating posteriorly in triangular tooth; cornea of eye usually largely exposed in dorsal aspect; mandible typically with incisor process but without palp; 3rd maxilliped not unusually broadened to form partial operculum over other mouthparts; 1st pereopods with major chela lacking socket on fixed finger to receive plunger on movable finger; 2nd pereopod with carpus composed of 5 articles; pereopods

typically with strap-like epipods on 2 or 3 anterior pairs.

RANGE.—Red Sea to Okinawa, Philippines, Indonesia, Australia, and Marshall Islands.

REMARKS.—Two nominal species have been assigned to this rather uncommon genus, in addition to the type species, *A. amabilis*: *A. aegyptiaca* Ramadan, 1936, from the Egyptian coast of the northern Red Sea and *A. manazuruensis* Suzuki, 1971, from Sagami Bay, Japan. Ramadan's species was synonymized with *A. amabilis* by D.M. and A.H. Banner (1973:330), and that synonymy was retained by the same authors later (1981:40). The specimen from Sagami Bay described by Suzuki superficially resembles the type species so closely—even to the color pattern and the association with hermit crabs—that its specific identity might be questioned, especially if the symmetrical first chelipeds of the unique holotype could possibly have resulted from regeneration. Examination of the first specimen of *Aretopsis* to be recorded from the Philippines, however, revealed no palp on the mandible, in contrast with the prominent one illustrated by Suzuki. If *A. manazuruensis* does prove to differ in consistently having one, rather than two, pairs of posterolateral telson spines, symmetrical first chelipeds, and a slightly different branchial formula, in addition to the mandibular palp, perhaps a distinct genus should be proposed for it.

77. *Aretopsis amabilis* De Man, 1910

Aretopsis amabilis De Man, 1910:311 [type locality: Pulau Kaniungan-Ketjil, Makassar Strait coast of Borneo; reef]; 1911:171, pl. 4: fig. 14.—D.M. and A.H. Banner, 1973:330, fig. 12; 1981:40; 1985:33.

Aretopsis aegyptiaca Ramadan, 1936:16, pls. 1, 2: figs. 9–17 [type locality: Hurghada, Egypt].

DIAGNOSIS.—Rostrum triangular, slightly overreaching 1st antennular segment; carapace with suborbital tooth subrectangular; cornea more than $\frac{1}{2}$ exposed in dorsal aspect; 2nd antennular segment about as long as wide; basal antennal segment (basicerite) with strong ventral spine not reaching level of tip of stylocerite; antennal scale with lateral margin nearly straight, distolateral spine extending far beyond distal margin of blade; 1st pereopods asymmetrical, merus without distal tooth on inferior flexor margin; major chela with 1 or 2 large, blunt teeth on opposable margin of dactyl, fixed finger with deep basal sinus bounded by large tooth on each side, palm sharply carinate on margin proximal to fixed finger, bluntly carinate on opposite margin; minor chela about $\frac{2}{3}$ times as long as wide, fingers about as long as palm, crossing at tips; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl distinctly biunguiculate, propodus with 6–8 spines on flexor margin, carpus with distal spine on flexor margin, merus and ischium unarmed; maximum carapace length about 9 mm.

RANGE.—Red Sea to Okinawa, Philippines, Indonesia, Australia, and Marshall Islands.

REMARKS.—The inclusion of *A. amabilis* in the Philippine

fauna is based on a male specimen with a carapace length of 5.2 mm collected on 12 May by the Smithsonian Philippine Expedition of 1978 at Bonbonon Point, Negros Island (9°03'45"N, 123°07'33"E), and identified in 1983 by A.H. Banner (see generic "Remarks").

**Athanas* Leach, 1814

Athanas Leach, 1814:432 [type species, by monotypy: *Palaemon nitescens* Leach, 1814:401; gender: masculine].

Arete Stimpson, 1860:32 [type species, by monotypy: *Arete dorsalis* Stimpson, 1860:32; gender: feminine].

DIAGNOSIS.—Body not unusually compressed; rostrum distinct, acute in lateral aspect; carapace without high carina throughout length of dorsal midline; abdomen with triangular flap articulated diagonally at posterolateral angle of 6th somite; telson not terminating posteriorly in triangular tooth; cornea of eye largely exposed in dorsal aspect; mandible with palp and molar process; 3rd maxilliped not unusually broadened to form partial operculum over other mouthparts; 1st pereopods with major chela without molar-like tooth on movable finger; 2nd pereopod with carpus composed of 4 or 5 articles; number of pereopodal epipods variable.

RANGE.—*Athanas* is generally believed to live in most tropical and some temperate seas, except off the American continents, but Coutière (1899:544) mentions a specimen of *A. dorsalis* from "la mer des Antilles," and the same author (1903:86–88) records a specimen of *A. dorsalis* var. *pacificus* from "Amerique Centrale (sans indic. de versant)"; no American material of the genus is represented among the identified Smithsonian collections. Most species of *Athanas* occur in shallow water, but a few are found in more than 100 meters, and *A. phyllocheles* A.H. and D.M. Banner, 1983:152, came from 450 meters in the western Indian Ocean off La Réunion.

REMARKS.—Since the Indo-Pacific members of the genus were revised by A.H. and D.M. Banner (1960a), five of the 24 species recognized in that work have fallen into synonymy and six additional ones have been described, bringing the total species count to 29, including the four species currently recognized from the eastern Atlantic. Of the species cited by the Banners, I believe that the spelling of *A. haswelli* should revert to the original orthography, *A. hasswelli*; there seems to be no "clear evidence of an inadvertent error" in the original publication, as required by Article 32(c)(ii) of the third edition of the *International Code of Zoological Nomenclature* (1985), for a justified emendation.

Five species of *Athanas* were recorded from the Philippines by D.M. and A.H. Banner (1979). Three additional species were collected by the Smithsonian Philippine Expedition of 1978 and identified by A.H. Banner, and the specimen in the *Albatross* collections tentatively identified as *A. jedanensis* brings the total Philippine count to nine.

Key to Philippine Species of *Athanas*

1. Orbit with supracorneal tooth (sometimes rounded) 2
Orbit without supracorneal tooth 4
2. Infracorneal tooth, if present, overreaching extracorneal tooth; 1st pereopod with merus deeply excavate on flexor surface 81. *A. djiboutensis*
Infracorneal tooth absent or, if present, not overreaching extracorneal tooth; 1st pereopod with merus not deeply excavate on flexor surface 3
3. Major chela subcylindrical; 2nd pereopod with 5 carpal articles 78. *A. areteformis*
Major chela compressed; 2nd pereopod with 4 carpal articles 79. *A. borradailei*
4. Third pereopod with dactyl simple, not biunguiculate 5
Third pereopod with dactyl biunguiculate 6
5. Adult female with carpus of 1st pereopod longer than chela 80. *A. dimorphus*
Adult female with carpus of 1st pereopod no longer than palm of chela 85. *A. marshallensis*
6. Second pereopod with 4 carpal articles 7
Second pereopod with 5 carpal articles 8
7. Rostrum not overreaching 2nd antennular segment 82. *A. dorsalis*
Rostrum overreaching 2nd antennular segment 83. *A. indicus*
8. Without infracorneal tooth below orbit *84. ?*A. jedanensis*
With sharp infracorneal spine below orbit 86. *A. parvus*

78. *Athanas areteformis* Coutière, 1903

Athanas areteformis Coutière, 1903:79, figs. 17, 18 [type locality: Naifaro Reef and Hulele Male Atoll, Maldives Islands].—D.M. and A.H. Banner, 1973:304, fig. 2.—A.H. and D.M. Banner, 1983:73.

Athanas Naifaroensis Coutière, 1903:77, figs. 14–16 [type locality: Naifaro Reef and Hulele Male Atoll, Maldives Islands].

Athanas erythraeus Ramadan, 1936:13, pl. 1: fig. 1 [type locality: Hurghada, Egypt].

Athanas dubius A.H. Banner, 1956:322, fig. 2 [type locality: Saipan, Mariana Islands].

DIAGNOSIS.—Rostrum usually overreaching 2nd antennular segment; orbit with sometimes obscure supracorneal tooth, strong extracorneal tooth, and sometimes rounded infracorneal tooth, extracorneal far overreaching infracorneal tooth; major cheliped with chela subcylindrical, carpus shorter than palm in mature female, merus not deeply excavate on flexor surface; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl simple, not biunguiculate, about $\frac{1}{3}$ as long as propodus; maximum carapace length to base of rostrum about 6 mm.

RANGE.—Red Sea to South Africa, Maldives and Laccadive islands, Philippines, Australia, and Marshall, Fiji, Tonga, Samoa, and Society islands; often in dead coral on reef flats and deeper.

79. *Athanas borradailei* (Coutière, 1903)

Arete Borradailei Coutière, 1903:80, figs. 19–24 [type locality: Hulele Male Atoll, Maldives Islands].

Arete ghardaqensis Ramadan, 1936:36, pl. 1: figs. 2–8 [type locality: Harghada, Egypt].

Athanas polynesia A.H. and D.M. Banner, 1966a:152, fig. 7 [type locality: Alofau, Tutuila, American Samoa].

Athanas borradailei.—A.H. and D.M. Banner, 1983:73.

DIAGNOSIS.—Rostrum not usually overreaching 2nd antennular segment; orbit with supracorneal tooth and extracorneal tooth, but no infracorneal tooth; major cheliped with chela compressed, carpus shorter than palm in mature female, merus not deeply excavate on flexor surface; 2nd pereopod with 4 carpal articles; 3rd pereopod with dactyl simple, not biunguiculate, about $\frac{1}{2}$ as long as propodus; maximum carapace length to base of rostrum about 5 mm.

RANGE.—Red Sea, eastern Africa, Madagascar, Maldives, Philippines, Australia, and American Samoa; subtidal. The Philippine record stems from a single specimen collected at Lalaan, Negros, in 1978.

80. *Athanas dimorphus* Ortmann, 1894

Athanas dimorphus Ortmann, 1894:12, pl. 1: fig. 1 [type locality: Dar es Salaam, Tanzania, Upanga Reef; holes and recesses in coral].—D.M. and A.H. Banner, 1973:313, fig. 6.—A.H. and D.M. Banner, 1983:76.

Athanas solenomerus Coutière, 1897a:381 [type locality: Red Sea].

Athanas leptochelous Coutière, 1897a:381 [type locality: Red Sea].

Athanas dispar Coutière, 1897b:233 [type locality: Djibouti and El Suweis; under stones at low tide].

Athanas setoensis Kubo, 1951:265, figs. 5, 6 [type locality: Shirahama, Wakayama Prefecture, southwest of Kii Peninsula, Japan].

Athanas dimorphus seedang A.H. and D.M. Banner, 1966b:28, fig. 4 [type locality: Koh Kradard, Thailand].

DIAGNOSIS.—Rostrum usually overreaching 2nd antennular segment; orbit without supracorneal tooth, extracorneal tooth acute, infracorneal tooth rounded, not overreaching extracorneal; major cheliped with chela subcylindrical, carpus longer than chela in mature female, merus deeply excavate on flexor surface; 2nd pereopod with 5 carpal articles; 3rd pereopod with

dactyl simple, not biunguiculate, about $\frac{1}{3}$ as long as propodus; maximum carapace length to base of rostrum nearly 10 mm.

RANGE.—Red Sea and eastern Africa, Thailand, Philippines, Hong Kong, Japan, Australia, New Caledonia; commonly amid detritus on shallow reef flats, rarely to a depth of 115 meters.

81. *Athanas djiboutensis* Coutière, 1897

Athanas Djiboutensis Coutière, 1897a:234 [type locality: Djibouti].

Athanas sulcatipes Borradaile, 1898:1011, pl. 65: fig. 9 [type locality: Funafuti, Ellice Islands].

Athanas djiboutensis.—D.M. and A.H. Banner, 1973:306, fig. 3.—A.H. and D.M. Banner, 1983:77.

DIAGNOSIS.—Rostrum variable in length; orbit with supracorneal, extracorneal, and infracorneal teeth, latter overreaching extracorneal teeth; major cheliped with chela subcylindrical, merus deeply excavate on flexor surface, minor cheliped of mature female with carpus shorter than palm; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl simple, not biunguiculate, about $\frac{1}{2}$ as long as propodus; maximum carapace length to base of rostrum about 3 mm.

RANGE.—Red Sea, eastern and South Africa, Maldives and Laccadive islands, Indonesia, Philippines, Japan, Coral Sea coast of Australia, and eastward through the Pacific islands to the Marquesas and Society groups; under rocks at low tide and in dead coral. More than 30 specimens of *A. djiboutensis* were collected at the Visayan Islands, northern Negros, and one specimen at the Cuyo Islands in the northern Sulu Sea in 1978.

82. *Athanas dorsalis* (Stimpson, 1860)

Arete dorsalis Stimpson, 1860:32 [type locality: Lyemun Strait, Hong Kong; among sublittoral rocks].

Arete dorsalis var. *Pacificus* Coutière, 1903:87, fig. 30 [type locality: Hong Kong(?), Samoa, New Caledonia, Central America ("sans indic. de versant")].

Arete Maruteensis Coutière, 1905:864 [type locality: Marutea, Tuamotu Archipelago].

Arete maruteensis, var. *salibabuensis* De Man, 1910:313 [type locality: anchorage off Lirung, Palau Salebabu, Kepulauan Talaud, Indonesia; to 36 meters].

DIAGNOSIS.—Rostrum usually not overreaching 2nd antennular segment; orbit without supracorneal tooth, with extracorneal tooth, and without infracorneal tooth; major cheliped with chela compressed, not subcylindrical, merus not deeply excavate on flexor surface, carpus shorter than palm in mature female; 2nd pereopod with 4 carpal articles; 3rd pereopod with dactyl biunguiculate, about $\frac{1}{3}$ as long as propodus; maximum carapace length to base of rostrum about 6 mm.

RANGE.—There is little doubt that *A. dorsalis* occurs throughout the Indo-Pacific area from the Red Sea and Indian Ocean to Thailand, Indonesia, Philippines, China, Japan, Australia, and eastward to the Tuamotu Archipelago. Coutière (1899:544) mentioned a specimen from the West Indies and (1903:86–88) included Central America in the range, but both

of these extensions need confirmation. The Smithsonian Philippine Expedition of 1978 collected two specimens of *A. dorsalis* at the Cayo Islands, northern Sulu Sea. This shrimp frequents reef flats and rather shallow sublittoral depths; it is commonly, perhaps obligatorily, associated with echinoderms, usually echinoids.

83. *Athanas indicus* (Coutière, 1903)

Arete dorsalis var. *Indicus* Coutière, 1903:84, figs. 25–29 [type locality: Djibouti and Hulele Male Atoll, Maldives Islands].

Arete Iphianassa De Man, 1910:312 [type locality: off Sawan, Pulau Siau, Kepulauan Sangi, Indonesia; reef].

Arete intermedius Yu, 1931:513, fig. 1 [type locality: Amoy(?), China].

Athanas indicus.—Suzuki, 1970:5, figs. 4–7.—D.M. and A.H. Banner, 1973:327, fig. 11; 1981:42.

DIAGNOSIS.—Rostrum overreaching 2nd antennular segment; orbit without supracorneal tooth, with extracorneal tooth, without infracorneal tooth; major cheliped with chela compressed, merus not deeply excavate on flexor surface, carpus shorter than palm in mature female; 2nd pereopod with 4 carpal articles; 3rd pereopod with dactyl biunguiculate, about $\frac{1}{3}$ as long as propodus; maximum carapace length to base of rostrum about 7 mm.

RANGE.—Red Sea, Mozambique, Madagascar, Persian Gulf, Indian Ocean, Indonesia, Philippines, China, Japan, and Australia, eastward to the Tuamotu Archipelago; possibly always associated with echinoids situated in the upper sublittoral zone.

REMARKS.—*Athanas kominatoensis* Kubo, 1942, is probably a synonym of this species, but Suzuki (1970:5) chose to regard it as distinct until the importance of the angulate versus rounded pterygostomial margin and the obtuse rather than acute distal part of the palm of the first cheliped can be evaluated more reliably.

*84. ?*Athanas jedanensis* De Man, 1910

Athanas jedanensis De Man, 1910:313 [type locality: Djedan, Kepulauan Aru, Indonesia; 13 meters]; 1911:154, pl. 2: fig. 7.

DIAGNOSIS.—Rostrum reaching about to level of distal margin of 2nd antennular segment; orbit without supracorneal tooth, with extracorneal tooth, and without infracorneal tooth; major cheliped with chela subcylindrical, merus deeply excavate on flexor surface, carpus longer than chela in mature female; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, about $\frac{1}{3}$ as long as propodus; maximum carapace length to base of rostrum about 5 mm.

MATERIAL.—PHILIPPINES. Off Tawitawi, Sulu Archipelago: sta 5157; 5°12'30"N, 119°55'50"E; 33 m; fine sand; 21 Feb 1908 (0904–0909); 9' Johnston oyster dredge: 1 male [1.9].

RANGE.—This questionable record is apparently the first for the species since the original male and three ovigerous females

were described from Kepulauan Aru in the Arafura Sea south of West New Guinea, at a depth of 13 meters.

REMARKS.—The single representative of the genus *Athanas* in the *Albairross* collections lacks both members of the first pair of chelipeds. It has been tentatively assigned to *A. jedanensis* only because it seems to agree reasonably well with De Man's description and illustrations in all other particulars.

85. *Athanas marshallensis* Chace, 1955

Athanas marshallensis Chace, 1955:17, fig. 8 [type locality: Bogombogo Island, Eniwetok Atoll, Marshall Islands; intertidal].—A.H. and D.M. Banner, 1983:151.

DIAGNOSIS.—Rostrum not overreaching 2nd antennular segment; orbit without supracorneal tooth, with extracorneal tooth, with rounded infracorneal tooth; major cheliped with chela subcylindrical, merus deeply excavate on flexor surface, carpus more than $1/2$ as long to longer than palm in mature female; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl simple, not biunguiculate, about $1/5$ as long as propodus; maximum carapace length to base of rostrum 5 mm.

RANGE.—Until the limits of variation of this nominal species are better known, its range—as well as its appropriate name—must remain somewhat questionable. The most recent analysis (A.H. and D.M. Banner, 1983:151) suggests that *A. marshallensis* occurs in the Red Sea and western Indian Ocean, the Philippines, and Micronesia; shallow subtidal.

REMARKS.—As alluded to above, it is still indeterminate whether *A. routhionastes* A.H. and D.M. Banner, 1960a, is a synonym of *A. marshallensis* and even whether the latter species is distinct from *A. esakii* Kubo, 1940b, from the Caroline Islands, or even the Japanese *A. lamellifer* Kubo, 1940a, which is generally believed to be a synonym of *A. japonicus* Kubo, 1936.

86. *Athanas parvus* De Man, 1910

Athanas Sibogae De Man, 1910:314 [type locality: six different Indonesian *Siboga* stations; 13–36 meters]; 1911:151, pl. 2: fig. 6.—Miyai and Miyake, 1968:134, fig. 2.—D.M. and A.H. Banner, 1973:321, fig. 9.

Athanas parvus De Man, 1910:315 [type locality: south coast of Timor, Indonesia; 8°39.1'S, 127°4.4'E; 34 meters]; 1911:148, pl. 1: fig. 4.

DIAGNOSIS.—Rostrum usually overreaching 2nd antennular segment; orbit without supracorneal tooth, with extracorneal tooth and acute infracorneal tooth, extracorneal overreaching infracorneal tooth; major cheliped with chela subcylindrical, merus deeply excavate on flexor surface, carpus shorter than palm in mature female; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, about $1/3$ as long as propodus; maximum carapace length to base of rostrum about 6 mm.

RANGE.—Red Sea, eastern Africa, Singapore, Indonesia, Philippines, Japan, Australia, and Tonga and Samoa islands; common intertidally under rocks and occurring at a maximum

depth of 70 meters.

REMARKS.—There is little doubt that A.H. and D.M. Banner (1960a:141) acted as first reviser in citing *A. sibogae* as a junior synonym of *A. parvus*, and the latter name should take precedence over the former, even though the reverse relationship has been adopted by most authors since that date, perhaps in the mistaken belief that the selection is determined solely by page precedence.

Automate De Man, 1888

Arethusa De Man, 1888a:216 [nomen nudum; no type species indicated].

Automate De Man, 1888a:529 [type species, by monotypy: *Automate dolichognatha* De Man, 1888a:529; gender: feminine].

DIAGNOSIS.—Body not unusually compressed; rostrum, if present, inconspicuous, subtriangular or lobate, unarmed extension of frontal margin of carapace; carapace without high carina throughout length of dorsal midline; abdomen without articulated triangular flap at posterolateral angle of 6th somite; telson not terminating posteriorly in triangular tooth; both eyes and eyestalks visible in dorsal aspect; mandible with palp and molar process; 3rd maxilliped not unusually broadened to form partial operculum over other mouthparts; 1st pereopods dissimilar, carried extended with movable finger dorsal or lateral, not ventral, major chela without molar-like tooth on movable finger; 2nd pereopod with fingers about as long as palm, carpus with 5 articles; pereopods with strap-like epipods on 4 anterior pairs; appendix masculina absent.

RANGE.—Pantropical with temperate extensions; intertidal to 250 meters.

REMARKS.—A dozen species seem to have been described in this genus. Eight of them are here presumed to be valid, in line with the conclusions reached by D.M. and A.H. Banner (1973:302). The Banners omitted from their list of acceptable species *A. branchialis* from the eastern Mediterranean and included two names, *A. kingsleyi* and *A. haightae*, which, together with *A. gardineri* and *A. johnsoni*, are here relegated to the synonymy of the variable and wide-ranging *A. dolichognatha*, the only member of the genus thus far known from the Philippines. Inasmuch as Crosnier and Forest (1966:203) reported that they were unable to find the type specimens of *A. talismani* in the Paris Museum, the true identity of that species—which would logically represent an extension of *A. dolichognatha* into the eastern Atlantic and thereby establish the pantropical distribution of the species—may never be determined; it is here tentatively treated as a distinct species, as did the Banners, because the original description by CouÛère (1902) indicates that the rostrum is larger than its maximum development in *A. dolichognatha*.

It is hoped that the following provisional key to the species recognized herein may help to clarify eventually the true membership of the genus.

basal segment of antennal peduncle (basicerite) armed with small distal tooth; major chela with margins smooth, not rugose; 3rd pereopod with dactyl simple, not subspatulate, with about 5 spinules on flexor margin of propodus; maximum carapace length to base of rostrum about 7 mm.

RANGE.—Pantropical, except for eastern Atlantic; usually intertidal or shallow subtidal.

***Batella Holthuis, 1955**

Cheirothrix Bate, 1888:532 [type species, by monotypy: *Cheirothrix parvimanus* Bate, 1888:533; gender: feminine. Invalid junior homonym of *Cheirothrix* Pictet and Humbert, 1866:51 (Pisces)].

Batella Holthuis, 1955:92 [substitute name for *Cheirothrix* Bate, 1888; type species: *Cheirothrix parvimanus* Bate, 1888; gender: feminine].

DIAGNOSIS.—Body not unusually compressed from side to side; rostrum distinct, acute in dorsal and lateral aspects; carapace without high carina throughout length of dorsal midline; abdomen without triangular flap articulated at

posteroventral angle of 6th somite; telson not terminating posteriorly in triangular tooth; eyes largely concealed from dorsal aspect, visible in anterior aspect; mandible with molar process but without palp; 3rd maxilliped not unusually broadened to form partial operculum over other mouthparts; 1st pereopods similar, not necessarily equal, carried extended with movable finger dorsal or lateral, not ventral, major chela without molar-like tooth on movable finger; 2nd chela with fingers about $\frac{1}{6}$ as long as palm, carpus with 5 articles; pereopods without strap-like epipods; appendix masculina not overreaching exopod of 2nd pleopod.

RANGE.—Northern East China Sea, Philippines, and Torres Strait; 15–296 meters.

REMARKS.—To my knowledge, only two specimens of *Batella*, which were at first assigned to separate species, have been recorded heretofore. The *Albatross* obtained four specimens in the Philippines, three belonging to the type species and one to an undescribed species, as characterized in the following key.

Key to Species of *Batella*

- Pterygostomial angle sharply produced; telson overreaching both branches of uropod, bearing single pair of small sublateral spines, posterior margin transverse; basal antennal segment (basicerite) with ventral lobe strongly produced; 1st pair of pereopods with movable finger very slightly, if at all, overreaching fixed finger; 2nd pair of pereopods with carpus nearly twice as long as chela, distal article about 4 times as long as wide *88. *B. leptocarpus*
- Pterygostomial angle less sharply produced; telson not overreaching mesial branch of uropod, bearing 2 pairs of dorsolateral spines, posterior margin mesially convex; basal antennal segment (basicerite) with ventral lobe not unusually produced; 1st pair of pereopods with movable finger far overreaching fixed finger; 2nd pair of pereopods with carpus less than $1\frac{1}{2}$ times as long as chela, distal article barely 3 times as long as wide *89. *B. parvimanus*

***88. *Batella leptocarpus*, new species**

FIGURE 17

DIAGNOSIS.—See “Key to Species.”

DESCRIPTION.—Front damaged (Figure 17*b*), apparently tridentate. Inconspicuous tubercle in midline of gastric region. Pterygostomial angle sharply produced (Figure 17*a*). Cardiac notch in posterior margin of carapace at base of branchiostegite deep.

Abdomen broadly rounded dorsally, 3 anterior somites with pleura rounded subrectangular, 4th posteroventrally rectangular, 5th posteroventrally bluntly acute, 6th with posteroventral angle obtuse and with broadly acute tooth either side of base of telson. Telson (Figure 17*c*) about twice as long as 6th somite, more than twice as long as anterior width, armed laterally with single pair of lateral spines in posterior $\frac{1}{4}$ of length, posterior

margin nearly transverse.

Eyes deeply recessed, completely concealed from dorsal and lateral view, quite exposed anteriorly.

Antennules badly damaged, stylocerite sharply produced, distinctly overreaching basal segment.

Antennal scale (Figure 17*d*) $1\frac{3}{4}$ times as long as wide, distolateral tooth not reaching level of angularly convex distal margin of blade. Basal antennal segment with strong, acutely produced ventral lobe. Antennal peduncle reaching distal $\frac{1}{3}$ of antennal scale.

Mouthparts as illustrated (Figure 17*e-i*). Mandible with incisor process distally concave. First maxilliped with greatly expanded central lobe and 2nd maxilliped with obscure distal segment, both as in type species. Third maxilliped overreaching antennal scale by nearly $\frac{2}{3}$ length of distal segment.

First pair of pereopods slightly unequal (possibly due to

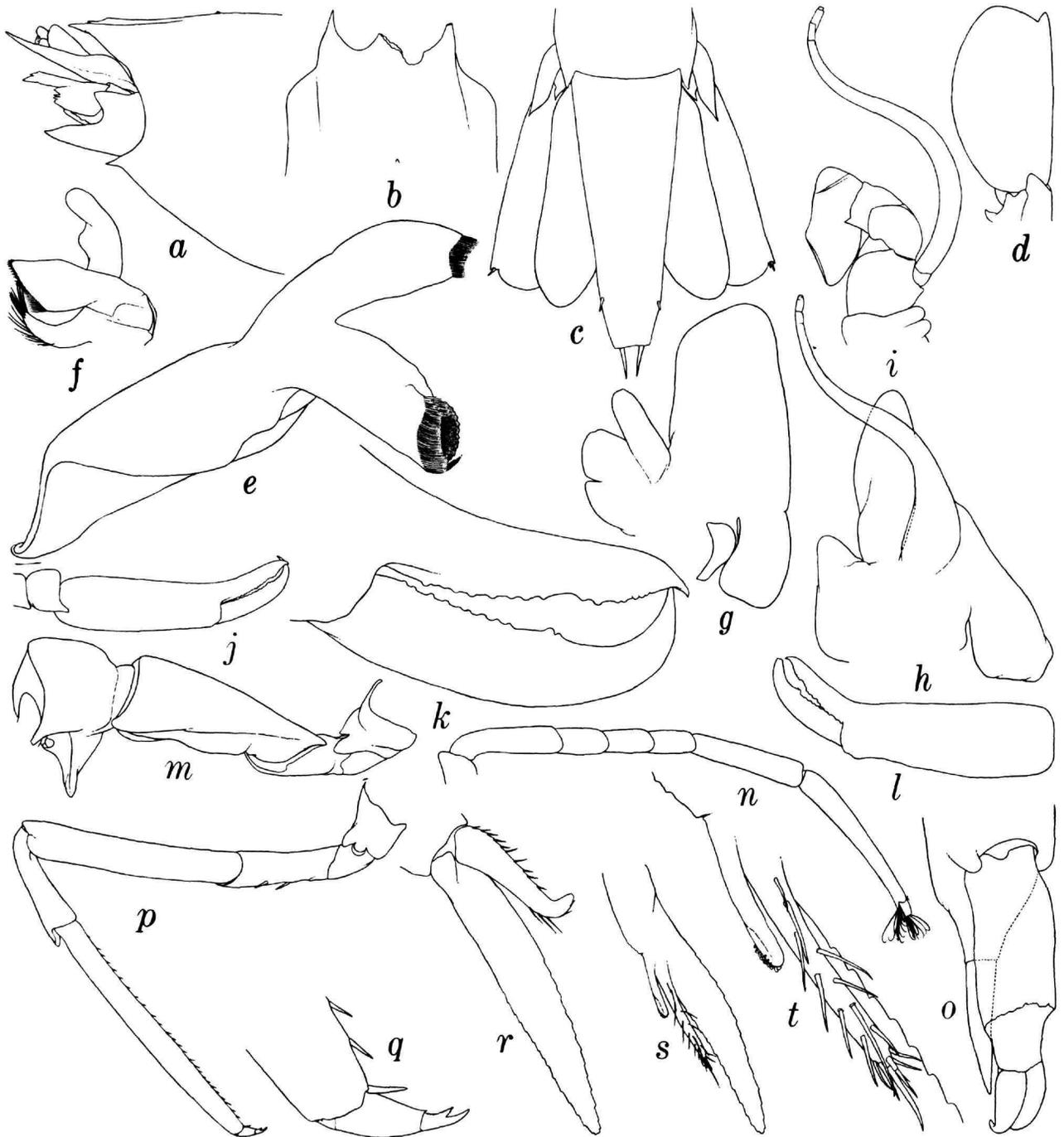


FIGURE 17.—*Batella leptocarpus*, new species, male holotype from *Albatross* sta 5543, carapace length 5.8 mm: *a*, anterior end, lateral aspect; *b*, anterior end of carapace, dorsal aspect; *c*, telson and uropods, dorsal aspect; *d*, right antennal scale; *e*, left mandible; *f*, left 1st maxilla; *g*, left 2nd maxilla; *h*, left 1st maxilliped; *i*, left 2nd maxilliped; *j*, right 1st chela; *k*, same, fingers; *l*, left 1st chela; *m*, left 1st cheliped, proximal segments; *n*, right 2nd pereopod; *o*, same, fingers, denuded; *p*, left 3rd pereopod; *q*, same, dactyl; *r*, left 1st pleopod, posterior aspect; *s*, endopod of left 2nd pleopod; *t*, same, appendices interna and masculina.

regeneration), left larger, overreaching antennal scale by about $\frac{3}{4}$ length of chela, movable finger slightly longer than fixed finger, right with fingers subequal in length (Figure 17j,k); carpus with at least 1 sharp marginal tooth; merus with staggered convex flanges on flexor margins (Figure 17m), most prominent on right side. Second pereopod overreaching antennal scale by fully length of chela; movable finger (Figure 17o) terminating in 2 nearly contiguous curved spines but tips of both fingers concealed by plumose setae; carpus (Figure 17n) slender, composed of 5 articles, proximal one slightly shorter than distal, each slightly shorter than combined lengths of other 3 articles. Third pereopod (Figure 17p) overreaching antennal scale by length of dactyl and nearly all of propodus; dactyl (Figure 17q) little more than $\frac{1}{10}$ as long as propodus, distinctly biunguiculate; propodus bearing more than 20 fine spinules on flexor margin; carpus unarmed; merus unarmed, more than $\frac{4}{5}$ as long as propodus and $\frac{5}{4}$ times as long as wide; ischium less than $\frac{1}{2}$ as long as merus, with 2 marginal spines. Fourth pereopod similar to but shorter than 3rd, overreaching antennal scale by length of dactyl and about $\frac{1}{3}$ of propodus. Fifth pereopod similar to but shorter than preceding pairs, reaching only to distal $\frac{1}{3}$ of antennal scale.

First pleopod of male (Figure 17r) with endopod tapering to blunt tip bent nearly at right angle. Appendix masculina on 2nd pleopod (Figure 17s,t) overreaching appendix interna by more than $\frac{1}{2}$ length of former, armed with about 17 long spines, including 7 clustered near distal end. Uropod (Figure 17c) with lateral branch armed with distolateral tooth and 1 (or 2) movable spines immediately adjacent thereto; transverse suture barely visible near distal margin.

SIZE.—Carapace length of unique male holotype, 5.8 mm.

MATERIAL.—PHILIPPINES. Western Mindanao Sea: sta 5543; 8°47'15"N; 123°35'00"E; 296 m; sand; 12.5°C; 20 Aug 1909 (0904–0921); 12' Tanner beam trawl: 1 male [5.8], holotype (USNM 205660).

TYPE LOCALITY.—Off Murcielagos Bay, Mindanao, Philippines; 8°47'15"N, 123°35'00"E; 296 meters.

RANGE.—Known only from the unique type specimen taken off Murcielagos Bay, Mindanao, in 296 meters.

REMARKS.—Although I had some reservations about describing a species from a single specimen with damaged front and antennules, the differences between this specimen and the only other species in the genus were sufficient to overcome my reluctance to follow such a course. There is little doubt that *B. leptocarpus* is a distinct species, and the most important characters for distinguishing it seem to be displayed in the single available specimen.

ETYMOLOGY.—The Greek *leptos* ("slender") plus *karpos* ("carpus") describes the slender carpus of the second pereopod, which seems to be one of the most useful characters for separating *B. leptocarpus* from *B. parvimanus*.

*89. *Batella parvimanus* (Bate, 1888)

FIGURE 18

Cheirothrix parvimanus Bate, 1888:533, pl. 96: fig. 2 [type locality: Torres Strait; 10°30'S, 142°18'E; 15 meters; coral mud].

Batella bifurcata Miya and Miyake, 1968b:116, figs. 2–4 [type locality: northwest of Danjo Gunto, northern East China Sea; 32°14.0'N, 127°50.4'E; 156 meters].—Miya, 1984:217.

DIAGNOSIS.—See "Key to Species."

MATERIAL.—PHILIPPINES. 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: 1 male [4.9] 2 females [5.3, 6.0], 1 ovig [6.0].

RANGE.—Northern East China Sea, Philippines, and Torres Strait off Cape York, Australia; 15–216 meters.

REMARKS.—I, too, was able to examine the unique male holotype of *B. parvimanus*, through the kind cooperation of R.W. Ingle of the British Museum (Natural History), and I concur with Miya's conclusion that the presumed differences that prompted the description of *B. bifurcata* were based on unfortunate inaccuracies in the original description of *B. parvimanus*. It may be noted from Figure 18o that the Philippine specimens identified with this species have the movable finger of the second pereopod terminating in two contiguous curved spines, as in *B. leptocarpus*; this feature could not be discerned in the holotype of *B. parvimanus* without damaging the specimen, but there would seem to be little doubt that Bate's fig. 21" represents further evidence of careless descriptive effort.

Betaeopsis Yaldwyn, 1971

Betaeopsis Yaldwyn, 1971:88 [type species, by original designation: *Betaeus aequimanus* Dana, 1852a:23; gender: feminine].

DIAGNOSIS.—Body not unusually compressed from side to side; rostrum absent, front emarginate; carapace without high carina throughout length of dorsal midline; abdomen without triangular flap articulated at posterolateral angle of 6th somite; telson not terminating posteriorly in triangular tooth; eyes concealed from dorsal view, partially so in anterior aspect; mandible with palp and molar process; 3rd maxilliped with antepenultimate segment flattened but not unusually broadened to form partial operculum over other mouthparts; 1st pereopods similar, subequal, carried extended with movable finger ventral, major chela without molar-like tooth on movable finger; 2nd cheliped with fingers nearly as long as palm, carpus with 5 articles; pereopods with slender, strap-like epipods on 2 anterior pairs; appendix masculina not overreaching exopod of 2nd pleopod.

RANGE.—Red Sea, Philippines, Indonesia, and New Zealand; damp supratidal situations to a depth of 18 meters.

REMARKS.—The two known species of the genus are very similar, differing principally in the appearance of the frontal region, as indicated in the following key.

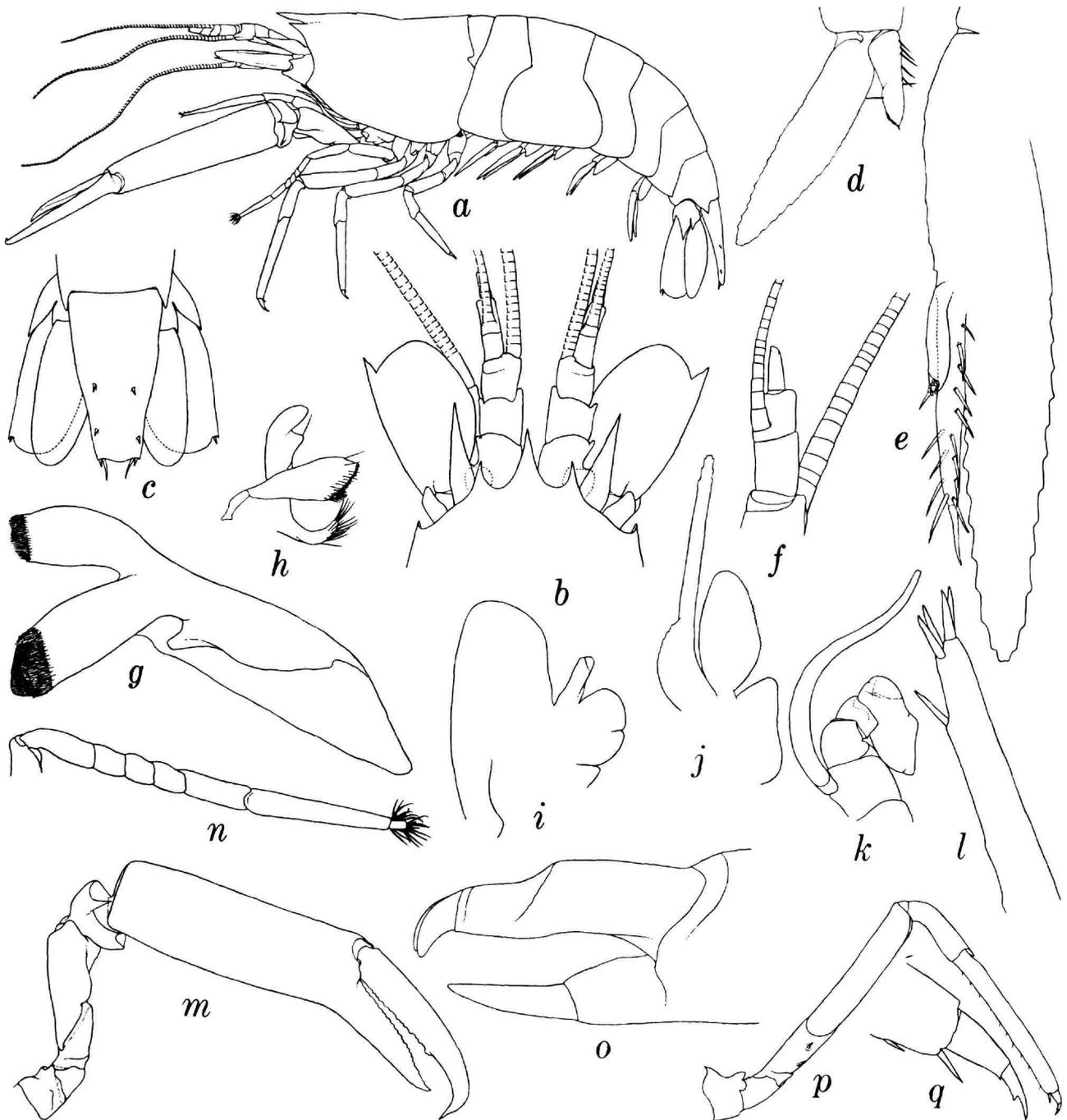


FIGURE 18.—*Batella parvimanus*, a–e, male from *Albatross* sta 5117, carapace length 4.9 mm; f–g, female from same station, carapace length 5.3 mm: a, lateral aspect; b, anterior carapace and appendages, dorsal aspect; c, telson and uropods, dorsal aspect; d, left 1st pleopod, posterior aspect; e, endopod of left 2nd pleopod, anterior aspect; f, denuded bases of right antennular flagella, dorsolateral aspect; g, right mandible; h, right 1st maxilla; i, right 2nd maxilla; j, right 1st maxilliped; k, right 2nd maxilliped; l, distal end of 3rd maxilliped, lateral aspect; m, right 1st pereopod, carpus and chela; n, right 2nd pereopod, carpus and chela; o, same, denuded fingers; p, right 3rd pereopod, q, same, dactyl.

Key to Species of *Betaeopsis*

- Front deeply, triangularly incised; orbital hoods with variably shaped mesial, horizontal flanges sometimes forming secondary emargination above mesial frontal depression *B. aequimanus* (Dana, 1852)
(New Zealand; supratidal and littoral, under stones)
- Front shallowly, broadly emarginate; orbital hoods at most with paired mesial sutures meeting posteriorly 90. *B. indica*

90. *Betaeopsis indica* (De Man, 1910)

Betaeus indicus De Man, 1910:309 [type locality: Labuhanpandan, Lombok, Lesser Sunda Islands, Indonesia; 18 meters]; 1911:173, pl. 4: fig. 15a-f; pl. 5: fig. 15.

Betaeopsis indicus.—D.M. and A.H. Banner, 1981:48.

DIAGNOSIS.—See "Key to Species."

RANGE.—Red Sea, Philippines, Indonesia; 0–18 meters.

REMARKS.—The inclusion of *B. indica* in the Philippine fauna is based on a male specimen, with a carapace length of 5.6 mm, collected on 13 May by the Smithsonian Philippine Expedition of 1978 at Maloh, Negros Island (9°03'08"N, 122°59'30"E) and identified in 1983 by A.H. Banner. That specimen has been compared with 5 specimens of *B. aequimanus* from New Zealand in the Smithsonian collections to construct the key to the two known species of the genus.

Metalpheus Coutière, 1908

Metalpheus Coutière, 1908:213 [type species, selected by Shelford, 1909:2631: *Alpheus rostratipes* Pocock, 1890:522; gender: masculine].—Chace, 1972:78.—D.M. and A.H. Banner, 1982:280.

DIAGNOSIS.—Body not unusually compressed from side to side; rostrum distinct, acute in lateral aspect; carapace without high carina throughout length of dorsal midline; abdomen without triangular flap articulated at posterolateral angle of 6th somite; telson not terminating posteriorly in triangular tooth; eyes concealed from dorsal and all but anteroventral aspects; mandible with palp and molar process, incisor process unusually expanded; 3rd maxilliped broadened to form partial operculum over other mouthparts; 1st pereopods dissimilar and unequal, carried extended with movable finger dorsal or lateral, not ventral; major chela with molar-like tooth on movable finger; 2nd cheliped with fingers about as long as palm, carpus with 5 articles; pereopods with strap-like epipods on 3 anterior pairs; appendix masculina overreaching exopod of 2nd pleopod of male.

RANGE.—Pantropical; intertidal to 20 meters.

REMARKS.—A key to the three usually recognized species of *Metalpheus* has been published by D.M. and A.H. Banner, (1982:282). A distinction between *M. paragracilis* and *M. rostratipes* not emphasized previously is the difference in the

structure of the appendix masculina; although this appendage overreaches the exopod of the second pleopod of males of both species, it is indistinguishably fused with the endopod in at least Atlantic specimens of *M. rostratipes*, whereas there is no such fusion in *M. paragracilis*.

91. *Metalpheus paragracilis* (Coutière, 1897)

Alpheus paragracilis Coutière, 1897b:304 [type locality: "l'île Tague" (?); this origin of the unique holotype was not repeated among the localities listed for the species by Coutière in 1905:883].

Metalpheus paragracilis.—D.M. and A.H. Banner, 1982:282, fig. 86.

DIAGNOSIS.—Rostrum reaching about to level of distal margin of 1st antennular segment; antennal scale overreaching antennular peduncle, lateral margin concave in proximal 1/2 of length; major chela with distinct shoulder on margin proximal to fixed finger; 2nd pereopod with 2nd carpal article nearly twice as long as wide; 3rd pereopod with merus armed with strong distal tooth on flexor margin; maximum carapace length about 7 mm.

RANGE.—Probably pantropical; intertidal to 20 meters.

Nennalpheus A.H. and D.M. Banner, 1981

Nennalpheus A.H. and D.M. Banner, 1981:219 [type species, by original designation: *Alpheopsis Sibogae* De Man, 1910:307; gender: masculine].

DIAGNOSIS.—Body not unusually compressed from side to side; rostrum distinct, acute in lateral aspect; carapace without high carina throughout length of dorsal midline; abdomen with or without triangular flap articulated at posterolateral angle of 6th somite; telson not terminating posteriorly in triangular tooth; eyes largely concealed from dorsal view, partially visible from other aspects; mandible with palp and molar process; 3rd maxilliped not unusually broadened to form partial operculum over other mouthparts; 1st pereopods similar, carried extended with movable finger ventral, without molar-like tooth; 2nd pereopod with fingers no shorter than palm, carpus with 5 articles; pereopods with strap-like epipods on 4 anterior pairs.

RANGE.—Philippines and Indonesia; 19 to at least 208 meters.

Key to Species of *Nennalpheus*

- Orbital hoods unarmed; abdomen without flap articulated at posterolateral angle of 6th somite 92. *N. inarticulatus*
 Each orbital hood armed with acute marginal tooth; abdomen with triangular flap articulated at posterolateral angle of 6th abdominal somite
 *N. sibogae* De Man, 1910:307
 (Lesser Sunda Islands, Indonesia; 19–70 meters)

92. *Nennalpheus inarticulatus* A.H. and D.M. Banner, 1981

Nennalpheus inarticulatus; A.H. and D.M. Banner, 1981:221, fig. 1a–r [type locality: southwest of Manila Bay, Luzon, Philippines; 13°59.2'N, 120°20.3'E; 208–222 meters].

DIAGNOSIS.—See “Key to Species.”

RANGE.—Known from only two stations southwest of Manila Bay, Philippines; 191–200 and 208–222 meters.

Neoalpheopsis A.H. Banner, 1953

Neoalpheopsis A.H. Banner, 1953:20 [type species, by original designation: *Neoalpheopsis hiatti* A.H. Banner, 1953:21 (= *Alpheopsis? Euryone* De Man, 1910:308); gender: feminine].

DIAGNOSIS.—Body not unusually compressed from side to side; rostrum distinct, acute in lateral aspect; carapace without high carina throughout length of dorsal midline; abdomen with triangular flap articulated at posterolateral angle of 6th somite; telson terminating posteriorly in acutely triangular endpiece; eyes concealed from dorsal view, visible in anterior aspect; mandible with palp and molar process; 3rd maxilliped not unusually broadened to form partial operculum over other mouthparts; 1st pereopods similar, carried flexed, movable finger without molar-like tooth; 2nd pereopod with fingers no shorter than palm, carpus with 5 articles; pereopods with strap-like epipods on 4 anterior pairs, vestigial on 4th; appendix masculina slightly longer than appendix interna but not nearly overreaching endopod or exopod of 2nd pleopod of male.

RANGE.—Kenya, Philippines, Indonesia, Hawaii, Galapagos Islands, Gulf of California, Bermuda, and Bonaire; intertidal to 6 meters.

REMARKS.—D.M. and A.H. Banner (1985:36–39) are probably justified in suggesting that *Parabetaeus* Coutière, 1896, may be a senior synonym of *Neoalpheopsis* and that *P. Culliereti* Coutière, 1896, its type species from Papeete, may be a senior synonym of *N. euryone* based on a specimen with a deformed rostral region, but the evidence is not yet sufficiently positive to support adoption of the synonymy unequivocally.

93. *Neoalpheopsis euryone* (De Man, 1910)

Alpheopsis? Euryone De Man, 1910:308 [type locality: off Kawio Pulau and Kamboling Pulau, Kawio Pulau-Pulau, Indonesia; reef]; 1911:184, pl. 5: fig. 19.

Alpheopsis hummelincki Schmitt, 1936:364, fig. 1 [type locality: Kralendijk, Bonaire, Lesser Antilles; from under sandy coral debris, about 1 meter].

Neoalpheopsis hiatti A.H. Banner, 1953:21, fig. 6 [type locality: Hanauma Bay, Hawaii; 6 meters].

Neoalpheopsis euryone.—A.H. Banner, 1953:25.—A.H. and D.M. Banner, 1983:86.—Wicksten, 1983:40.—D.M. and A.H. Banner, 1985:36.

DIAGNOSIS.—Characters of the genus.

RANGE.—See generic “Range.”

Prionalpheus A.H. and D.M. Banner, 1960

Prionalpheus A.H. and D.M. Banner, 1960b:292 [type species, by original designation: *Prionalpheus triarticulatus* A.H. and D.M. Banner, 1960b:293; gender: masculine].

DIAGNOSIS.—Body not unusually compressed from side to side; rostrum represented by dorsally and laterally acute projection usually discrete from orbital hoods; carapace without high carina throughout length of dorsal midline; abdomen with triangular flap articulated at posterolateral angle of 6th somite; telson not terminating posteriorly in triangular tooth; eyes concealed from dorsal view, visible in anterior aspect; mandible without palp or molar process; 3rd maxilliped not unusually broadened to form partial operculum over other mouthparts, 1st pereopods similar, subequal, carried extended with movable finger dorsal or lateral, not ventral, major chela without molar-like tooth on movable finger; 2nd cheliped with fingers at least as long as palm, carpus with 3–5 articles; pereopods without strap-like epipods.

RANGE.—Madagascar, Seychelles, southern Philippines, Australia, and Fiji and Society islands; shallow water to 91–143 meters.

REMARKS.—The four known species of *Prionalpheus* are diagnosed in the key and table in A.H. and D.M. Banner (1971:264). Only one species has been reported from the Philippine-Indonesia region.

94. *Prionalpheus sulu* A.H. and D.M. Banner, 1971

Prionalpheus sulu A.H. and D.M. Banner, 1971:268, fig. 2 [type locality: eastern end of Great Santa Cruz Island, Basilan Strait, off Zamboanga, Mindanao, Philippines; from dead coral head in 3 meters]; 1983:86.

DIAGNOSIS.—Rostrum distinct from orbital hoods; pterygostomial angle produced as acute tooth; slender, acute, mesial tooth between bases of antennules; antennal scale with distal margin of blade in line with distal margin of 2nd antennular

segment; left mandible with anterior tooth of incisor process twice as long as 3 adjacent teeth; 2nd pereopod with 4 carpal articles; 3rd pereopod with distal tooth on extensor margin of dactyl larger than opposite member of pair on flexor margin; lateral branch of uropod with 6 stout spines on lateral part of transverse suture; maximum carapace length to base of rostrum slightly more than 4 mm.

RANGE.—Madagascar, Seychelles, Sulu Archipelago region of Philippines and Kyushu, Japan; 2–4 meters.

Racilius Paulson, 1875

Racilius Paulson, 1875:107 [type species, by monotypy: *Racilius compressus* Paulson, 1875:107; gender: masculine].

DIAGNOSIS.—Body unusually compressed from side to side; rostrum sharp, acute in lateral aspect; carapace with high carina throughout length of dorsal midline; abdomen without flap articulated at posterolateral angle of 6th somite; telson not terminating posteriorly in triangular tooth; eyes concealed from dorsal and lateral view, visible in anterior aspect; mandible with palp and molar process; 3rd maxilliped not unusually broadened to form partial operculum over other mouthparts; 1st pereopods dissimilar, carried more or less extended with movable finger dorsal or lateral, not ventral; major chela with molar-like tooth on movable finger; 2nd cheliped with fingers about as long as palm, carpus with 5 articles, pereopods with prominent strap-like epipods on 4 anterior pairs.

RANGE.—Suez Canal, Red Sea, eastern Africa, South Africa, Singapore, Thailand, Philippines, and Queensland, Australia; probably always associated with corals of the genus *Galaxea*.

REMARKS.—Only one species is recognized.

95. *Racilius compressus* Paulson, 1875

Racilius compressus Paulson, 1875:107, pl. 14: fig. 2 [type locality: Red Sea].—D.M. and A.H. Banner, 1973:350, fig. 19; 1981:48.—A.H. and D.M. Banner, 1983:87.

DIAGNOSIS.—Orbital hoods not inflated, but each with marginal tooth at base of rostrum; telson unarmed dorsally; 2nd pereopod with proximal carpal article 5 times as long as 2nd; 3rd pereopod with dactyl simple, tip lying at right angle to propodus, latter with single distal spine on flexor margin, merus unarmed; maximum carapace length to base of rostrum rarely about 5 mm.

RANGE.—See generic "Range."

Salmoneus Holthuis, 1955

Jousseaumea Coutière, 1896:381 [type species, selected by Holthuis, 1955:88: *Jousseaumea serratidigitus* Coutière, 1896:382; gender: feminine. Name invalidated under the plenary powers in Opinion 673 of the International Commission on Zoological Nomenclature (1963:325)].
Salmoneus Holthuis, 1955:88 [substitute name for *Jousseaumea* Coutière, 1896].

DIAGNOSIS.—Body not unusually compressed from side to

side; rostrum represented by triangular extension of carapace; abdomen without flap articulated at posterolateral angle of 6th somite; telson not terminating posteriorly in triangular tooth; eyes at least partially concealed from dorsal view, visible in anterior aspect; mandible with palp and molar process; 3rd maxilliped not unusually broadened to form partial operculum over other mouthparts; 1st pereopods dissimilar and unequal, major cheliped carried in flexed position, without molar-like tooth on movable finger; 2nd pereopod with fingers about as long as palm, carpus with 5 articles; pereopods with strap-like epipods on 4 anterior pairs; appendix masculina not overreaching exopod of 2nd pleopod of male.

RANGE.—Panropical; intertidal to a maximum depth of 32 meters.

REMARKS.—The often small and fragile members of this genus are in need of intensive collection efforts and study. A good foundation for such research has been laid by D.M. and A.H. Banner (1981:51–54), with an annotated list of the 16 nominal species described to that date and a provisional key to the 14 species recognized by them, offered with "great reservations." Two of those species have been recorded from the Philippines (D.M. and A.H. Banner, 1979:239).

96. *Salmoneus mauiensis* (Edmondson, 1930)

Jousseaumea mauiensis Edmondson, 1930:5, fig. 2 [type locality: Island of Maui, Hawaii; shallow water among dead coral heads].—A.H. Banner, 1953:12, fig. 2.

Salmoneus mauiensis.—D.M. and A.H. Banner, 1979:239.

DIAGNOSIS.—Rostrum rather narrowly acute, overreaching 2nd antennular segment, unarmed ventrally, dorsal carina rounded, confined to rostrum, proper; carapace with orbital teeth horizontal, not upturned, reaching to about level of midlength of 1st antennular segment, without dorsolateral crests; telson with posterior margin broadly emarginate; antennal scale overreaching antennular peduncle; major chela with movable finger not overreaching fixed finger, bearing 5–7 teeth on opposable margin; 3rd pereopod with dactyl simple, about $\frac{1}{3}$ as long as propodus; maximum carapace length to base of rostrum more than 4 mm.

RANGE.—Philippines and Hawaii; tide line to 3 meters.

97. *Salmoneus serratidigitus* (Coutière, 1896)

Jousseaumea latirostris Coutière, 1896:382 [type locality: Red Sea].

Jousseaumea serratidigitus Coutière, 1896:382 [type locality: Red Sea].

Jousseaumea Sibogae De Man, 1910:303 [type locality: Banda Sea south of Kepulauan Lucipara, Indonesia; reef].

Salmoneus sibogae.—D.M. and A.H. Banner, 1979:239.

Salmoneus serratidigitus.—D.M. and A.H. Banner, 1981:58, figs. 7, 8.—Wicksten, 1983:40.

DIAGNOSIS.—Rostrum rather narrowly acute, overreaching 2nd antennular segment, unarmed ventrally, not carinate dorsally; carapace with orbital teeth horizontal, not upturned, reaching fully as far as midlength of 1st antennular segment,

without dorsolateral crests; telson with posterior margin broadly emarginate or with narrow, U-shaped notch; antennal scale reaching level of distal end of antennular peduncle; major chela with movable finger not noticeably overreaching fixed finger, bearing 10–16 teeth on opposable margin; 3rd pereopod with dactyl simple, about $\frac{1}{3}$ as long as propodus; maximum carapace length to base of rostrum about 6 mm.

RANGE.—Red Sea, eastern Africa, Madagascar, Aldabra, Seychelles, Philippines, Indonesia, and Baja California, Mexico; shallow water. Just when the passage of time begins to cast doubt on the documentation of the record of the occurrence of six specimens of *S. serratidigitus* in the Gulf of California (Coutière, 1899:463, 544, and D.M. and A.H. Banner, 1981:65), because of the apparent absence of the species anywhere in the intervening Pacific Ocean and the presence of a related species (*S. mauiensis*) in Hawaii, Wicksten (1983:40) records another specimen from Cabo San Lucas. Such are the happenings that contradict the apocryphal boredom of taxonomic research!

**Synalpheus* Bate, 1888

Homaralpheus Bate, 1876:378 [nomen nudum].

Homaralpheus Bate, 1888:539 [type species, selected by Holthuis, 1955:93:

Alpheus minus Say, 1818:245; gender: masculine].

Synalpheus Bate, 1888:572 [type species, by monotypy: *Synalpheus falcatus* Bate, 1888:574 (= *Alpheus Comatularum* Haswell, 1882:762); gender: masculine].

Alpheinus Borradaile, 1899:415 [type species, by monotypy: *Alpheinus tridens* Borradaile, 1899:415; gender: masculine].

DIAGNOSIS.—Rostrum acute in lateral aspect; carapace without high carina throughout length of dorsal midline; abdomen without triangular flap articulated at posterolateral angle of 6th somite; telson not terminating posteriorly in triangular tooth; eyes concealed from dorsal view; mandible with palp and molar process; 3rd maxilliped not unusually broadened to form partial operculum over other mouthparts; 1st pereopods dissimilar and unequal, carried extended with movable finger dorsal or lateral, not ventral, major chela usually with molar-like tooth on movable finger; 2nd pereopod with fingers about as long as palm, carpus with 4 or 5 articles; pereopods without strap-like epipods on any pair; no appendix masculina on 2nd pleopod of male.

RANGE.—Virtually all tropical and subtropical and some temperate seas; intertidal to at least 250 meters.

REMARKS.—Of the approximately 115 currently recognized

species of the genus *Synalpheus*, 30 have been recorded from the Philippines, and 18 are represented in the *Albatross* collections, including six species not previously known from those islands.

There is little doubt that *Synalpheus* will eventually be restricted to the small group of species related to *S. comatularum* (Haswell, 1882), but I, like D.M. and A.H. Banner (1975:273), hesitate to adopt this generally desirable change because of the temporary taxonomic confusion that might be engendered by such a move. Probably the only available name (see below) for the majority of species now assigned to *Synalpheus* is *Homaralpheus*, which was first (invalidly) suggested for an abbreviated larval form by Bate some 12 years before *Synalpheus* was proposed by the same author. The problem relates to the exact identity of the concept represented by *Homaralpheus*. If *Alpheus minus* is accepted as the type species, as proposed by Holthuis (1955), there is no problem, but some taxonomists might contend that *A. minus* is the one taxon that was eliminated from consideration as the type species by the statement by Bate (1888:539): "The Megalopa [so named] was got from the ovum of a near ally of *Alpheus minus*, but differing in having a long powerful tooth on the outer margin of the scaphocerite, the foliaceous part being smaller, membranous and very thin." There would seem to be little doubt, however, that *Homaralpheus* represents one of the dominant group of species of *Synalpheus*, sensu lato (to which *Alpheus minus* belongs), despite the disbelief of Coutière (1899:415) that the larva depicted by Bate is an alpheid. I at first feared that satisfactory resolution of this dilemma might involve review of the case by the International Commission on Zoological Nomenclature, a time-consuming procedure that few would cheerfully anticipate, but Dr. Holthuis has convinced me (in correspondence) that all the requirements of Article 69a (i)(1) of the *Code* were complied with in his designation of *Alpheus minus* as the type species of *Homaralpheus*, that the differences mentioned by Bate had no bearing on this action, and that *A. minus* is therefore legally the type species of *Homaralpheus* both by subsequent monotypy and subsequent selection.

Evidence recently deposited in the Smithsonian files by D.M. Banner indicates that the type specimens of *Alpheinus tridens* Borradaile, 1899—the type species of the only other synonym of *Synalpheus*—belong to the *Synalpheus comatularum* complex. *Alpheinus* must therefore be assumed to be a subjective synonym of *Synalpheus*, sensu stricto.

Key to Philippine Species of *Synalpheus*

1. Sixth abdominal somite with acute posterior projection either side of base of telson 2
- Sixth abdominal somite without acute posterior projection either side of base of telson 8
2. Sixth abdominal somite with posterior margin unarmed between acute lateral projections 3

- Sixth abdominal somite with posterior margin armed with 1 or more teeth between acute lateral projections 5
- 3. Rostrum distinctly longer and wider than orbital teeth; 3rd pereopod with acute distal tooth on flexor margin of merus; uropod with transverse articulation on lateral branch *120. *S. stimpsonii*
 Rostrum narrower and little if at all longer than orbital teeth; 3rd pereopod with merus unarmed on flexor margin; uropod without transverse articulation on lateral branch 4
- 4. Uropod with lateral tooth of protopod unusually long, extending nearly to midlength of lateral branch *115. *S. pescadorensis*
 Uropod with lateral tooth of protopod not elongate, not overreaching proximal 1/4 of lateral branch *118. *S. sciro*
- 5. Rostrum not overreaching 1st antennular segment; 6th abdominal somite armed on posterior margin with 2 or more teeth between acute lateral projections; telson with posterior angles not projecting posteriorly 6
 Rostrum overreaching 1st antennular segment; 6th abdominal somite armed on posterior margin with single median tooth; telson with posterior angles projecting posteriorly 7
- 6. Sixth abdominal somite armed with 2 teeth on posterior margin between acute lateral projections; 3rd pereopod unarmed on flexor margin of merus *117. *S. quadrispinosus*
 Sixth abdominal somite armed with more than 2 teeth on posterior margin between acute lateral projections; 3rd pereopod with series of movable spines on distal 1/2 of flexor margin of merus 119. *S. septemspinosus*
- 7. Major chela with movable finger not significantly overreaching fixed finger; 3rd pereopod with 0–3 spines on flexor margin of merus . . . *124. *S. triacanthus*
 Major chela with movable finger distinctly overreaching fixed finger; 3rd pereopod with more than 4 spines on flexor margin of merus . . . *125. *S. trispinosus*
- 8. Third pereopod with dactyl clearly triunguiculate 9
 Third pereopod with dactyl biunguiculate, at most with rounded proximal lobe on flexor margin 11
- 9. Third pereopod with merus armed with series of movable spines on flexor margin *112. *S. nilandensis*
 Third pereopod with merus unarmed on flexor margin 10
- 10. Telson with dorsolateral spines minute, obscure; basal antennal segment (basicerite) with 2nd tooth proximal to dorsal tooth *104. *S. demani*
 Telson with dorsolateral spines prominent; basal antennal segment (basicerite) without 2nd tooth proximal to dorsal tooth *105. *S. fossor*
- 11. Third pereopod with merus armed with 1 or more movable spines on flexor margin 12
 Third pereopod without movable spines on flexor margin of merus 15
- 12. Telson with both pairs of dorsolateral spines situated posterior to midlength in mature individuals; 3rd pereopod with extensor tooth of dactyl less than 1/2 as long and 1/2 as wide as flexor tooth *110. *S. neomeris*
 Telson with anterior pair of dorsolateral spines usually situated anterior to midlength; 3rd pereopod with extensor tooth of dactyl longer or only slightly shorter than flexor tooth 13
- 13. Rostrum extending to about level of midlength of 1st antennular segment; major chela with palm terminating distally in 1 or, usually, 2 blunt tubercles at level of articulation with movable finger; 3rd pereopod with extensor tooth of dactyl about twice as long as flexor tooth *101. *S. bituberculatus*
 Rostrum usually overreaching midlength of 1st antennular segment; major chela with palm terminating distally in acute tooth at level of articulation with movable finger; 3rd pereopod with extensor tooth of dactyl slightly longer or slightly shorter than flexor tooth 14

14. Third pereopod with terminal teeth of dactyl much reduced, $1/10-1/6$ as long as segment *108. *S. iocasta*
 Third pereopod with terminal teeth of dactyl longer, $1/4-1/3$ as long as segment *121. *S. streptodactylus*
15. Antennal scale with blade vestigial or absent 16
 Antennal scale with blade well-developed, overreaching midlength of lateral margin 20
16. Basal antennal segment (basicerite) with dorsal margin rounded to slightly projecting 17
 Basal antennal segment (basicerite) with dorsal margin sharply projecting . . . 19
17. Minor chela with each finger terminating in 2 or 3 teeth 100. *S. antenor*
 Minor chela with each finger terminating in single tooth 18
18. Dorsolateral spines on telson stout; ventrolateral tooth of basal antennal segment (basicerite) not far overreaching stylocerite; 3rd maxilliped usually with terminal circlet of stout spines on distal segment *111. *S. neptunus*
 Dorsolateral spines on telson elongate; ventrolateral tooth of basal antennal segment (basicerite) far overreaching stylocerite; 3rd maxilliped usually with terminal dense brush of long setae on distal segment *123. *S. theano*
19. Rostrum not sharply upturned at apex; telson with posterior angles not projecting posteriorly; stylocerite not overreaching 1st antennular segment; 2nd pereopod with 4 carpal articles; uropod without transverse articulation on lateral branch 116. *S. quadriarticulatus*
 Rostrum upturned nearly vertically at apex; telson with posterior angles projecting posteriorly as pointed teeth nearly $1/2$ as long as remainder of telson; stylocerite overreaching 1st antennular segment; 2nd pereopod with 5 carpal articles; uropod with transverse articulation on lateral branch 122. *S. thai*
20. Rostrum wider at base than orbital teeth 21
 Rostrum narrower than orbital teeth 24
21. Third pereopod with merus unarmed on flexor margin 22
 Third pereopod with merus armed with acute distal tooth on flexor margin 23
22. Rostrum not reaching level of distal margin of 1st antennular segment 98. *S. albatrossi*
 Rostrum overreaching 1st antennular segment *126. *S. tropidodactylus*
23. Stylocerite reaching to about level of midlength of 1st antennular segment *113. *S. odontophorus*
 Stylocerite reaching nearly to level of or overreaching distal margin of 1st antennular segment *120. *S. stimpsonii*
24. Ventrolateral tooth on basal antennal segment (basicerite) not overreaching stylocerite 25
 Ventrolateral tooth on basal antennal segment (basicerite) overreaching stylocerite 34
25. Basal antennal segment (basicerite) with dorsal margin usually rounded or truncate 26
 Basal antennal segment (basicerite) with dorsal margin acutely produced . . . 31
26. Telson with posterior angles rectangular 27
 Telson with posterior angles usually acutely produced 30
27. Third pereopod with dactyl comparatively slender, neither excavate nor swollen on flexor margin proximal to flexor tooth 28
 Third pereopod with dactyl rather stout, with either "pocket" or bulge on flexor margin proximal to flexor tooth 29
28. Stylocerite not overreaching 1st antennular segment; major chela with palm terminating distally in strong spinose tooth extending obliquely from near articulation with movable finger 99. *S. amabilis*

- Stylocerite overreaching 1st antennular segment; major chela with palm terminating bluntly near articulation with movable finger or with terminal tooth continuing marginal contour of palm, not oblique 127. *S. tumidomanus*
29. Third pereopod with dactyl excavate on flexor margin proximal to blunt, stout flexor tooth 102. *S. charon*
 Third pereopod with bulge on dactyl proximal to flexor tooth 4. *S. paraneomeris*
30. Telson with posterior angles produced posteriorly into strong teeth usually overreaching midlength of adjacent spine; minor chela with patterned row of setae on extensor margin of movable finger *107. *S. hastilicrassus*
 Telson with posterior angles produced posteriorly into shorter teeth usually not reaching level of midlength of adjacent spine; minor chela with scattered setae not arranged in patterned row on extensor margin of movable finger 127. *S. tumidomanus*
31. Minor chela with patterned row of setae on extensor or lateral surface of movable finger 32
 Minor chela without patterned row of setae on extensor or lateral surface of movable finger 33
32. Rostrum not reaching level of distal margin of 1st antennular segment; telson with posterior angles rectangular; major chela with palm terminating distally in blunt tooth directed obliquely from near articulation with movable finger; minor chela with patterned row of setae on lateral surface of movable finger . 103. *S. coutierei*
 Rostrum reaching to or beyond level of distal margin of 1st antennular segment; telson with posterior angles strongly projecting posteriorly; major chela with palm terminating distally in blunt tooth directed distally from near articulation with movable finger; minor chela with patterned row of setae on extensor margin of movable finger *107. *S. hastilicrassus*
33. Rostrum reaching level of mid length of antennular segment; antennal scale with blade narrow, subequal in width to base of distolateral spine; 3rd pereopod with merus 5 times as long as wide 106. *S. gracilirostris*
 Rostrum, at most, not overreaching proximal 1/4 of 2nd antennular segment; antennal scale with blade wider than base of distolateral spine; 3rd pereopod with merus usually less than 5 times as long as wide . . 127. *S. tumidomanus*
34. Telson with posterior angles acute, slightly projecting; basal antennal segment (basicerite) dorsally produced into long, spinose tooth 109. *S. laticeps*
 Telson with posterior angles subrectangular; basal antennal segment (basicerite) usually rounded dorsally, slightly projecting at most 35
35. Dorsolateral spines on telson stout; ventrolateral tooth of basal antennal segment (basicerite) not far overreaching stylocerite; 3rd maxilliped usually with terminal cirlet of stout spines on distal segment *111. *S. neptunus*
 Dorsolateral spines on telson elongate; ventrolateral tooth of basal antennal segment (basicerite) far overreaching stylocerite; 3rd maxilliped usually with terminal dense brush of long setae on distal segment *123. *S. theona*

98. *Synalpheus albatrossi* Coutière, 1909

Synalpheus albatrossi Coutière, 1909:89, fig. 54 [type locality: Laysan Island Light, Hawaii, N. 67°, E. 1.5'; 18'35 meters].—A.H. Banner, 1953:30, fig. 9.—A.H. and D.M. Banner, 1981:223; 1983:89.

DIAGNOSIS.—Typically, rostrum not reaching level of distal margin of 1st antennular segment, tip not upturned, wider at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of telson, posterior margin unarmed mesially; telson with dorsolateral spines slender but distinct,

anterior pair situated anterior to midlength of telson, posterolateral angles obtuse; stylocerite typically not overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth not nearly overreaching stylocerite, dorsal tooth strong, not accompanied by second, proximal tooth; antennal scale with well-developed blade; major chela with movable finger typically slightly overreaching fixed finger, palm terminating distally in weak, conical prominence at level of articulation with movable finger; minor chela without

patterned row of setae on extensor margin of movable finger, each finger terminating in single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth considerably larger than flexor tooth, segment neither excavate nor swollen on flexor margin, merus unarmed on flexor margin; maximum carapace length to base of rostrum about 3 mm.

RANGE.—Réunion, Mauritius, southwest of Manila Bay, Philippines, Hawaii; shallow subtidal to 194 meters (see "Remarks").

REMARKS.—A.H. and D.M. Banner, (1983:89) expressed some doubt about the identity of material identified since 1909 with the species represented by the unique holotype from off Laysan Island, Hawaii. Re-examination of that type specimen tends to accentuate that doubt, but it is probably best to follow the Banner advice and consider all 13 specimens that have been assigned to the species as conspecific until the variability of the taxon is better known.

99. *Synalpheus amabilis* De Man, 1910

Synalpheus amabilis De Man, 1910:295 [type locality: Banda, Indonesia; 9–36 meters]; 1911:275, pl. 11: fig. 52.—D.M. and A.H. Banner, 1979:240.

DIAGNOSIS.—Rostrum not nearly reaching level of distal margin of 1st antennular segment, apex not upturned, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of telson, posterior margin unarmed mesially; telson with dorsolateral spines reasonably prominent, anterior pair situated anterior to midlength of telson, posterolateral angles rectangular; stylocerite attaining level of distal margin of 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth not overreaching stylocerite, dorsal margin oblique, obtuse, not dentate; antennal scale with well-developed blade; major chela with movable finger overreaching fixed finger, palm terminating distally in acute, divergent tooth at level of articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, each finger terminating in single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth longer and slightly wider at base than flexor tooth, segment neither excavate nor swollen on flexor margin, merus unarmed on flexor margin; maximum size not recorded.

RANGE.—Basilan Strait and Sulu Archipelago, Philippines, and Banda Sea, Indonesia; intertidal to 9–36 meters, associated with coralline algae, sponges, and coral heads.

100. *Synalpheus anterior* De Man, 1910

Synalpheus anterior De Man, 1910:293 [type locality: 2 stations in the eastern Halmahera Sea off western New Guinea and 1 station off Banda, Banda Sea; 9 to 59–83 meters]; 1911:294, pl. 13: fig. 62.
Synalpheus anterior.—D.M. and A.H. Banner, 1979:240.

DIAGNOSIS.—Rostrum not nearly reaching level of distal margin of 1st antennular segment, tip not upturned, narrower

at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of telson, posterior margin unarmed mesially; telson with dorsolateral spines fairly prominent, anterior pair situated just anterior to midlength of telson, posterolateral angles rectangular; stylocerite distinctly overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth slightly overreaching stylocerite, dorsal tooth subacute, not spinose, not accompanied by 2nd, proximal tooth; antennal scale with blade rudimentary or absent, major chela with palm terminating distally in acute tooth in male, in blunt tubercle in female; minor chela without patterned row of setae on extensor margin of movable finger, movable finger terminating in 2 acute teeth and 1 truncate lobe, fixed finger in 4 acute teeth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth longer than but basally subequal in width to flexor tooth, segment neither excavate nor swollen on flexor margin, merus unarmed on flexor margin; maximum carapace length to base of rostrum about 13 mm.

RANGE.—Southern Philippines and Indonesia; intertidal to 59–83 meters, associated with sponges, coral heads, and brittle star.

*101. *Synalpheus bituberculatus* De Man, 1910

Synalpheus bituberculatus De Man, 1910:294 [type locality: 7 stations in Indonesia; shallow subtidal to 36 meters]; 1911:276, pl. 11: fig. 53.—D.M. and A.H. Banner, 1975:307, fig. 8.

DIAGNOSIS.—Rostrum not nearly overreaching 1st antennular segment, apex upturned, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with dorsolateral spines prominent, anterior pair situated anterior to midlength of telson, posterior angles subacute but not projecting; stylocerite overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth overreaching stylocerite, dorsal tooth acute but short, not accompanied by 2nd, proximal tooth; antennal scale with blade narrow but not vestigial; major chela with movable finger slightly overreaching fixed finger, palm terminating distally in usually 2 blunt tubercles at level of articulation with movable finger; minor chela with movable finger not bearing patterned row of setae on extensor margin, terminating in 2 acute teeth, fixed finger terminating in single strong tooth and, sometimes, small accessory tooth; 2nd pereopod with 5 carpal articles, 3rd pereopod with dactyl biunguiculate, extensor tooth about twice as long as flexor tooth, segment neither excavate nor swollen on flexor margin, merus armed with series of movable spines on distal 1/2 of flexor margin; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum about 7mm.

MATERIAL.—PHILIPPINES. Off Jolo Island, Sulu Archipelago: sta 5145; 6°04'30"N, 120°59'30"E; 42 m; coral sand, shells; 15 Feb 1908 (1344–1359); 12' Agassiz beam trawl, mud bag; 2 [3.6, 4.7], 1 ovig [4.7]. Near Siasi, Sulu Archipelago; sta 5146; 5°46'40"N, 120°48'50"E; 44 m; coral

sand, shells; 16 Feb 1908 (1011–1031); 12' Agassiz beam trawl, mud bag: 2 [4.1, 5.0], 1 ovig [5.0]. San Juanico Strait, between Samar and Leyte: sta 5205; 11°19'30"N, 124°58'05"E; 15 m; 13 Apr 1908 (0928); 12' Agassiz beam trawl, 3 mud bags (fouled bottom; trawl lost; mud bag only recovered; sounding with hand lead): 1 ovig [5.9].

RANGE.—Réunion, Mauritius, Singapore, Thailand, Indonesia, Philippines, Japan and Australia; to a depth of 44 meters, commonly in sponges and dead coral.

102. *Synalpheus charon* (Heller, 1861)

A[ipheus] charon Heller, 1861:27 [type locality: Red Sea].

Alpheus prolificus Bate, 1888:556, pl. 99: fig. 4 [type locality: off Honolulu, Hawaii; 33 meters].

Synalpheus Charon.—De Man, 1911:245, pl. 8: fig. 37.

Synalpheus Helli De Man, 1911:194, 246 [type locality: Nicobar Islands].

Synalpheus charon obscurus A.H. Banner, 1956:329, fig. 5 [type locality: southeast side of Unai Obyan, Saipan, Mariana Islands; reef flat].

Synalpheus charon.—D.M. and A.H. Banner, 1975:369, fig. 25.—A.H. and D.M. Banner, 1983:90.

DIAGNOSIS.—Rostrum not overreaching 1st antennular segment, apex not upturned, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with rather small dorsolateral spines, both pairs sometimes situated in posterior 1/2 of telson, posterior angles obtuse, stylocerite distinctly overreaching 1st antennular segment; basal antennal segment (basicerite) not overreaching stylocerite, dorsal margin little dentate, usually rounded; antennal scale with well-developed blade; major chela with movable finger not clearly overreaching fixed finger, palm terminating distally in slight, blunt protrusion at level of articulation with movable finger; minor chela with movable finger not bearing patterned row of setae on extensor margin, fingers not terminating in more than 1 tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth slender, with lateral flange, segment excavate on flexor margin proximal to flexor tooth, merus unarmed; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum about 7 mm.

RANGE.—Red Sea to South Africa, Japan to Australia, and Gulf of California to Ecuador; shallow subtidal to 33 meters, perhaps confined to living heads of branching corals.

103. *Synalpheus coutierei* A.H. Banner, 1953

Synalpheus biunguiculatus?—Coutière, 1898f:232, figs. 1–4 [not *Alpheus biunguiculatus* Stimpson, 1860:31].

Synalpheus coutierei A.H. Banner, 1953:36 [type locality: *S. coutierei* was proposed as a replacement name for *S. biunguiculatus* Coutiere, 1898f:232, a misidentification based on material from Ambon; Pulau Damar-Besar; Zanzibar, Bahia de Ferrião Veloso, Mocambique; D'Arros Island, Amirante Isles; El Suweis, Egypt; Rameswaran, southern India; Holothuria Reefs, Timor Sea; Arafura Sea; and Djibouti].—D.M. and A.H. Banner, 1975:343, fig. 18a–i; 1979:241, fig. 4a,b.—A.H. and D.M. Banner, 1983:91, fig. 10.

DIAGNOSIS.—Rostrum not overreaching 1st antennular segment, apex not upturned, narrower at base than orbital teeth;

6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with dorsolateral spines prominent, anterior pair situated anterior to midlength of telson, posterior angles rectangular; stylocerite overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth reaching to about level of tip of stylocerite, dorsal tooth strong, spinose, unaccompanied by 2nd, proximal tooth; antennal scale with blade narrow but not vestigial; major chela with movable finger overreaching fixed finger, palm terminating distally in bluntly acute, divergent tooth and adjacent tubercle at level of articulation with movable finger; minor chela with movable finger bearing somewhat patterned series of stiff setae, fingers terminating in single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth slightly longer than flexor tooth, segment neither excavate nor swollen on flexor margin, merus unarmed; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum at least 8 mm.

RANGE.—Suez Canal and eastern Africa to Philippines, Indonesia, Australia, and most of Pacific islands, but not including Japan, Hawaii, or Society Islands; shallow subtidal to 77 meters, in dead coral and sponges. If the Clipperton Island record mentioned by D.M. and A.H. Banner (1975:344) was based on Chace (1962:612), it is referable to *S. biunguiculatus* (Stimpson, 1960) and not to this species.

REMARKS.—It is apparent from the discussion in D.M. and A.H. Banner (1975:344) that, if *S. biunguiculatus* var. *exilipes* Coutière, 1905—which was elevated to a full species by Johnson (1962:51)—is included in the synonymy of this species, it must be accorded preference over *S. coutierei* as the senior synonym. It seems best, however, not to make this substitution until the synonymy can be supported by stronger evidence than is currently available.

*104. *Synalpheus demani* Borradaile, 1899

Alpheus triunguiculatus De Man, 1888a:504, pl. 22: fig. 1 [type locality: Ambon; not *A. triunguiculatus* Paulson, 1875:103].

Alpheus spiniger.—Bate, 1888:560, pl. 100: fig. 3 [probably not *A. spiniger* Stimpson, 1860:31].

Synalpheus demani Borradaile, 1899:416 [replacement name for *Alpheus triunguiculatus* De Man, 1888a:504].—D.M. and A.H. Banner, 1975:324, fig. 13.

Synalpheus Brockii Nobili, 1901:2 [replacement name for *Alpheus triunguiculatus* De Man, 1888a:504].

DIAGNOSIS.—Rostrum reaching to or overreaching level of distal margin of 1st antennular segment, apex not upturned, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with dorsolateral spines inconspicuous or absent, posterior angles acute but not noticeably produced; stylocerite overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth nearly reaching level of tip of stylocerite, dorsal tooth strong, accompanied by much less conspicuous 2nd, proximal

tooth; antennal scale with blade well-developed; major chela with movable finger slightly overreaching fixed finger, palm terminating distally in blunt tooth or tubercle at level of articulation with movable finger; minor chela with movable finger devoid of patterned row of setae on extensor margin, each finger terminating in single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl triunguiculate, extensor tooth much weaker than other 2, segment neither excavate nor swollen on flexor margin, merus unarmed on flexor margin; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum fully 10 mm.

MATERIAL.—PHILIPPINES. Near Siasi, Sulu Archipelago: sta 5147; 5°41'40"N, 120°47'10"E; 38 m; coral sand, shells; 16 Feb 1908 (1127–1147); 12' Agassiz beam trawl, mud bag: 2 with abdominal parasites [7.2, 7.9].

RANGE.—Red Sea, Japan, Philippines, Indonesia, Australia, and Marshall and Loyalty islands; shallow subtidal to about 50 meters, usually associated with crinoids.

REMARKS.—Inasmuch as De Man (1888a) proposed the name *Alpheus triunguiculatus* as a new species in apparent ignorance of, rather than misidentification of, *A. triunguiculatus* Paulson, 1875, it seems to me that *Synalpheus demani* is a true "replacement name" and that it should be assigned the type locality indicated by the De Man reference—not the locality mentioned by Borradaile (1899) and cited by Miya (1972:62) as the type locality—even though Article 72(e) of the third edition of the *International Code of Zoological Nomenclature* (1985) is, rather characteristically, more ambiguous than the comparable Article 72(d) of the second edition (1964).

*105. *Synalpheus fossor* (Paulson, 1875)

Alph[eus] fossor Paulson, 1875:103, pl. 13: fig. 5 [type locality: Saya de Malha Bank, Seychelles-Mauritius Ridge, Indian Ocean; 47–53 meters].

S[synalpheus] Bakeri Coutière, 1908:199 [type locality: South Adelaide, South Australia].

Synalpheus fossor, var. *propinqua* De Man, 1909a:121 [type locality: Pearl Bank, Sulu Archipelago, Philippines, and Indonesia between Misool and New Guinea, off Timor, and Lesser Sunda Islands; 13–36 meters].

Synalpheus Bakeri var. *Stormi* De Man, 1911:253 [type locality: Balikpapan, Makassar Strait coast of Borneo, and Atjeh, Sumatra].

Synalpheus fossor.—D.M. and A.H. Banner, 1975:335, fig. 16.—A.H. and D.M. 1983:97.

DIAGNOSIS.—Rostrum not reaching level of or overreaching level of distal margin of 1st antennular segment, apex sometimes upturned, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin not dentate mesially; telson with dorsolateral spines prominent, anterior pair situated anterior to midlength of telson, posterior angles acute, projecting posterolaterally, stylocerite overreaching 1st antennular seg-

ment; basal antennal segment (basicerite) reaching nearly to level of tip of stylocerite, with strong dorsal tooth, not accompanied by 2nd, proximal tooth; antennal scale with blade narrow but not vestigial; major chela with movable finger not much overreaching fixed finger, palm terminating distally in 1 or 2 blunt tubercles at level of articulation with movable finger; minor chela with movable finger not bearing distinctly patterned row of setae on extensor margin, each finger terminating in single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl triunguiculate, extensor tooth shorter than distal flexor tooth, segment not excavate nor swollen on flexor margin, merus unarmed on flexor margin; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum fully 8 mm.

MATERIAL.—PHILIPPINES. Off Jolo Island, Sulu Archipelago: sta 5141; 6°09'N, 120°58'E; 53 meters; coral sand; 15 Feb 1908 (0847–0905); 12' Agassiz beam trawl, mud bag: 1 damaged specimen [?].

RANGE.—Red Sea, Madagascar, Seychelles, Mauritius, Maldives Islands, Thailand, Philippines, Indonesia, and Australia; to a depth of about 50 meters, in dead coral and sponges.

106. *Synalpheus gracilirostris* De Man, 1910

Synalpheus gracilirostris De Man, 1910:291 [type locality: off northeastern point of Timor, Indonesia; 8°25.2'S, 127°18'E; 27–54 meters].—D.M. and A.H. Banner, 1975:372, fig. 26.

DIAGNOSIS.—Rostrum overreaching 1st antennular segment, apex not upturned, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with dorsal spines distinct, anterior pair arising at about midlength of telson, posterior angles acute, slightly projecting; stylocerite far overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth not overreaching stylocerite but sometimes reaching equally far, dorsal tooth acute and reasonably prominent, not accompanied proximally by 2nd tooth; antennal scale with blade narrow but not very reduced; major chela with movable finger slightly overreaching fixed finger, palm terminating distally in acute tooth at level of articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, each finger terminating in single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth slightly longer but no stronger than flexor tooth, segment neither excavate nor swollen on flexor margin, merus unarmed on flexor margin; maximum carapace length to base of rostrum about 4 mm.

RANGE.—Red Sea, eastern Africa, Réunion, Mauritius, Philippines, Indonesia, and Australia; shallow subtidal to 27–54 meters, sometimes in dead coral.

*107. *Synalpheus hastilicrassus* Coutière, 1905

FIGURES 19, 20

Synalpheus hastilicrassus Coutière, 1905:1875, pl. 72: fig. 12 [type locality: the type series came from 4 different atolls in the Maldive Islands].—D.M. and A.H. Banner, 1975:353, fig. 21; 1979:242, fig. 4c,d.

Synalpheus acanthitelsonis Coutière, 1905:875, pl. 72: fig. 13 [type locality: the type series came from 5 different atolls in the Maldive Islands].

Synalpheus hastilicrassus, var. *acanthitelsoniformis* De Man, 1920:108 [type locality: east side of Pulau Pajunga, Teluk Kuandang, north coast of Celebes, Indonesia; reef].

DIAGNOSIS.—Rostrum usually overreaching 1st antennular segment, apex not upturned, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with dorsolateral spines distinct, posterior angles acute, rather strongly projecting; stylocerite overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth reaching about to level of apex of stylocerite, dorsal margin usually unarmed, sometimes acute; antennal scale with blade reasonably well-developed; major chela with movable finger not appreciably overreaching fixed finger, palm terminating distally in more or less acute tooth at level of articulation with movable finger; minor chela with somewhat patterned row of setae on extensor margin, each finger terminating in single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, terminal teeth subequal in length, segment neither excavate nor swollen on flexor margin, merus unarmed on flexor margin; uropod with transverse articulation on lateral branch; maximum carapace length about 7 mm.

MATERIAL.—PHILIPPINES. San Juanico Strait, between Samar and Leyte: sta 5205; 11°19'30"N, 124°58'05"E; 15 m; 13 Apr 1908 (0928); 12' Agassiz beam trawl, 3 mud bags (fouled bottom; trawl lost; mud bag only recovered; sounding with hand lead): 2 [3.0, 3.1], 1 ovig [3.0]. Off Jolo Island, Sulu Archipelago: sta 5174; 6°03'45"N, 120°57'E; 37 m; coarse sand; 5 Mar 1908 (1551–1557); 9' Johnson oyster dredge: 1 [3.9].

RANGE.—Red Sea and eastern Africa to the Philippines, Indonesia, Australia, and the Caroline, Marshall and Fiji islands; shallow subtidal to 90 meters, in coral heads, sometimes sponges.

REMARKS.—The three *Albatross* specimens seem to support the data and conclusions of D.M. and A.H. Banner (1975:354, 356). They are in general agreement in all characters except the dorsal margin of the basal antennal segment (basicerite); this segment is dorsally unarmed in the single specimen from the Sulu Sea area (Figure 19), as was material recorded from that region by the Banners, but it is armed with a very strong, spinose, dorsal tooth in both specimens from San Juanico Strait, to the northeast (Figure 20).

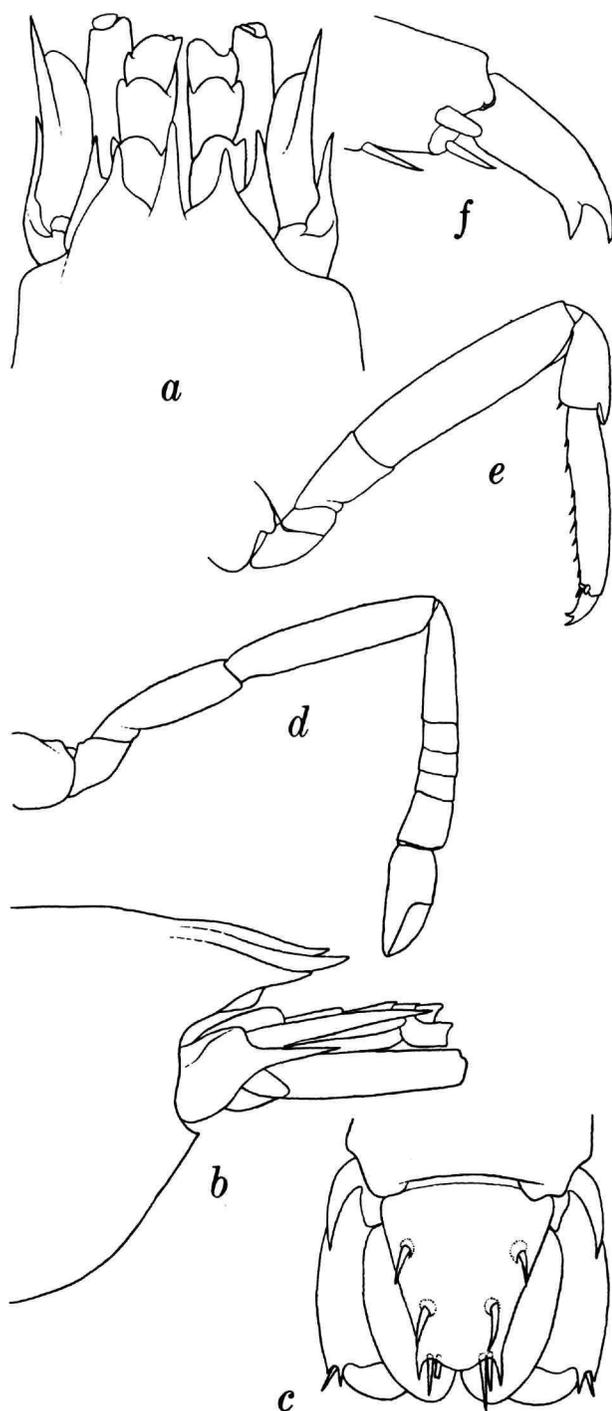


FIGURE 19.—*Synalpheus hastilicrassus*, specimen from *Albatross* sta 5174, carapace length 3.9 mm: a, anterior carapace and appendages, dorsal aspect; b, same, lateral aspect; c, telson and uropods, dorsal aspect; d, right 2nd pereopod; e, right 3rd pereopod; f, same dactyl.

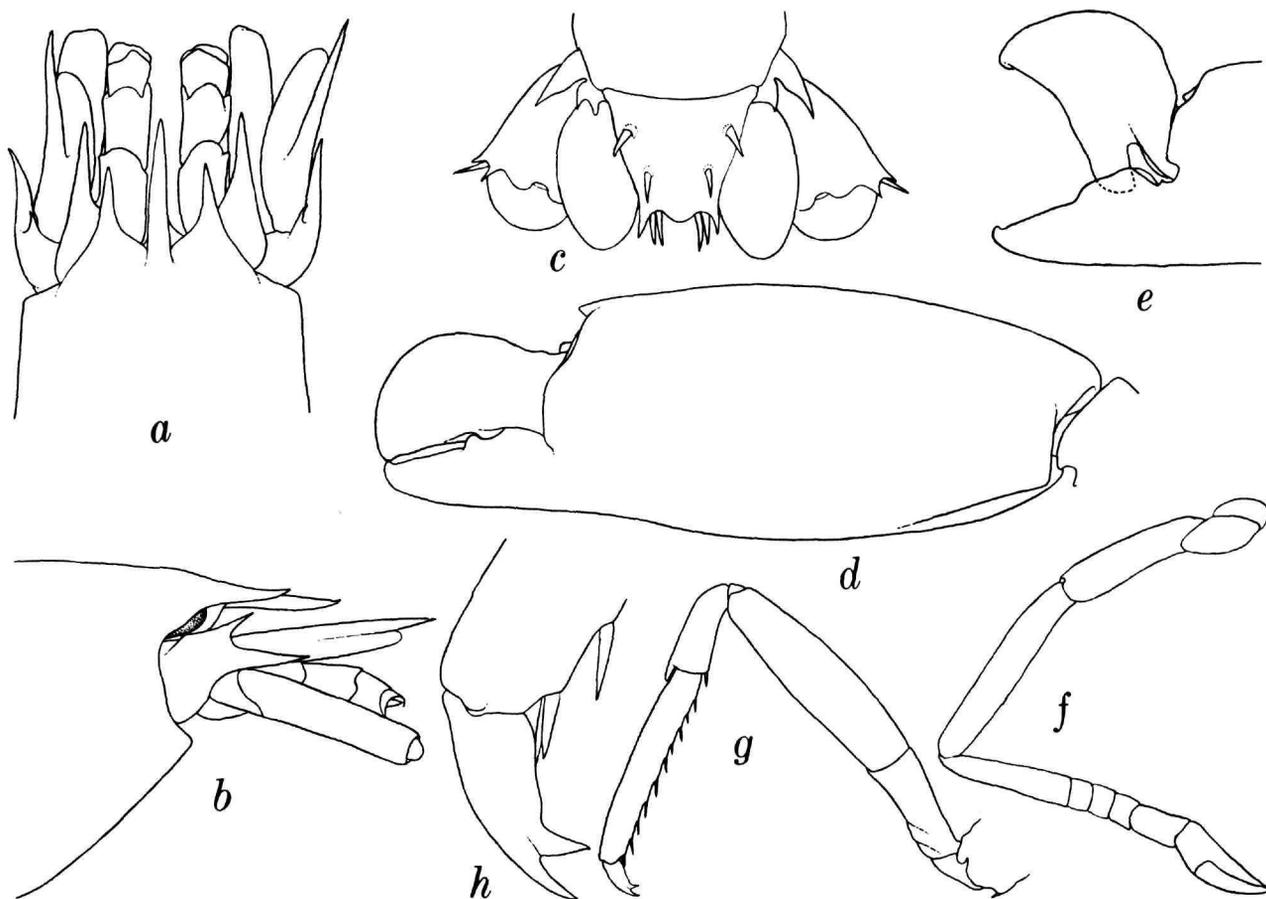


FIGURE 20.—*Synalpheus hastilicrassus*, ovigerous female from Albatross sta 5205, carapace length 3.0 mm: a, anterior carapace and appendages, dorsal aspect; b, same, lateral aspect; c, telson and uropods, dorsal aspect; d, left 1st (major) chela; e, same, fingers; f, left 2nd pereopod; g, left 3rd pereopod; h, same dactyl.

***108. *Synalpheus iocasta* De Man, 1909**

Synalpheus iocasta De Man, 1909a:119 [type locality: the type series came from 12 different stations in Indonesia; 13–113 meters]; 1911:235, pl. 8: fig. 33.

Synalpheus iocasta.—D.M. and A.H. Banner, 1975:368, fig. 241–n; 1985:42, fig. 4.

DIAGNOSIS.—Rostrum usually reaching level of distal margin of 1st antennular segment, apex not upturned, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with dorsolateral spines small but distinct, anterior pair usually situated anterior to midlength of telson, posterior angles acute and slightly projecting; stylocerite overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth not overreaching stylocerite, dorsal tooth acute, prominent, not accompanied proximally by 2nd tooth; antennal scale with blade well-

developed; major chela with movable finger barely overreaching fixed finger, palm terminating distally in slightly arched acute tooth at level of articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, each finger terminating in single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, terminal teeth unusually short, extensor tooth much less robust but slightly longer than flexor tooth, segment neither excavate nor swollen on flexor margin, merus armed with 2 stout, movable spines on distal 1/2 of flexor margin; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum about 4 mm.

MATERIAL.—PHILIPPINES. Near Jolo Island, Sulu Archipelago: sta 5141; 6°09'N, 120°58'E; 53 m; coral sand; 15 Feb 1908 (0847–0905); 12' Agassiz beam trawl, mud bag: 2 [2.9, 3.4], 1 ovig. [3.4] (smaller specimen found on surface of sepia-brown sponge). Near Siasi, Sulu Archipelago: sta 5149; 5°33'N, 120°42'10"E; 18 m; coral, shells; 18 Feb 1908

(0932–0952); 12' Agassiz beam trawl, mud bag: 1 ovig [3.2].

RANGE.—Southeastern South China Sea, Philippines, Indonesia, and Australia; 13–113 meters.

109. *Synalpheus laticeps* Coutière, 1905

Synalpheus laticeps Coutière, 1905:874, pl. 72: fig. 11 [type locality: Male Atoll, Maldives Islands].—A.H. and D.M. Banner, 1966b:68, fig. 23.—D.M. and A.H. Banner, 1979:243, fig. 4e–i.—A.H. and D.M. Banner, 1983:100.

DIAGNOSIS.—Rostrum not reaching level of distal margin of 1st antennular segment, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with dorsolateral spines small but distinct, anterior pair situated anterior to midlength of telson, posterior angles acute, slightly projecting; stylocerite overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth overreaching stylocerite, dorsal tooth long, spinose, not accompanied by 2nd, proximal tooth; antennal scale with blade narrow, rarely vestigial; major chela with movable finger not appreciably overreaching fixed finger, palm terminating in subrectangular angle at level of articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, both fingers broadened, excavate, and terminating in 1 or more distal teeth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth slightly longer and, usually, less stout than flexor tooth, segment neither excavate nor swollen on flexor margin, merus unarmed, maximum carapace length to base of rostrum probably about 4 mm.

RANGE.—Western Indian Ocean, Maldives Islands, Thailand, southern Philippines and Indonesia; in depths of less than 7 meters.

*110. *Synalpheus neomeris* (De Man, 1897)

Alpheus neomeris De Man, 1897:734 [part; type locality: Mergui Archipelago, Burma].

Synalpheus Gravieri Coutière, 1905:870, pl. 70: fig. 2 [type locality: the type series was recorded from 4 atolls in the Maldives Islands, Djibouti, and "mer de Chine"].

Synalpheus miscellaneous De Man, 1909a:118 [type locality: off northeastern point of Timor, Indonesia; 27–54 meters].

Synalpheus neomeris.—D.M. and A.H. Banner, 1975:357, fig. 22.—A.H. and D.M. Banner, 1983:101.—D.M. and A.H. Banner, 1985:51.

DIAGNOSIS.—Rostrum not overreaching 1st antennular segment, usually faintly upturned, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with all dorsolateral spines situated in posterior 1/2 of telson in mature specimens, posterior angles subrectangular, stylocerite overreaching 1st antennular segment; basal antennal segment (basicerite) not overreaching stylocerite, dorsal tooth acute or spinose, not accompanied by 2nd, proximal tooth; antennal scale with well-developed blade; major chela with movable finger not appreciably overreaching fixed finger, palm

terminating in blunt to acute tooth at level of articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, each finger terminating in single tooth; 2nd pereopod with 5 carpal articles, 3rd pereopod with dactyl biunguiculate, extensor tooth less than 1/2 as long and less than 1/3 as stout at base as flexor tooth, segment neither excavate or swollen on flexor margin, merus without acute distal fixed tooth but armed with 1 or more stout movable spines on flexor margin; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum about 11 mm.

MATERIAL.—PHILIPPINES. Bohol Strait, east of Cebu: sta 5413; 10°10'35"N, 124°03'15"E [77 m]; 24 Mar 1909 (1134–1140); 6' McCormick: 4 [3.4–4.8]. Davao Gulf, Mindanao: sta 5249; 7°06'06"N, 125°40'08"E; 42 m; coral, sand; 18 May 1908 (1102–1109); 6' Johnston oyster dredge: 2 [3.4, 10.0]; sta 5253; 7°04'48"N, 125°39'38"E; 51 m; coral; 18 May 1908 (1347–1358); 6' Johnston oyster dredge: 4 [4.5–7.0]; sta 5254; 7°05'42"N, 125°39'42"E; 38 m; sand, coral; 18 May 1908 (1426–1431); 6' Johnston oyster dredge: 6 [4.5–7.3]. Off Jolo Island, Sulu Archipelago: sta 5137, 6°04'25"N, 120°58'30"E; 37 m; sand, shells; 14 Feb 1908 (0955–1015); 12' Agassiz beam trawl, 2 mud bags: 1 [5.1]; sta 5141; 6°09'N, 120°58'E; 53 m; coral sand; 15 Feb 1908 (0847–0905); 12' Agassiz beam trawl, mud bag: 2 [4.1, 5.1], 1 ovig [5.1]; sta 5145; 6°04'30"N, 120°59'30"E; 42m; coral sand, shells; 15 Feb 1908 (1344–1359); 12' Agassiz beam trawl, mud bag: 3 [2.9–3.1]; sta 5555; 5°51'15"N, 120°58'35"E; 62 m; coarse sand; 18 Sep 1909 (1109–1113); 6' McCormick: 1 [5.9]; sta 5557; 5°51'30"N, 121°01'00"E; 24 m; 18 Sep 1909 (1458–1503); 6' McCormick: 2 [9.0, 10.2], 1 ovig [10.2]. Near Siasi, Sulu Archipelago: sta 5147; 5°41'40"N, 120°47'10"E; 38 m; coral sand, shells; 16 Feb 1908 (1127–1147); 12' Agassiz beam trawl, mud bag: 4[8.1–10.6], 1 ovig [10.4]; sta 5148; 5°34'40"N, 120°47'30"E; 31 m; coral, shells; 16 Feb 1908 (1307–1325); 12' Agassiz beam trawl, mud bag: 1 [2.0]. Off Tawitawi, Sulu Archipelago: sta 5151; 5°24'40"N, 120°27'15"E; 44 m; coarse sand, shells; 18 Feb 1908 (1307–1327); 12' Agassiz beam trawl, mud bag: 1 ovig [4.5]; sta 5154; 5°14'50"N, 119°58'45"E; 22 m; coral sand; 19 Feb 1908 (1035–1050); 12' Agassiz beam trawl, mud bag: 4 [2.5–9.3], 2 ovig [6.3, 9.3]; sta 5165; 4°58'20"N, 119°50'30"E [17m]; coral; 24 Feb 1908 (1319–1323); 9' Johnston oyster dredge: 1 [8.7].

RANGE.—Suez Canal, Red Sea, eastern Africa, Persian Gulf, Thailand, Japan, Philippines, Indonesia, and Australia; shallow subtidal to 250 meters, commonly associated with alcyonarians, sometimes with sponges.

REMARKS.—Seven of the smaller Philippine specimens collected by the *Albatross*, including all five specimens (one ovigerous) from stations 5141 and 5145 off Jolo Island, Sulu Archipelago, have the anterior pair of dorsolateral spines situated at or anterior to the midlength of the telson. Eight others with carapace lengths of less than about 5 mm, however,

have both pairs of dorsolateral spines situated on the posterior half of the telson. It seems unlikely that this atypical condition is of more than varietal significance, but the possibility that a distinct small species has been confused with *S. neomeris* might be considered in future study of the species.

***111. *Synalpheus neptunus* (Dana, 1852)**

Alpheus neptunus Dana, 1852a:22 [type locality (based on neotype designation by D.M. and A.H. Banner, 1972:24): "Tictabon Island, near Zamboanga, Philippines (Sulu Sea)" (presumably currently known as "Tictauan Islands" (6°53'N, 122°09'E), situated on the Moro Gulf (not Sulu Sea) side of Basilian Strait)].

Synalpheus neptunus.—D.M. and A.H. Banner, 1972:24, fig. 3.

Synalpheus neptunus neptunus.—D.M. and A.H. Banner, 1975: 317, fig. 11.

DIAGNOSIS.—Rostrum not overreaching 1st antennular segment, apex not upturned, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with dorsolateral spines stout, prominent, anterior pair situated on anterior 1/2 of telson, posterior angles subrectangular; stylocerite falling short of or overreaching distal margin of 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth reaching about to level of tip of stylocerite, dorsal angle rounded, occasionally slightly projecting; antennal scale with blade sometimes moderately developed, sometimes vestigial; major chela with movable finger not appreciably overreaching fixed finger, palm terminating distally in rounded prominence at level of articulation with movable finger; minor chela with movable finger bearing lateral rows of regularly spaced setae but without patterned row on extensor surface, both fingers broad, excavate, and terminating in single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, teeth subequal in length, flexor tooth slightly stouter than extensor tooth, segment neither excavate nor swollen on flexor margin, merus unarmed; uropod with transverse articulation on lateral branch in mature specimens; maximum carapace length to base of rostrum about 9 mm.

MATERIAL.—PHILIPPINES. Off Jolo Island, Sulu Archipelago: sta 5139; 6°06'N, 121°02'30"E; 37 m; coral sand; 14 Feb 1908 (1313–1317); 12' Agassiz beam trawl, mud bag: 2 [3.8, 4.2], 1 ovig [4.2]; sta. 5142; 6°06'10"N, 121°02'40"E; 38 m; coral sand and shells; 15 Feb 1908 (1033–1044); 12' Agassiz beam trawl, mud bag: 7 [2.5–3.6].

RANGE.—Red Sea to Japan, Philippines, Indonesia, and Australia; shallow subtidal to 70 meters.

REMARKS.—If I am justified in assigning the two specimens from station 5139 to a single species, there seems to be little cause to recognize subspecies in this seemingly very variable species. The smaller specimen is the more nearly typical one of the two, as verified by comparison with the neotype. It displays a rostrum that falls short of the level of the distal margin of the 1st antennular segment and does not overreach the orbital teeth, a stylocerite that similarly does not overreach the 1st antennular segment, an antennal scale without any

vestige of a blade, and a uropod with a distinct transverse articulation on the lateral branch. The larger, ovigerous specimen, on the other hand, has a longer rostrum that overreaches both the 1st antennular segment and the orbital teeth, a stylocerite that similarly overreaches the 1st antennular segment, an antennal scale with a well-developed blade, and a uropod with an obscure transverse articulation on the lateral branch. In most other respects, including the distal cirlet of spines on the third maxilliped, however, the two specimens agree with each other and with the current concept of *S. neptunus*. Although the collection of two such different specimens at the same station seems to discourage the recognition of subspecies, I have not included *S. neptunus germanus* D.M. and A.H. Banner, 1975:321, in the above synonymy because of the somewhat isolated and apparently uniform population from Western Australia on which it was based.

***112. *Synalpheus nilandensis* Coutière, 1905**

Synalpheus Nilandensis Coutière, 1905:871, pl. 70: fig. 4 [type locality: the type series came from 4 atolls in the Maldives Islands].

Synalpheus Nilandensis, var. *oxyceros* Coutière, 1905:871, pl. 70: fig. 5 [type locality: Nilandu Atoll, Maldives Islands].

Synalpheus nilandensis, var. *bandaensis* De Man, 1909a:121 [type locality: Selat Sape, Lesser Sunda Islands, and Banda, Banda Sea, Indonesia].

Synalpheus nilandensis.—D.M. and A.H. Banner, 1975:327, fig. 14.

DIAGNOSIS.—Rostrum not overreaching 1st antennular segment, apex upturned, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with posterolateral spines distinct, anterior pair situated in anterior 1/2 of telson, posterior angles acutely produced; stylocerite overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth of variable length, overreaching stylocerite or not, dorsal tooth strong, acute, without accompanying 2nd, proximal tooth; antennal scale with blade narrow, not vestigial; major chela with movable finger only slightly overreaching fixed finger, palm terminating distally in acute tooth at level of articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, fingers terminating in single distal tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl triunguiculate, extensor tooth smaller than flexor tooth, segment neither excavate nor swollen on flexor margin, merus armed with about 4 strong movable spines on flexor margin; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum fully 5 mm.

MATERIAL.—PHILIPPINES. Off Tawitawi, Sulu Archipelago: sta 5157; 5°12'30"N, 119°55'50"E; 33 m; fine sand; 21 Feb 1908 (0904–0909); 9' Johnston oyster dredge: 1 [3.2].

RANGE.—Red Sea and eastern Africa to Hong Kong, Philippines, Indonesia, Australia, and, possibly, Tuamotu Archipelago; less than 18 to 134 meters.

***113. *Synalpheus odontophorus* De Man, 1909**

Synalpheus odontophorus De Man, 1909a:113 [type locality: the type series came from 3 different stations in southern and eastern Indonesia; 90 to more than 120 meters].—D.M. and A.H. Banner, 1979:244, fig. 4j–m.

DIAGNOSIS.—Rostrum overreaching 1st antennular segment, apex not upturned, wider at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with dorsolateral spines distinct, anterior pair situated anterior to midlength, posterior angles acute but not projecting; stylocerite reaching to about level of midlength of visible part of 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth not nearly overreaching stylocerite, dorsal tooth spinose, not accompanied by 2nd, proximal tooth; antennal scale with blade well-developed; major chela with movable finger not overreaching fixed finger, palm terminating distally in small acute tooth at level of articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, each finger terminating in single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth about twice as long as flexor tooth, segment neither excavate nor swollen on flexor margin proximal to flexor tooth, merus armed with small, acute distal tooth on flexor margin, without movable spines, uropods with transverse articulation on lateral branch; maximum carapace length to base of rostrum about 7 mm.

MATERIAL.—PHILIPPINES. Off Tawitawi, Sulu Archipelago: sta 5153; 5°18'10"N, 120°02'55"E; 90 m; coral sand, shells; 19 Feb 1908 (0908–0922); 12' Agassiz beam trawl, mud bag: 1 [5.2].

RANGE.—Southern Japan; South China Sea south of Hong Kong; Sulu Archipelago, Philippines; and southern and eastern Indonesia; 55 to more than 120 meters, sometimes associated with crinoids.

REMARKS.—Although D.M. and A.H. Banner (1979:244) were doubtful about the potential importance of the two characters that seemed most useful in distinguishing *S. odontophorus* from *S. simpsonii* (the relative lengths of the rostrum and of the stylocerite), it may be desirable to direct attention to the single *Albatross* specimen that manifests this distinction, especially because it was found in somewhat deeper water than were any of the more numerous specimens of *S. simpsonii* in the collection.

114. *Synalpheus paraneomeris* Coutière, 1905

Synalpheus paraneomeris Coutière, 1899:456, 466, 486, 501 [nomen nudum]; 1905:872, pl. 71: fig. 7 [type locality: the type series apparently came from Goidu Island in the Maldives and Minicoy, southernmost island of the Laccadives, as well as from Djibouti in the Gulf of Aden, Masqat in the Gulf of Oman, and Mahe Island in the Seychelles].—D.M. and A.H. Banner, 1975:383, fig. 29.—A.H. and D.M. Banner, 1983:103.—D.M. and A.H. Banner, 1985:52.

S[synalpheus] paraneomeris prolatus Coutière, 1909:9 [nomen nudum].
S[synalpheus] paraneomeris oxyceros Coutière, 1909:9 [nomen nudum].

Synalpheus townsendi Coutière, 1909:34 [part; syntype without pereopods from French Frigate Shoals, Hawaii, determined to be *S. paraneomeris* by A.H. Banner, 1953:44, fig. 14; "type" designated by Coutière (USNM 38392) represented by 11 specimens from northeastern Gulf of Mexico].

Synalpheus paraneomeris, var. *halmaherensis* De Man, 1909a:122 [type locality: "Wunoh-bay," northwest coast of Pulau Waigeo, Irian Java, Indonesia].

Synalpheus paraneomeris, var. *praedabunda* De Man, 1909a:123 [type locality: the type series came from 4 different stations in Indonesia; reef to 27 meters].

Synalpheus paraneomeris var. *prolatus* De Man, 1911:241, pl. 8: fig. 35 [type locality: "Wunoh-bay," northwest coast of Pulau Waigeo, Irian Jaya, and Pulau Kabaena, Celebes, Indonesia; shallow water (doubtfully referred to the nomen nudum *S. paraneomeris prolatus* Coutière, 1909)].

Synalpheus Sluiteri De Man, 1920:107 [type locality: Teluk Djakarta, Java].

S[synalpheus] paraneomeris praslini Coutière, 1921:415, pl. 61: fig. 6 [type locality: Praslin Island, Seychelles; reef].

S[synalpheus] paraneomeris seychellensis Coutière, 1921:415, pl. 61: fig. 7 [type locality: Seychelles].

DIAGNOSIS.—Rostrum not overreaching 1st antennular segment, apex not upturned, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with dorsolateral spines small but distinct, both pairs frequently situated in posterior 1/2 of telson, posterior angles usually subrectangular; stylocerite overreaching 1st antennular segment; basal antennal segment (basicerite) not overreaching stylocerite, dorsal margin usually not produced; antennal scale usually with well-developed blade, major chela with movable finger not appreciably overreaching fixed finger, palm slightly produced distally at level of articulation with movable finger; minor chela without patterned row of setae on extensor surface of movable finger, each finger terminating in single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, flexor tooth usually considerably stouter than extensor tooth, segment usually with bulge on margin proximal to flexor tooth, merus unarmed on flexor margin; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum about 5 mm.

RANGE.—Red Sea and western Indian Ocean to (Thailand excepted ?) Japan (variety ?), Philippines, Indonesia, Australia, and the Pacific islands at least as far eastward as Hawaii; shallow subtidal to 126 meters.

***115. *Synalpheus pescadorensis* Coutière, 1905**

Synalpheus Pescadorensis Coutière, 1905:877, pl. 73: fig. 15 [type locality: Miladummadulu, Nilandu, and Male atolls, Maldive Islands, and P'enghu Lichiao (Pescadores), Formosa Strait].

Synalpheus pescadorensis.—D.M. and A.H. Banner, 1975:301, fig. 6

DIAGNOSIS.—Rostrum not nearly reaching level of distal margin of 1st antennular segment, apex upturned, narrower at base than orbital teeth; 6th abdominal somite with acute projection either side of base of telson, posterior margin unarmed mesially; telson with dorsal spines unusually large, anterior pair slightly smaller than posterior pair and situated in anterior 1/2 of telson, posterior angles subrectangular;

stylocerite not overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth overreaching stylocerite, armed dorsally with long, spinose tooth, not accompanied by 2nd, proximal tooth; antennal scale with blade narrow but not vestigial; major chela with movable finger overreaching fixed finger, palm terminating in convex projection armed with acute tooth at level of articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, latter terminating in 2 teeth, fixed finger in 1; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth slightly longer than flexor tooth, segment neither excavate nor swollen on flexor margin proximal to flexor tooth, merus unarmed on flexor margin; uropod without transverse articulation on lateral branch, protopod with unusually long lateral tooth reaching nearly or quite to midlength of lateral branch; maximum carapace length of carapace to base of rostrum probably about 6 mm.

MATERIAL.—PHILIPPINES. Southwest of Manila Bay, Luzon: sta 5109; 14°13'45"N, 120°16'30"E; 18 m; coral; 1911:285, pl. 12: fig. 57.—A.H. Banner, 1958:161. 9' *Albatross-Blake* beam trawl (trawl immediately torn on coral): 1 [5.3]. Davao Gulf, Mindanao: sta 5250; 7°05'07"N, 125°39'45"E; 42 m; coral, sand; 18 May 1908 (1124–1127); 6' Johnston oyster dredge: 1 [4.3]; sta 5253; 7°04'48"N, 125°39'38"E; 51 m; coral; 18 May 1908 (1347–1358); 6' Johnston oyster dredge: 1 [4.1].

RANGE.—Somalia to Formosa Strait, Philippines, Indonesia, Australia, and the Caroline and Solomon Islands; shallow water to 51 meters.

116. *Synalpheus quadriarticulatus* D.M. and A.H. Banner, 1975

Synalpheus quadriarticulatus D.M. and A.H. Banner, 1975:297 fig. 5 [type locality: between Hammond and Waiwea islands, Torres Strait, Queensland, Australia; 3 meters, in sponge].

DIAGNOSIS.—Rostrum not nearly reaching level of distal margin of 1st antennular segment, apex not upturned, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with dorsolateral spines distinct, anterior pair situated near midlength of telson, posterior angles subquadrangular; stylocerite not overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth overreaching stylocerite, armed dorsally with prominent spine-like tooth, not accompanied by 2nd, proximal tooth; antennal scale without blade; major chela with movable finger slightly overreaching fixed finger, palm terminating distally in tubercle armed with acute tooth at level of articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, each finger terminating in single tooth; 2nd pereopod with 4 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth longer and more slender than flexor tooth, segment neither excavate nor

swollen on flexor margin proximal to flexor tooth, merus unarmed on flexor margin; uropod without transverse articulation on lateral branch; maximum carapace length to base of rostrum about 4 mm.

RANGE.—Known previously only from the type series from the vicinity of Thursday Island, Torres Strait, at a depth of about 3 meters. The Philippine record stems from 7 Smithsonian specimens collected by the *Alpha Helix* at station M-136 in Pujada Bay, southeastern Mindanao, 9–18 meters, 21 July 1979, and identified by A.H. Banner in 1983.

*117. *Synalpheus quadrispinosus* De Man, 1910

Synalpheus quadrispinosus De Man, 1910:298 [type locality: the type series came from 5 stations in southern and eastern Indonesia; 13–70 meters]; 1911:285, pl. 12: fig. 57.—A.H. Banner, 1958:161.

Synalpheus quadridens De Man, 1910:299 [type locality: off northeast point of Timor, Indonesia, 8°25.2'S, 127°18.4'E; 27–54 meters]; 1911:284, pl. 12: fig. 56.

DIAGNOSIS.—Rostrum not nearly reaching level of distal margin of 1st antennular segment, apex sometimes slightly upturned, narrower at base than blunt orbital teeth; 6th abdominal somite projecting posteriorly either side of base of telson, posterior margin armed with 2 small additional teeth separated by concave mesial margin of somite; telson with dorsolateral spines distinct, anterior pair situated in anterior 1/2 of length, posterior angles subacute but not projecting; stylocerite overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth reaching nearly to level of distal end of stylocerite, dorsal tooth strong, not accompanied by 2nd, proximal tooth; antennal scale with blade narrow but not by any means vestigial; major chela with movable finger distinctly overreaching fixed finger, palm terminating distally in variably projecting tooth at level of articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, each finger terminating in single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth slightly longer than flexor tooth, segment neither excavate nor swollen on flexor margin proximal to flexor tooth, merus unarmed on flexor margin; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum about 8 mm.

MATERIAL.—PHILIPPINES. Visayan Sea north of Cebu: sta 5401; 11°24'45"N, 124°06'E; 55 m; fine sand; 16 Mar 1909 (1005–1032); 6' McCormick trawl: 1 [4.1]. Davao Gulf, Mindanao: sta 5254; 7°05'42"N, 125°39'42"E; 38 m; sand, coral; 18 May 1908 (1426–1431); 6' Johnston oyster dredge: 1 [3.5].

RANGE.—Singapore, Indonesia, Philippines, and Gilbert Islands; 13–70 meters, probably commensal with crinoids at Singapore, according to Johnson (1962:51).

REMARKS.—The two specimens from the Gilbert Islands have been re-examined; they are larger than either of the Philippine specimens, with carapace lengths of 4.5 and 4.6, the

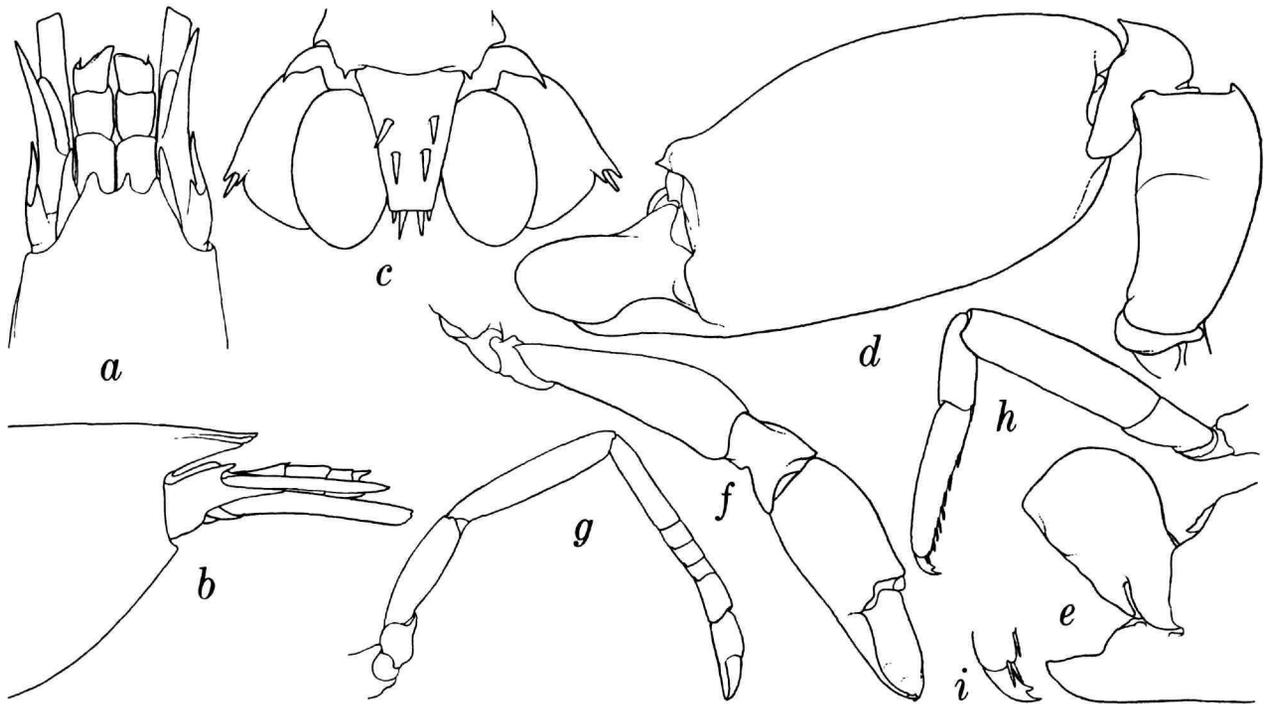


FIGURE 21.—*Synalpheus sciro*, specimen from Albatross sta 5482, carapace length 5.7mm: a, anterior carapace and appendages, dorsal aspect; b, same, lateral aspect; c, telson and uropods, dorsal aspect; d, left 1st (major) cheliped; e, same, fingers; f, right 1st (minor) cheliped; g, right 2nd pereopod; h, left 3rd pereopod; i, same dactyl.

smaller being ovigerous. The three ovigerous specimens recorded by De Man (1911:284, 285) were 12, 16, and 23 mm overall; the smallest compares in size with the ovigerous female from Onotoa, and the largest must be about twice as large.

*118. *Synalpheus sciro* D.M. and A.H. Banner, 1975

FIGURE 21

Synalpheus sciro D.M. and A.H. Banner, 1975:304, fig. 7 [type locality: northwest of Bluff Point, Western Australia, 27°40'S, 113°20'E; 14 meters].

DIAGNOSIS.—Rostrum not nearly reaching level of distal margin of 1st antennular segment, apex slightly upturned, narrower at base than orbital teeth; 6th abdominal somite with acute projection either side of base of telson, posterior margin unarmed mesially; telson with dorsolateral spines unusually large, anterior pair situated on anterior $\frac{1}{2}$ of telson, posterior angles subrectangular; stylocerite not overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth overreaching stylocerite, dorsal tooth strong, spinose, not accompanied by 2nd, proximal tooth; antennal scale with blade narrow but not vestigial; major chela with movable finger overreaching fixed finger, palm terminating distally in tubercle armed with distal acute tooth at level of articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, latter terminating in 2 distal teeth, fixed finger in 3; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl

biunguiculate, extensor tooth slightly longer than flexor tooth, segment neither excavate nor swollen on flexor margin proximal to flexor tooth, merus unarmed on flexor margin; uropod without transverse articulation on lateral branch, protopod with lateral tooth not extending far beyond proximal $\frac{1}{4}$ of lateral branch; maximum carapace length to base of rostrum probably about 6 mm.

MATERIAL.—PHILIPPINES. Surigao Strait, east of Leyte: sta 5482; 10°27'30"N, 125°18'E; 123 m; broken shells, sand, and green mud; 30 Jul 1909 [0911–0932]; 12' Agassiz beam trawl: 1 [5.7].

RANGE.—The only other known specimen of this species is the holotype from the Indian Ocean off Bluff Point, Western Australia; 14 meters.

REMARKS.—The illustrations (Figure 21) will serve to corroborate the identification of the specimen from Surigao Strait and to depict the major cheliped and the posterior end of the telson, both of which were lacking in the holotype.

119. *Synalpheus septemspinus* De Man, 1910

Synalpheus septemspinus De Man, 1910:297 [type locality: east of Pulau Sailus-Besar, Kepulauan Tengah, eastern Java Sea, Indonesia; "up to 36" meters]; 1911:289, pl. 13: fig. 59.—D.M. and A.H. Banner, 1979:245, fig. 4n—r.—A.H. and D.M. Banner, 1983:105.

DIAGNOSIS.—Rostrum not nearly reaching level of distal margin of 1st antennular segment, narrower at base than orbital teeth; 6th abdominal somite acutely projecting posteriorly

either side of base of telson, posterior margin armed with about 5 acute teeth irregularly spaced between posterolateral projections; telson with dorsolateral spines distinct, anterior pair situated anterior to midlength, posterior angles subacute but not projecting; stylocerite reaching level of distal margin of 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth overreaching stylocerite, dorsal tooth strong, sharply acute, not accompanied by 2nd, proximal tooth; antennal scale with blade narrow but not vestigial; major chela with movable finger slightly overreaching fixed finger, palm terminating distally in 2 unequal tubercles at level of articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, fixed finger terminating in 3 or 4 small teeth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth longer than flexor tooth, segment neither excavate nor swollen on flexor margin proximal to flexor tooth, merus bearing series of movable spines on distal 1/2 of flexor margin but without fixed distal tooth; maximum carapace length to base of rostrum probably about 4 mm.

RANGE.—Madagascar; Sulu Archipelago, Philippines; and Java Sea, Indonesia; 2 to at least 28 meters.

***120. *Synalpheus stimpsonii* (De Man, 1888)**

Alpheus Stimpsonii De Man, 1888a:513, pl. 22: fig. 3 [type locality: Ambon, Indonesia].

Alpheus amboinae Zehnter, 1894:202, pl. 8: fig. 23 [type locality: Ambon, Indonesia].

Alpheinus tridens Borradaile, 1899:415, pl. 38: fig. 12 [type locality: Baie du Sandal, Île Lifou, Admiralty Islands].

Synalpheus Stimpsoni var. *Maldivensis* Coutière, 1905:878, pl. 73: fig. 16 [type locality: Hulele, Male Atoll, Maldives Islands; on crinoid].

Synalpheus consobrinus De Man, 1909a:111 [type locality: the series came from 4 different stations in Indonesia; reef to 113 meters].

Synalpheus Brucei Potts, 1915:76, figs. 1A,B, 2A–C, 3 [type locality: Murray Island, eastern Torres Strait, Australia, associated with crinoids].

Synalpheus striatus Kubo, 1938:89, figs. 1, 2 [type locality: O Shima, Wakayama Prefecture, Honshu, Japan; 3–7 meters].

Synalpheus stimpsoni.—D.M. and A.H. Banner, 1975:292, figs. 2m, 4.

Synalpheus stimpsonii.—A.H. and D.M. Banner, 1983:106, 1984:45.—D.M. and A.H. Banner, 1985:54.

DIAGNOSIS.—Rostrum overreaching 1st antennular segment, often slightly concave dorsally, wider at base than orbital teeth; 6th abdominal somite with or without acute tooth at mesial end of posterolateral lobe on either side of base of telson, posterior margin unarmed mesially; telson with dorsolateral spines distinct, anterior pair situated slightly anterior to midlength, posterior angles not projecting; stylocerite reaching nearly to or overreaching level of distal margin of 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth not nearly overreaching stylocerite, dorsal tooth spinose, not accompanied by 2nd, proximal tooth; antennal scale with blade well-developed; major chela with movable finger not overreaching fixed finger, palm usually terminating distally in tooth at level of articulation with movable finger; minor chela

without patterned row of setae on extensor margin of movable finger, each finger terminating in single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth bent at nearly right angle and fully twice as long as flexor tooth, segment neither excavate nor swollen on flexor margin proximal to flexor tooth, merus armed with small, acute distal tooth on flexor margin, without movable spines; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum about 13 mm.

MATERIAL.—PHILIPPINES. Southwest of Manila Bay, Luzon: sta 5108; 14°05'05"N, 120°19'45"E; 24 m; coral; 15 Jan 1908 (0834–0835); 9' *Albatross-Blake* beam trawl, mud bag (dredging cable fouled on gin block; trawl not dragged on bottom): 2 [6.4, 6.4]; sta 5109; 14°03'45"N, 120°16'30"E; 18 m; coral; 15 Jan 1908 (1026–1038); 9' *Albatross-Blake* beam trawl (trawl immediately torn on coral): 1 ovig. [8.5]. Davao Gulf, Mindanao: sta 5248; 7°07'25"N, 125°40'24"E; 33 m; coral; 18 May 1908 (1038–1042); 6' Johnston oyster dredge (veered from 49 to 55 meters): 2 [7.7, 9.4], 1 ovig [9.4]; sta 5254; 7°05'42"N, 125°39'42"E; 38 m; sand, coral; 18 May 1908 (1426–1431); 6' Johnston oyster dredge: 1 ovig [9.6]. Off Jolo Island, Sulu Archipelago: sta 5141; 6°09'N, 120°58'E; 53 m; coral sand; 15 Feb 1908 (0847–0905); 12' Agassiz beam trawl, mud bag: 1 [4.3]; sta 5142; 6°06'10"N, 121°02'40"E; 38 m; coral sand and shells; 15 Feb 1908 (1033–1044); 12' Agassiz beam trawl, mud bag: 2 [10.2, 12.2], 1 ovig [12.2]; sta 4145; 6°04'30"N, 120°59'30"E; 42 m; coral sand, shells; 15 Feb 1908 (1344–1359); 12' Agassiz beam trawl, mud bag: 1 ovig [10.3]; sta 5174; 6°03'45"N, 120°57'E; 37 m; coarse sand; 5 Mar 1908 (1551–1557); 9' Johnston oyster dredge: 1 [7.7]; sta 5558; 5°51'33"N, 121°01'00"E; 27 m; 18 Sep 1909 (1517–1520); 6' McCormick trawl: 1 ovig [7.5]. Marungas Island, Sulu Archipelago: 1 [6.9]. Near Siasi, Sulu Archipelago: sta 5147; 5°41'40"N, 120°47'10"E; 38 m; coral sand, shells; 16 Feb 1908 (1127–1147); 12' Agassiz beam trawl, mud bag: 8 [2.5–9.8], 3 ovig [9.4–9.8], 1 with egg-shaped, sac-like parasitic capsules on pereopods and pleopods [9.5]. Near Tawitawi, Sulu Archipelago: sta 5165; 4°58'20"N, 119°50'30"E [17 m]; coral; 24 Feb 1908 (1319–1323); 9' Johnston oyster dredge: 2 [9.8, 11.4], 1 ovig [11.4].

RANGE.—Eastern Africa and Madagascar to Singapore, Thailand, Japan, Philippines, Indonesia, Australia, and Marshall, Gilbert, and Loyalty islands; intertidal to 155 meters, frequently associated with crinoids, occasionally with alcyonarians and in dead coral heads and under rocks.

REMARKS.—There is little argument with the conclusion of D.M. and A.H. Banner (1975:296) that *S. stimpsonii* is a "highly variable species." Study of the rather limited material (23 specimens) collected during the *Albatross* Philippine Expedition suggests that those with the longest rostral and orbital teeth also display an acute projection from the posterolateral lobe of the sixth abdominal somite, a character that seems otherwise to be of specific significance.

***121. *Synalpheus streptodactylus* Coutière, 1905**

Synalpheus neomeris var. *streptodactylus* Coutière, 1905:870, pl. 70: fig. 1' [type locality: Haddummati, Suvadiva, and Nilandu atolls, Maldives Islands].

Synalpheus streptodactyloides De Man, 1909a:114 [type locality: off northeast point of Timor, Indonesia; 27–54 meters].

Synalpheus streptodactylus.—De Man, 1911:226, pl. 7: fig. 29.—D.M. and A.H. Banner, 1975:362, fig. 23; 1981:73.—A.H. and D.M. Banner, 1983:106.—D.M. and A.H. Banner, 1985:55.

S[*synalpheus*] *metaneomeris* Coutière, 1921:414, pl. 60: fig. 4 [except fig. 4c'''] [new name for *S. neomeris* sensu Coutière, 1905:869 (not *Alpheus neomeris* De Man, 1897); type locality: 11 Maldives localities cited by Coutière, 1905].

S[*synalpheus*] *metaneomeris* var. *streptodactylus* Coutière, 1921:414, pl. 60: fig. 4c'''.
S[*synalpheus*] *streptodactylus* *hadrunus* A. H. and D.M. Banner, 1966a:158 [new name for *S. metaneomeris streptodactylus* sensu Coutière, 1921 (= *S. neomeris streptodactylus* Coutière, 1905); see "Remarks"].

DIAGNOSIS.—Rostrum not overreaching 1st antennular segment, faintly convex dorsally, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with dorsolateral spines distinct, anterior pair usually situated slightly anterior to midlength, posterior angles acute but not much produced; stylocerite overreaching 1st antennular segment; basal antennal segment (basicerite) not quite overreaching stylocerite, dorsal tooth strong, acute, not accompanied by 2nd, proximal tooth; antennal scale with well-developed blade; major chela with movable finger not far overreaching fixed finger, palm terminating distally in acute tooth at level of articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, each finger terminating in single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth more slender and $\frac{1}{2}$ to nearly as long as flexor tooth, segment neither excavate nor swollen on flexor margin proximal to flexor tooth, merus bearing 2–5 movable spines on distal $\frac{1}{2}$ of flexor margin, without acute distal tooth; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum rarely as much as 7 mm.

MATERIAL.—PHILIPPINES. Mindoro Strait: sta 5332; 12°47'15"N, 120°41'E; 1362 m; green mud; 3.4°C; 12 Dec 1908 (1150–1210); from driftwood at surface: 1 [3.2]. Marungas Island, Sulu Archipelago [6°06'N, 120°58'E]; 19 Feb 1908; shore, coral head: 2 [4.3, 4.8], 1 ovig [4.8]. Off Jolo Island, Sulu Archipelago: sta 5139; 6°06'N, 121°02'30"E; 37 m; coral sand; 14 Feb 1908 (1313–1317); 12' Agassiz beam trawl, mud bag: 4 [2.8–4.3], 1 ovig [4.3]; sta 5141; 6°09'N, 120°58'E; 53 m; coral sand; 15 Feb 1908 (0847–0905); 12' Agassiz beam trawl, mud bag: 3 [3.7–4.4], 1 ovig [4.4]; sta 5145; 6°04'30"N, 120°59'30"E; 42 m; coral sand, shells; 15 Feb 1908 (1344–1359); 12' Agassiz beam trawl, mud bag: 2 ovig [4.7, 5.0]; sta 5174; 6°03'45"N, 120°57'E; 37 m; coarse sand; 5 Mar 1908 (1551–1557); 9' Johnston oyster dredge: 2 [3.8, 4.0]. Near Siasi, Sulu Archipelago: sta 5147; 5°41'40"N, 120°47'10"E; 38 m; coral sand, shells; 16 Feb 1908

(1127–1147); 12' Agassiz beam trawl, mud bag: 2 ovig [4.1, 4.4]. Off Tawitawi, Sulu Archipelago: sta 5157; 5°12'30"N, 119°55'50"E; 33 m; fine sand; 21 Feb 1908 (0904–0909); 9' Johnston oyster dredge: 7 [2.0–4.1].

RANGE.—Red Sea and eastern and South Africa to Thailand, Japan, Philippines, Indonesia, and Australia to Hawaii; intertidal to 128 meters. The occurrence of a specimen of *S. streptodactylus* on driftwood in Mindoro Strait—together with four specimens of *Hippolyte ventricosa* H. Milne Edwards, 1837, a frequent denizen of flotsam on the high seas—is interesting evidence of this means of dispersal of normally benthic animals.

REMARKS.—If the above synonymy is accepted, there is no problem with the correct name of this shrimp, but the choice is more complex if more than one taxon are believed to be represented. That conclusion would seem to assume that the name *S. streptodactylus* or *S. streptodactylus streptodactylus* is to be retained for the species or subspecies in which the extensor tooth of the dactyl of the third pereopod is one-half as thick and two-thirds as long as the flexor tooth, as indicated by Coutière (1905:870). For the other taxon, in which the extensor tooth of that dactyl is no more than one-third as thick and one-half as long as the flexor tooth, the name *S. metaneomeris* or *S. streptodactylus metaneomeris* would seem to be available (see the *International Code of Zoological Nomenclature*, third edition, 1985, Article 47(b)j and example). It seems to me that *S. streptodactylus hadrunus* A.H. and D.M. Banner, 1966a:158 is a synonym of the typical form of *S. streptodactylus*, the taxon with the extensor tooth of the dactyl of the third pereopod one-half as thick as the flexor tooth; if, on the other hand, *S. s. hadrunus* should prove to represent the alternate form, it would seem to be a junior synonym of *S. s. metaneomeris*.

122. *Synalpheus thai* A.H. and D.M. Banner, 1966

Synalpheus thai A.H. and D.M. Banner, 1966b:61, fig. 19 [type locality: Koh Samet, Rayong, Thailand]; 1975:427.—D.M. and A.H. Banner, 1979:246, fig. 5a,b.

DIAGNOSIS.—Rostrum not overreaching 1st antennular segment, apex sharply upturned, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with strong dorsolateral spines, anterior pair situated in anterior $\frac{1}{2}$ of length, posterior angles produced posteriorly into teeth nearly $\frac{1}{2}$ as long as telson in midline; stylocerite overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth reaching about to level of tip of stylocerite, dorsal tooth strong, acute, not accompanied by 2nd, proximal tooth; antennal scale with blade very narrow, vestigial; major chela with movable finger overreaching fixed finger, palm terminating distally in blunt projection at level of articulation with movable finger; minor chela with movable finger bearing patterned row of setae on extensor margin, each

finger terminating acutely; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth more than twice as long as flexor tooth, segment neither excavate nor swollen on flexor margin proximal to flexor tooth, merus unarmed on flexor margin; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum about 6 mm.

RANGE.—Northeastern Gulf of Thailand, Basilan Strait, southern Philippines, Indonesia, and Hawaii; shallow subtidal.

***123. *Synalpheus theano* De Man, 1910**

Synalpheus Theano De Man, 1910:296 [type locality: Between Pulau Misool and Pulau Salawati, Indonesia; 1°42.5'S, 130°47.5'E; 32 meters]; 1911:293, pl. 13; fig. 61.

Synalpheus theano.—D.M. and A.H. Banner, 1972:20–24, fig. 3F; 1975:314, 318, fig. 10.

DIAGNOSIS.—Rostrum not overreaching 1st antennular segment, dorsal margin slightly concave, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with dorsolateral spines long, prominent, anterior pair situated on anterior 1/2 of telson, posterior pair near midlength, posterior angles subrectangular; stylocerite not overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth far overreaching stylocerite, dorsal angle rounded, truncate, or obscurely dentate; antennal scale with blade variably developed; major chela with movable finger overreaching fixed finger, palm terminating distally in acute to obtuse tooth at level of articulation with movable finger; minor chela without patterned row of setae on extensor margin, each finger broad, excavate, and terminating in single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, teeth subequal in length, flexor tooth slightly stouter than extensor tooth, segment neither excavate nor swollen on flexor margin proximal to flexor tooth, merus unarmed; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum fully 7 mm.

MATERIAL.—PHILIPPINES. Off Jolo Island, Sulu Archipelago: sta 5555; 5°51'15"N, 120°58'35"E; 62 m; coarse sand; 18 Sep 1909 (1109–1113); 6' McCormick trawl: 1 [5.5].

RANGE.—Philippines, Indonesia, and Australia; shallow water to 62 meters, in dead coral and sponges.

REMARKS.—D.M. and A.H. Banner (1972:21; 1975:318) suggested that *S. theano* could be distinguished from *S. neptunus* by a single character: the terminal excrescence on the distal segment of the third maxilliped, a dense brush of fine setae in *S. theano*, a circlet of heavy spinules in *S. neptunus*. This character is hardly definitive, however, in the well-preserved *Albatross* specimen assigned to *S. theano*, which has the third maxillipeds terminating in somewhat less than dense brushes composed of long spines and longer setae, the setae being more numerous and tending to obscure the spines on the

left member of the pair. This specimen has been identified as *S. theano* because it corresponds so well with the illustrations of that species offered by De Man (1911, supplement (1915)) and by D.M. and A.H. Banner (1975), especially in the long dorsolateral spines on the telson, long ventrolateral tooth on the basal antennal segment (basicerite) in comparison with the stylocerite, and the extension of the movable finger of the major chela beyond its fixed finger.

***124. *Synalpheus triacanthus* De Man, 1910**

Synalpheus triacanthus De Man, 1910:301 [type locality: Timor Sea, south of Timor; 9°0.3'S, 126°24.5'E; 112 meters. "Living in *Solenocolon* Gray," (a hollow-stemmed gorgonian that is known to harbor shrimps)]; 1911:282, pl. 12; fig. 55.—D.M. and A.H. Banner, 1979:247; 1981:82.—A.H. and D.M. Banner, 1981:224.

DIAGNOSIS.—Rostrum overreaching 1st antennular segment, upcurved, narrower at base than orbital teeth; 6th abdominal somite produced posteriorly into acute tooth either side of base of telson and armed posteromesially with similar acute tooth; telson with dorsolateral spines distinct, anterior pair situated just anterior to midlength, posterior angles acute, projecting; stylocerite overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth not reaching level of distal end of stylocerite, dorsal tooth strong, acute, not accompanied by 2nd, proximal tooth; antennal scale with well-developed blade; major chela with movable finger not clearly overreaching fixed finger, palm terminating distally in bluntly acute tooth slightly proximal to distal margin at articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, each finger terminating acutely; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth twice as long as flexor teeth, segment with flexor margin neither excavate nor swollen proximal to flexor tooth, merus sometimes with 2 or 3 movable spines, usually unarmed, on flexor margin; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum about 9 mm.

MATERIAL.—PHILIPPINES. Samar Sea, east of Masbate: sta 5213; 12°15'N, 123°57'30"E; 146 m; sand, mud, shells; 20 Apr 1908 (1047–1107); 12' Agassiz beam trawl, mud bag: 2 [6.0, 6.1], 1 ovig [6.1]. Off Jolo Island, Sulu Archipelago: sta 5140; 6°08'45"N, 121°03'E; 139 m; fine coral sand; 14 Feb 1908 (1409–1429); 12' Agassiz beam trawl, reversible net, mud bag: 3 [5.2–8.3], 1 ovig [8.3]; sta 5545; 6°04'45"N, 121°20'20"E; 209 m; fine coral sand; 15 Sep 1909 (0943–0959); 9' Tanner beam trawl: 1 [4.3]. Off Tawitawi, Sulu Archipelago; sta 5166; 4°56'10"N, 19°46'E; 177 m; coral sand; 8°C; 24 Feb 1908 (1505–1507); 12' Agassiz beam trawl, mud bag: 1 bridle top carried away: 2 [5.6, 6.0], 1 ovig [6.0].

INDONESIA. Eastern Molucca Sea near Ternate: sta 5617; 00°49'30"N, 127°25'30"E; 240 m; bottom?; 27 Nov 1909

(1101–1111); 12' Agassiz beam trawl: 1 [5.7].

RANGE.—Red Sea to Philippines and Indonesia: 112–230 meters, at least sometimes living in hollow-stemmed gorgonians.

REMARKS.—See "Remarks" under *S. trispinosus*.

***125. *Synalpheus trispinosus* De Man, 1910**

Synalpheus trispinosus De Man, 1910:300 [type locality (limited by De Man, 1911:288): "Madura-bay," southern part of Selat Moro, west of Pulau Flores, Indonesia; 70 meters]; 1911:288, pl. 12: fig. 58.—D.M. and A.H. Banner, 1981:82.—A.H. and D.M. Banner, 1981:224, fig. 2a–c; 1983:107.

DIAGNOSIS.—Rostrum overreaching 1st antennular segment, upcurved, narrower at base than orbital teeth; 6th abdominal somite produced posteriorly into acute tooth either side of base of telson and armed posteromesially with similar acute tooth; telson with dorsolateral spines distinct, anterior pair situated just anterior to midlength, posterior angles acute, projecting; stylocerite overreaching 1st antennular segment; basal antennal segment (basicerite) not reaching level of distal end of stylocerite, dorsal tooth strong, acute, not accompanied by 2nd proximal tooth; antennal scale with well-developed blade; major chela with movable finger clearly overreaching fixed finger, palm terminating in 1 or 2 acute, subdistal teeth near articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, each finger terminating acutely; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth longer than flexor tooth, segment with flexor margin neither excavate nor swollen proximal to flexor tooth, merus with 6–9 movable spines on flexor margin; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum about 9 mm.

MATERIAL.—PHILIPPINES. Off Jolo Island, Sulu Archipelago: sta 5140; 6°08'45"N, 121°03'E; 139 m; fine coral sand; 14 Feb 1908 (1409–1429); 12' Agassiz beam trawl, reversible net, mud bag: 1 [8.3].

RANGE.—Gulf of Aden and eastern Africa to Philippines and Indonesia; 50–139 meters.

REMARKS.—The rather remarkable similarity between *S. triacanthus* and *S. trispinosus* in characters that are not usually encountered in other members of the genus (long, curved rostrum; tridentate posterior margin of sixth abdominal somite; and acute posterior angles of the telson) and the probability that they differ in only two, sometimes variable characters (proportionately longer and differently shaped movable finger of the major chela and numerous socketed spines on the flexor margin of the merus of the third pereopod) suggests that these two taxa may eventually prove to be synonyms. This possibility is strengthened by the collection of both forms at the same station by the *Albatross*. On the other hand the *Albatross* material tends to accentuate the differences between the two. All seven of the specimens assigned to *S. triacanthus* in which the major chela is attached have that appendage

uniformly distinct from that of the single specimen called *S. trispinosus*, and all nine of the former specimens have the merus of the third pereopod completely unarmed, whereas there are six distinct spines on the flexor margin of that segment in the other specimen. Finally, the possibility that these disparities might be sex-linked seems to be contradicted by the fact that the illustrated syntype of *S. trispinosus* was ovigerous, whereas the *Albatross* specimen of that form has the abdominal pleura sharply dentate, as in presumed males of many species of *Synalpheus*, and, more significantly, the two ovigerous specimens in the collection are quite typical of *S. triacanthus*.

***126. *Synalpheus tropidodactylus* D.M. and A.H. Banner, 1975**

FIGURE 22

Synalpheus tropidodactylus D.M. and A.H. Banner, 1975:286, fig. 2a–k, o [type locality: west of Geraldton, Western Australia; 28°14'S, 113°14'E; 110 meters].

DIAGNOSIS.—Rostrum overreaching 1st antennular segment, very slightly upturned, wider at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson; telson with dorsolateral spines distinct but not large, anterior pair situated near midlength, posterior angles subrectangular; stylocerite reaching about to level of distal margin of 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth not overreaching stylocerite, dorsolateral tooth strong, without 2nd, proximal tooth; antennal scale with well-developed blade; major chela with movable finger not distinctly overreaching fixed finger, palm terminating distally in small, acute tooth at level of articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, each finger terminating in single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth more than twice as long as flexor tooth, segment neither excavate nor swollen proximal to flexor tooth, merus unarmed on flexor margin; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum about 7 mm.

MATERIAL.—PHILIPPINES. Surigao Strait, east of Leyte: sta 5482; 10°27'30"N, 125°18'E; 123 m; broken shells, sand, and green mud; 30 Jul 1909 (0911–0932); 12' Agassiz beam trawl: 2 [5.1, 5.5].

RANGE.—The only other recorded specimens of this species are the holotype and paratype from the Indian Ocean off Geraldton, Western Australia; 100 meters.

REMARKS.—The most distinctive character of this species, the major cheliped with its curious modification of the plunger on the movable finger into a broad carina, is missing from both *Albatross* specimens, but the remaining characters (Figure 22) seem sufficient to justify the attributed identification. The larger of the two specimens is almost certainly a female that had recently borne eggs. The smaller, illustrated one is probably a male, from the appearance of the abdomen.

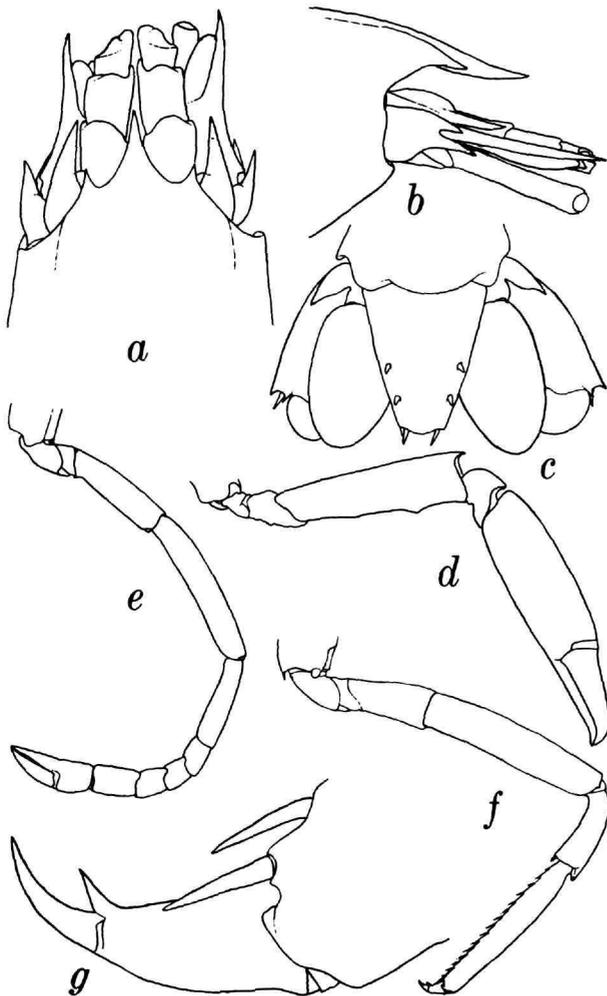


FIGURE 22.—*Synalpheus tropidodactylus*, specimen from *Albatross* sta 5482, carapace length 5.1 mm: *a*, anterior carapace and appendages, dorsal aspect; *b*, same, lateral aspect; *c*, telson and uropods, dorsal aspect; *d*, right 1st (minor) cheliped; *e*, right 2nd pereopod; *f*, right 3rd pereopod; *g*, same, dactyl.

It may be of interest, especially to the believer in the occult, that both this species and *S. sciro*, which were described from two and one specimens, respectively, from CSIRO collections obtained in the vicinity of Geraldston, Western Australia, in 1964 and 1963, were apparently first collected about 45 years earlier and 3000 miles (4800 km) to the north at a single station and with identical respective specimen representation.

127. *Synalpheus tumidomanus* (Paulson, 1875)

Alph[eus] tumido-manus Paulson, 1875:101, pl. 13: fig. 2 [type locality: Red Sea].

Alph. [tumido-manus] var. Alph[eus] gracili-manus Paulson, 1875:102, pl. 13: fig. 3 [type locality: Red Sea].

S[ynalpheus] Hululensis Coutière, 1908:202 [type locality: Maldives].

S[ynalpheus] Mac-Cullochi Coutière, 1908:203 [type locality: southwest coast of Australia].

S[ynalpheus] tumidomanus var. *exilimanus* Paulson? Coutière, 1909:10 [nomen nudum].

Synalpheus Theophane De Man, 1910:292 [type locality: the type series came from 3 localities in Macassar Strait, Celebes, and southeast of Timor, Indonesia; reef to 27–34 meters].

Synalpheus anisocheir Stebbing, 1915:86, pl. 87 [type locality: Gordon's Bay, False Bay, South Africa].

Synalpheus japonicus Yokoya, 1936:133, fig. 3 [type locality: vicinity of Misaki, Shikoku, Japan].

Synalpheus tumidomanus.—D.M. and A.H. Banner, 1975:377, fig. 28; 1981:83.—A.H. and D.M. Banner, 1983:107.

DIAGNOSIS.—Rostrum reaching nearly to or beyond distal margin of 1st antennular segment, not upturned, narrower at base than orbital teeth; 6th abdominal somite not projecting posteriorly either side of base of telson, posterior margin unarmed mesially; telson with dorsolateral spines distinct, anterior pair situated near midlength, posterior angles subrectangular to acutely projecting; stylocerite overreaching 1st antennular segment; basal antennal segment (basicerite) with ventrolateral tooth usually not overreaching stylocerite, dorsally unarmed to acutely projecting; antennal scale with well-developed blade; major chela with movable finger slightly, if at all, overreaching fixed finger, palm terminating distally in acute tooth or no projection at all at level of articulation with movable finger; minor chela without patterned row of setae on extensor margin of movable finger, each finger terminating in essentially single tooth; 2nd pereopod with 5 carpal articles; 3rd pereopod with dactyl biunguiculate, extensor tooth at least twice as long as flexor tooth, segment neither excavate nor swollen on flexor margin proximal to flexor tooth, merus unarmed on flexor margin; uropod with transverse articulation on lateral branch; maximum carapace length to base of rostrum about 9 mm.

RANGE.—Mediterranean coast of Israel and Red Sea to South Africa, eastward to Japan, Philippines, Indonesia, Australia, and across the Pacific to the Phoenix Islands; intertidal to 148 meters, in dead coral and sponges.

**Vexillipar*, new genus

TYPE SPECIES.—*Vexillipar repandum*, new species.

DIAGNOSIS.—Rostrum acute in lateral aspect; carapace without high carina throughout length of dorsal midline; abdomen without flap articulated at posterolateral angle of 6th somite; telson not terminating posteriorly in triangular tooth; eyes concealed from dorsal view; mandible with molar and incisor process but without palp; 3rd maxilliped not unusually broadened to form partial operculum over other mouthparts; 1st pereopods similar and equal, carried extended with movable finger ventrolateral; 2nd pereopod with fingers much shorter than palm, carpus with 5 articles; pereopods with strap-like epipods on 3 anterior pairs; appendix masculina not overreach-

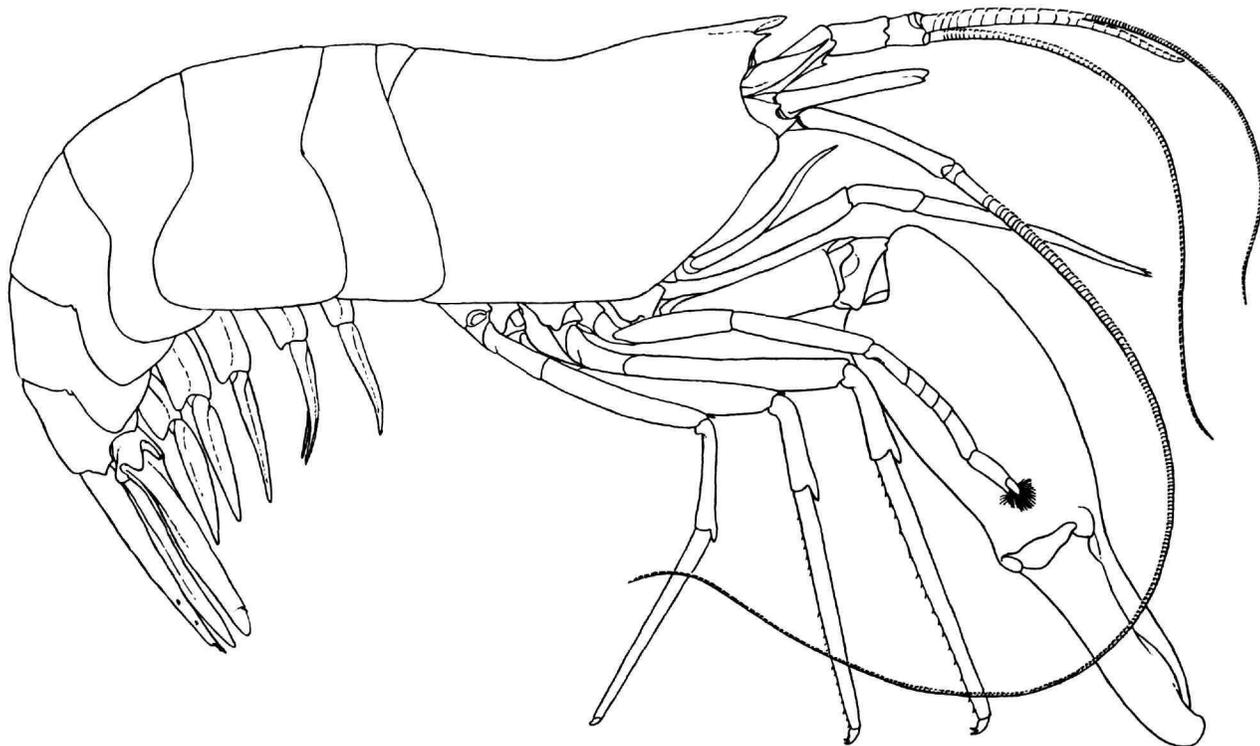


FIGURE 23.—*Vexillipar repandum*, new species, male holotype from *Albatross* sta 5543 (western Mindanao Sea, Philippines), carapace length 12.0 mm.

ing exopod of 2nd pleopod.

RANGE.—Philippines; 296 to 875 meters.

REMARKS.—Although the specimens referred to this genus key out to *Salmoneus* in the generic key by Holthuis (1955), they obviously are not closely related to that genus, as indicated by the absence of a mandibular palp and the virtually unarmed incisor process, the symmetrical 1st pair of pereopods held straight forward, and the biunguiculate dactyls of the 3 posterior pairs of pereopods. *Vexillipar* is almost certainly related to *Batella*, as disclosed by the form of the carapace, the lack of both a mandibular palp and teeth on the incisor process, and the comparable appearance of all 5 pairs of pereopods; it seems to differ fundamentally from that genus, however, by the considerably longer antennal peduncle, the different form of the dorsolateral antennular flagellum, the more conventional aspect of the 3-segmented palp of the 1st maxilliped and of the distal segments of the 2nd maxilliped, by the presence of epipods on the 3 anterior pairs of pereopods, and by the transverse suture on the outer branch of the uropod.

ETYMOLOGY.—From the Latin *vexillum*, ("banner,") and *par*, ("pair,") to honor my good friends and colleagues, Albert H. Banner and his wife Dora May, who so extraordinarily expanded our knowledge of the Indo-Pacific alpheids while

overcoming considerable personal and professional misfortune. The gender is neuter.

***128. *Vexillipar repandum*, new species**

FIGURES 23–25

DIAGNOSIS.—Rostrum acute in dorsal aspect, bluntly carinate in dorsal midline, not nearly reaching to level of distal margin of 1st antennular segment (Figure 24a), carapace usually markedly swaybacked (Figure 23), orbital hoods dentate, not reaching anteriorly to level of tip of rostrum, anteroventral margin produced into convex lobe bearing minute and inconspicuous denticle; abdomen with pleura rounded on 3 anterior somites, subrectangular on 4th and 5th, 6th produced laterally into obtuse angle either side of base of telson; telson (Figure 24c) armed with 2 pairs of inconspicuous spinules on posterior $\frac{1}{3}$ of length; eyes fully exposed in anterior aspect; stylocerite (Figure 24a) reaching nearly to level of anterior margin of 1st antennular segment, latter with subdistal ventral tooth, 2nd segment about $1\frac{1}{2}$ times as long as wide, lateral flagellum with branches fused for 12–15 articles, shorter, free branch shorter than fused portion; antennal peduncle (basicerite) with sharp ventral tooth not nearly reaching level of

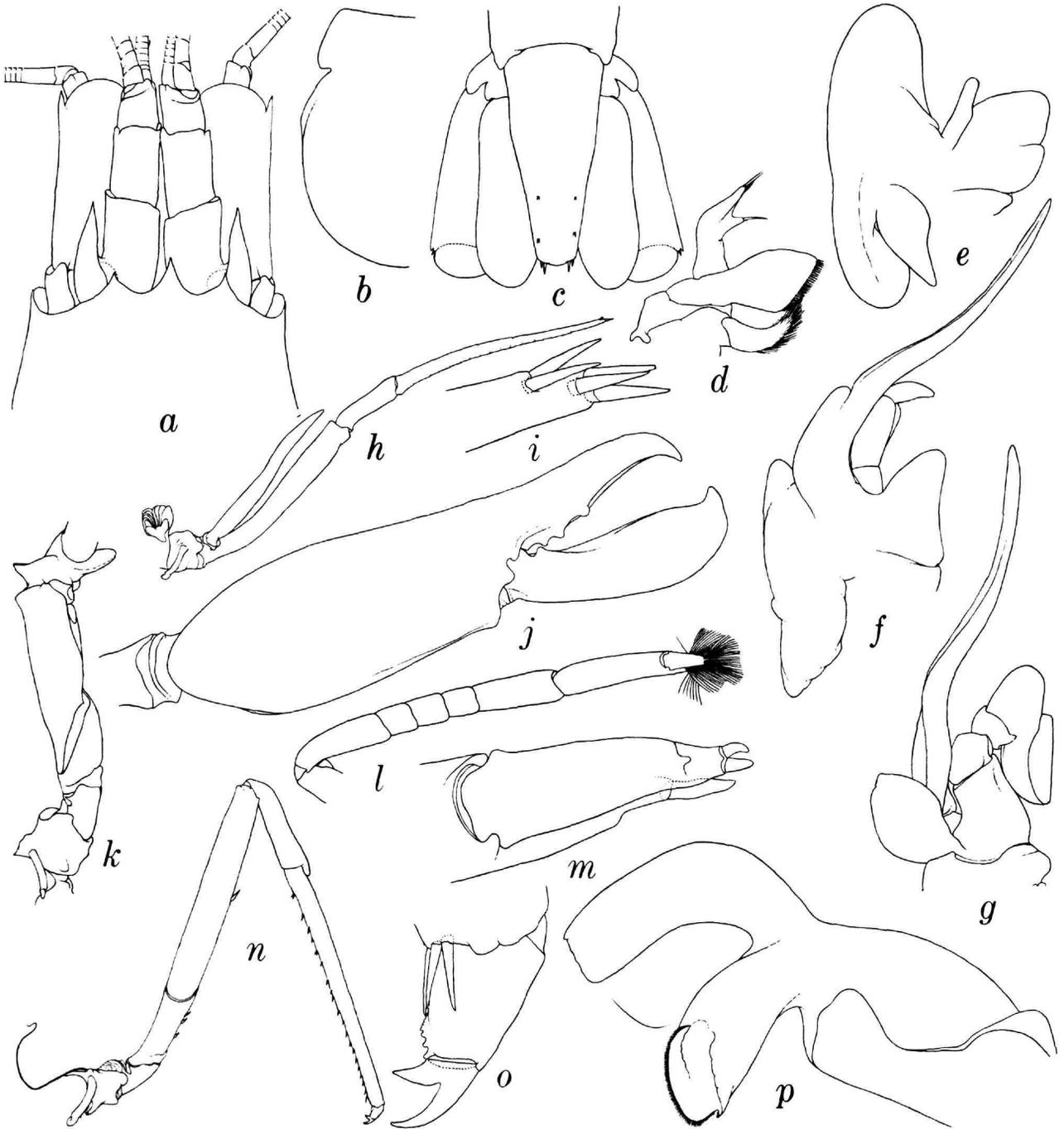


FIGURE 24.—*Vexillipar repandum*, new species, *a*, male holotype from *Albatross* sta 5543, carapace length 12.0 mm; *b–o*, male paratype from same station, carapace length 10.1 mm; *p*, female paratype from same station, carapace length 12.9 mm: *a*, anterior carapace and appendages, dorsal aspect; *b*, posterior margin of carapace; *c*, telson and uropods, dorsal aspect; *d*, right 1st maxilla; *e*, right 2nd maxilla; *f*, right 1st maxilliped; *g*, right 2nd maxilliped; *h*, right 3rd maxilliped; *i*, same, distal end, lateral aspect; *j*, right 1st chela; *k*, right 1st cheliped, proximal segments; *l*, right 2nd pereopod, carpus and chela; *m*, same, denuded fingers; *n*, right 3rd pereopod; *o*, same, dactyl; *p*, right mandible.

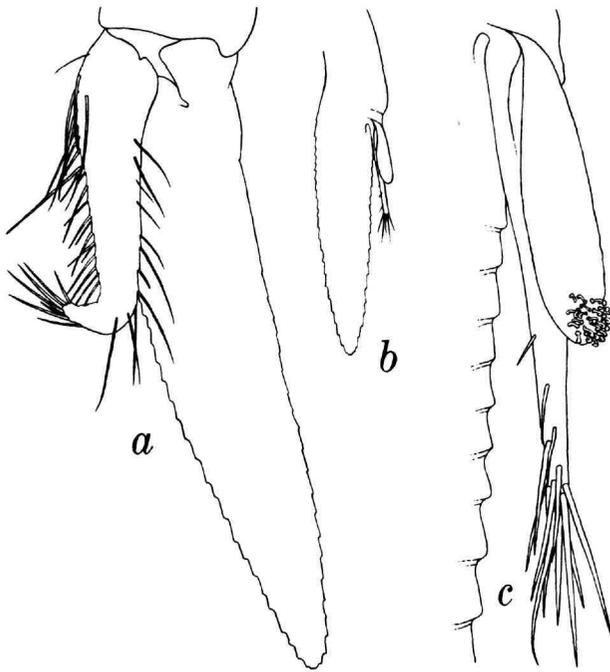


FIGURE 25.—*Vexillipar repandum*, new species, male paratype from *Albatross* sta 5534, carapace length 10.1 mm: a, right 1st pleopod, posterior aspect; b, endopod of right 2nd pleopod, anterior aspect; c, same, appendices interna and masculina.

tip of stylocerite; antennal scale about twice as long as wide, distolateral tooth not reaching level of distal margin of blade; 3rd maxilliped (Figure 24*h,i*) with terminal and subterminal cluster of 5 subequal spines; 1st pereopod with fingers about $\frac{3}{4}$ as long as palm of chela (Figure 24*j*), movable finger with 1 blunt tooth near proximal end, dilated and grooved on distal $\frac{1}{2}$ of opposable margin to fit into corresponding furrows in fixed finger, latter with 3 blunt teeth on proximal $\frac{1}{2}$ of opposable margin, carpus (Figure 24*k*) very short and produced into cristate flanges in 2 directions; merus unarmed; 2nd pereopod (Figure 24*l*) with movable finger (Figure 24*m*) terminating in 2 slightly divergent curved claws concealed in dense tufts of long setae; 3rd pereopod (Figure 24*n*) with dactyl (Figure 24*o*) about $\frac{1}{10}$ as long as propodus, strongly biunguiculate, with series of marginal tubercles extending proximally from base of robust flexor tooth, merus with 1–3 spines on flexor margin; appendix masculina (Figure 25*c*) overreaching appendix interna by fully $\frac{1}{3}$ length of former and armed with 12 or more long spines, most clustered near distal end; uropod (Figure 24*c*) with lateral branch armed with distolateral tooth and movable spine mesially adjacent thereto

and with indistinct transverse articulation; maximum carapace length to base of rostrum 14 mm.

MATERIAL.—PHILIPPINES. Tayabas Bay, southern Luzon: 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 male [10.8]. Eastern Mindanao Sea: sta 5493; 9°04'N, 125°20'E; 875 m; green mud; 11.2°C; 2 Aug 1909 (0703–0748); 12' Agassiz beam trawl: 1 male [8.1]. 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 males [10.8, 10.8] 4 females [10.7–12.0], 2 ovig [10.7, 11.2]. Western Mindanao Sea: sta 5516; 8°46'N, 123°32'30"; 320 m; globigerina; 12.4°C; 9 Aug 1909 (1021–1041); 12' Tanner beam trawl: 1 ovig female [11.5]; sta 5517; 8°45'30"N, 123°33'45"E; 309 m; globigerina; 12.4°C; 9 Aug 1909 (1121–1139); 12' Tanner beam trawl: 1 male [8.0]; sta 5516 or 5517; "From Venus Basket": 4 males [7.7–10.1] 5 ovig females [8.8–12.0]; sta 5519; 8°47'N, 123°31'15"E; 333 m; globigerina, sand; 12.4°C; 9 Aug 1909 (1356–1439); 12' Tanner beam trawl: 5 males [9.5–11.0] 8 females [6.9–14.2], 6 ovig [9.2–14.2]; sta 5543; 8°47'15"N, 123°35'00"E; 296 m; sand 12.5°C; 20 Aug 1909 (0904–0921); 12' Tanner beam trawl: 10 males [7.2–12.0], 1 [12.0] is holotype (USNM 205670), 24 females [7.8–15.2], 18 ovig [8.8–15.2].

TYPE LOCALITY.—Off Murcielagos Bay, Mindanao, Philippines; 8°47'15"N, 123°35'00"E; 296 meters.

RANGE.—The 66 specimens of this unusual shrimp from seven Philippine stations in depths of 296 to 875 meters—all but one from the Mindanao Sea—make it the commonest alpheid in the *Albatross* Philippine collections, as well as, perhaps, the deepest known member of the family. There is a possibility that the label accompanying the nine specimens combined in one lot from stations 5516 and 5517 ("From Venus Basket"), if it is reliable, may offer a clue to the apparent abundance of the species. If it is, indeed, associated with the hyalospongean *Euplectella*, that discovery might have led to an intensified search for the shrimps whenever the sponge was found in abundance, not only at those two stations, but at station 5519, where 13 specimens were present and at station 5543, where 34 specimens were saved. It may be pertinent that specimens of the stenopodidean *Spongicola*, a genus known to inhabit *Euplectella*, was recorded from *Albatross* station 5519 by Saint Laurent and Cleve (1981:153), but direct correlation with the occurrence of *Euplectella* at the stations where *Vexillipar* was taken is impossible because the *Albatross* Philippine specimens of *Euplectella* have not yet been studied.

ETYMOLOGY.—From the Latin *repandus*, -a, -um, ("bent backward" or "turned up") in reference to the typically swaybacked carapace of the species.

Literature Cited

- Alcock, A.
 1901. *A Descriptive Catalogue of the Indian Deep-Sea Crustacea Decapoda Macrura and Anomala, in the Indian Museum, Being a Revised Account of the Deep-Sea Species Collected by the Royal Indian Marine Survey Ship "Investigator."* 286 pages, 3 plates. Calcutta: Indian Museum.
- Alcock, A., and A.R. Anderson
 1894. Natural History Notes from H.M. Indian Marine Survey Steamer "Investigator," Commander C.F. Oldham, R.N., Commanding, 14: An Account of a Recent Collection of Deep Sea Crustacea from the Bay of Bengal and Laccadive Sea. *Journal of the Asiatic Society of Bengal*, series 2, 63:141-185, plate 9.
 1899. Natural History Notes from H.M. Royal Indian Marine Survey Ship "Investigator," Commander T.H. Heming, R.N., Commanding, series 3, number 2: An Account of the Deep-Sea Crustacea Dredged during the Surveying Season of 1897-98. *Annals and Magazine of Natural History*, 3:1-27, 278-292.
- Anonymous
 1910. Dredging and Hydrographic Records of the U.S. Fisheries Steamer *Albatross* during the Philippine Expedition, 1907-1910. *Bureau of Fisheries Document*, 741: 97 pages.
- Armstrong, J.C.
 1940. New Species of Caridea from the Bermudas. *American Museum Novitates*, 1096: 10 pages, 4 figures.
 1941. The Caridea and Stomatopoda of the Second Templeton Crocker-American Museum Expedition to the Pacific Ocean. *American Museum Novitates*, 1137: 14 pages.
 1949. New Caridea from the Dominican Republic. *American Museum Novitates*, 1410: 27 pages, 9 figures.
- Audouin, J.V.
 1826. Explication sommaire des planches de Crustacés de l'Egypte et de la Syrie, publiées par Jules-César Savigny, Membre de l'Institut; offrant un exposé des caractères naturels des genres, avec la distinction des espèces. In J.-C. Savigny, *Description de l'Egypte, Histoire Naturelle*, 1(4):77-98. Paris.
- Balss, H.
 1915. Expeditionen S.M. Schiff "Pola" in das Rote Meer, Nördliche und Südliche Hälfte, 1895/96-1897/98, 30: Die Decapoden des Roten Meeres, I: Die Macruren. *Denkschriften der Mathematisch-Naturwissenschaftlichen Klasse der Kaiserlichen Akademie der Wissenschaften*, 91 (supplement):1-38, 30 figures.
- Banner, A.H.
 1953. The Crangonidae, or Snapping Shrimp, of Hawaii. *Pacific Science*, 7(1):1-144, 147, 50 figures, frontispiece.
 1956. Contributions to the Knowledge of the Alpheid Shrimp of the Pacific Ocean, Part 1: Collections from the Mariana Archipelago. *Pacific Science*, 10:318-373, 23 figures.
 1958. Contributions to the Knowledge of the Alpheid Shrimp of the Pacific Ocean, Part III: On a Small Collection from Onotoa, Gilbert Islands. *Pacific Science*, 12(2):157-169, 4 figures.
 1959. Contributions to the Knowledge of the Alpheid Shrimp of the Pacific Ocean, Part IV: Various Small Collections from the Central Pacific Area, Including Supplementary Notes on Alpheids from Hawaii. *Pacific Science*, 13:130-155, figures 1-13.
- Banner, A.H., and D.M. Banner
 1960a. Contributions to the Knowledge of the Alpheid Shrimp of the Pacific Ocean, Part V: The Indo-Pacific Members of the Genus *Athanas*. *Pacific Science*, 14 (2):129-155, figures 1-6.
 1960b. Contributions to the Knowledge of the Alpheid Shrimp of the Pacific Ocean, Part VI: *Prionalpheus*, a New Genus of the Alpheidae. *Pacific Science*, 14(3):292-298, figures 1, 2.
 1964. Contributions to the Knowledge of the Alpheid Shrimp of the Pacific Ocean, IX: Collections from the Phoenix and Line Islands. *Pacific Science*, 18(1): 83-100, 5 figures.
 1966a. Contributions to the Knowledge of the Alpheid Shrimp of the Pacific Ocean, Part X: Collections from Fiji, Tonga, and Samoa. *Pacific Science*, 20(2):145-188, 20 figures.
 1966b. The Alpheid Shrimp of Thailand: The Alpheid Shrimp of the Gulf of Thailand and Adjacent Waters. *The Siam Society Monograph Series*, 3: vi + 168 pages, 168 figures.
 1967. Contributions to the Knowledge of the Alpheid Shrimp of the Pacific Ocean, XI: Collections from the Cook and Society Islands. *Occasional Papers of Bernice P. Bishop Museum*, 23(12):253-286, 5 figures.
 1968. Three New Species of the Genus *Alpheus* (Decapoda, Alpheidae) from the International Indian Ocean Expedition. *Crustaceana*, 15(2):141-148, 3 figures.
 1971. Contributions to the Knowledge of the Alpheid Shrimp of the Pacific Ocean, Part XIV: A Review of *Prionalpheus* (Decapoda, Alpheidae) with the Description of Two New Species. *Crustaceana*, 20(3):263-270, figures 1, 2.
 1972. The Establishment of a Neotype for *Alpheus edwardsi* (Audouin). *Bulletin du Muséum National d'Histoire Naturelle*, series 3, 88:1141-1146, 1 figure.
 1975. Contributions to the Knowledge of the Alpheid Shrimp of the Pacific Ocean, Part XVII: Additional Notes on the Hawaiian Alpheids: New Species, Subspecies, and Some Nomenclatorial Changes. *Pacific Science*, 28(4):423-437, figures 1-5.
 1977a. *Alpheopsis shearmii* (Alcock & Anderson): A New Combination with a Redescription of the Holotype (Decapoda, Alpheidae). *Crustaceana*, 32(2):207-210, 1 figure.
 1977b. Notes on the Alpheids in White's List of the Specimens of Crustacea in the Collections of the British Museum (1847). *Bulletin of the British Museum (Natural History), Zoology*, 31(6):279-284.
 1981. Decapod Crustacea: Alpheidae. In *Resultats des campagnes MUSORSTOM, I: Philippines (18-28 Mars 1976)*. *Collection Memoires ORSTOM*, 91(1):217-235, figures 1-4.
 1983. An Annotated Checklist of the Alpheid Shrimp from the Western Indian Ocean. *Travaux et Documents de l'ORSTOM*, 158:164 pages, 14 figures.
 1984. Old and Unreported Collections of Alpheid Shrimp from the Zoologisches Museum, Berlin, Principally from Melanesia. *Pacific Science*, 38(1):34-50, 2 figures.
- Banner, D.M., and A.H. Banner
 1972. Contributions to the Knowledge of the Alpheid Shrimp of the Pacific Ocean, XV: The Relationship of *Synalpheus theano* De Man, 1911, and the Establishment of a Neotype for *Synalpheus neptunus* (Decapoda, Alpheidae). *Crustaceana*, 23(1):20-27, figures 1-3.
 1973. The Alpheid Shrimp of Australia, Part I: The Lower Genera. *Records of the Australian Museum*, 28(15): 291-382, 19 figures.
 1975. The Alpheid Shrimp of Australia, Part 2: The Genus *Synalpheus*. *Records of the Australian Museum*, 29(12):267-389, 29 figures.
 1978 [1979]. Annotated Checklist of Alpheid and Ogyridid Shrimp from the Philippine Archipelago and the South China Sea. *Micronesica*,

- 14(2):215-257, 5 figures. [Title pages dated 1978; publication actually released in 1979.]
1981. Annotated Checklist of the Alpheid Shrimp of the Red Sea and Gulf of Aden. *Zoologische Verhandlungen Uügegeben door het Rijksmuseum van Natuurlijke Historie te Leiden*, 190:1-99, 12 figures.
1982. The Alpheid Shrimp of Australia, Part III: The Remaining Alpheids, Principally the Genus *Alpheus*, and the Family Ogyrididae. *Records of the Australian Museum* 34(1):1-357, 95 figures.
1985. The Alpheid Shrimp of Indonesia, Based upon J.G. de Man's "The Decapoda of the Siboga Expedition, Part II: Family Alpheidae." (1911). *Marine Research in Indonesia*, 25: 79 pages, 6 figures.
1987. Two New Species of Alpheid Shrimp from Australian Waters. *The Beagle*, 3(1):21-27, 2 figures.
- Barnard, K.H.
1947. Descriptions of New Species of South African Decapod Crustacea, with Notes on Synonymy and New Records. *Annals and Magazine of Natural History*, 11(13):361-392.
- Bate, C.S.
1876. On the Development of the Crustacean Embryo, and the Variations of Form Exhibited in the Larvae of 38 Genera of Podophthalmia. *Proceedings of the Royal Society of London*, 24:375-379.
1888. Report on the Crustacea Macrura Collected by the *Challenger* during the Years 1873-76. In *Report on the Scientific Results of the Voyage of H.M.S. Challenger during the Years 1873-76*, 24: i-xc, 1-942, figures 1-76, plates 1-157.
- Boone, L.
1931. A Collection of Anomuran and Macruran Crustacea from the Bay of Panama and the Fresh Waters of the Canal Zone. *Bulletin of the American Museum of Natural History*, 63(2):137-189, figures 1-23.
1935. Crustacea: Anomura, Macrura, Euphausiacea, Isopoda, Amphipoda and Echinodermata: Asteroidea and Echinoidea. In *Scientific Results of the World Cruise of the Yacht "Alva," 1931*, William K. Vanderbilt, Commanding. *Bulletin of the Vanderbilt Marine Museum*, 6:1-264, figures 1-13, plates 1-96.
- Borradaile, L.A.
1898. On Some Crustaceans from the South Pacific, Part III: Macrura. *Proceedings of the Zoological Society of London*, 1898:1000-1015, plates 63-65.
1899. On the Stomatopoda and Macrura Brought by Dr. Willey from the South Seas. In *Willey, Zoological Results Based On Material from New Britain, New Guinea, Loyalty Islands, and Elsewhere, Collected during the Years 1895, 1896 and 1897*, 4:395-428, plates 36-39.
- Calman, W.T.
1939. Crustacea: Caridea. In *The John Murray Expedition 1933-34 Scientific Reports*, 6(4):183-224, 8 figures.
- Chace, F.A., Jr.
1955. Notes on Shrimps from the Marshall Islands. *Proceedings of the United States National Museum*, 105(3349):1-22, 8 figures.
1962. The Non-Brachyuran Decapod Crustaceans of Clipperton Island. *Proceedings of the United States National Museum*, 113(3466):605-635, 7 figures.
1972. The Shrimps of the Smithsonian-Bredin Caribbean Expeditions with a Summary of the West Indian Shallow-water Species (Crustacea: Decapoda: Natantia). *Smithsonian Contributions to Zoology*, 98: x + 179 pages, 61 figures.
1983. The Caridean Shrimps (Crustacea: Decapoda) of the Albatross Philippine Expedition, 1907-1910, Part 1: Family Styloactylidae. *Smithsonian Contributions to Zoology*, 381: iii + 21 pages, 8 figures.
- Chace, F.A., Jr., and J. Forest
1970. Henri Coutière: son oeuvre carcinologique, avec un index pour son Mèmoire de 1899 sur les Alpheidae. *Bulletin du Muséum National d'Histoire Naturelle*, series 2, 41(6):1459-1486.
- Coutière, H.
1896. Note sur quelques genres nouveaux ou peu connus d'Alphéidés, formant la sous-famille des Alphéopsidés. *Bulletin du Muséum d'Histoire Naturelle*, 2:380-386.
- 1897a. Note sur quelques alphéidés nouveaux ou peu connus rapportés de Djibouti (Afrique orientale). *Bulletin du Muséum d'Histoire Naturelle*, 3:233-236.
- 1897b. Note sur quelques Alphees nouveaux. *Bulletin du Muséum National d'Histoire Naturelle*, series 1, 3:303-306.
- 1897c. Note sur quelques espèces du genre *Alpheus* du Musée de Leyde. *Notes from the Leyden Museum*, 19:195-207.
- 1898a. Note sur quelques Alphéidés nouveaux de la collection du British Museum. *Bulletin de la Société Entomologique de France*, 1898:149-152, figures 1, 2.
- 1898b. Note sur quelques cas de régénération hypotypique chez *Alpheus* (Crust.). *Bulletin de la Société Entomologique de France*, 1898:248-250.
- 1898c. Note sur quelques formes nouvelles d'Alphéidés voisins de *A. Bouvieri* A.M.-Edwards [Crust.]. *Bulletin de la Société Entomologique de France*, 1898: 131-134, figures 1, 2.
- 1898d. Note sur *Alpheus Talismani* n. sp. et *A. macroskeles* (Alcock et Anderson) (Crust.). *Bulletin de la Société Entomologique de France*, 1898:31-33.
- 1898e. Note sur quelques Alphéidés nouveaux de la collection du British Museum (Crust.). *Bulletin de la Société Entomologique de France*, 1898:166-168.
- 1898f. Note sur *Synalpheus biunguiculatus* Stimpson? de Man [Crust.]. *Bulletin de la Société Entomologique de France*, 1898(11):232, 233, figures 1-4.
1899. Les "Alpheidae," morphologie externe et interne, formes larvaires, bionomie. *Annales des Sciences Naturelles, Zoologie*, series 8, 9:1-560, figures 1-409, plates 1-6. [For index, see Chace and Forest, 1970.]
1902. Sur quelques espèces nouvelles du genre *Automate* De Man. *Bulletin du Muséum d'Histoire Naturelle* (Paris), 8:337-342.
1903. Note sur quelques Alpheidae des Maldives et Laquedives. *Bulletin de la Société Philomathique de Paris*, series 9, 5(2):72-90.
1905. Les Alpheidae. In J. Stanley Gardiner, *The Fauna and Geography of the Maldivé and Laccadive Archipelagoes*, 2(4):852-921, figures 127-139, plates 70-87.
1906. Sur une nouvelle espèce d'*Alpheopsis*, *A. Haugi*, provenant d'un lac d'eau douce du bassin de l'Ogooué (Voyage de M. Haug). *Bulletin du Muséum d'Histoire Naturelle*, 12:376-380, 2 figures.
1908. Sur quelques nouvelles espèces d'Alpheidae. *Bulletin de la Société Philomathique de Paris*, series 9, 10:191-216.
1909. The American Species of Snapping Shrimps of the Genus *Synalpheus*. *Proceedings of the United States National Museum*, 36(1659):1-93, 54 figures.
1921. Les espèces d'Alpheidae rapportées de l'Océan Indien par M. J. Stanley Gardiner. The Percy Sladen Trust Expedition to the Indian Ocean, under the Leadership of Mr. J. Stanley Gardiner, M.A., 6(10). *The Transactions of the Linnean Society of London, Zoology*, series 2, 17(4):413-428, plates 60-64.
- Crosnier, A., and J. Forest
1966. Crustacés Décapodes: Alpheidae. In *Campagne de la Calypso dans le Golfe de Guinée et aux Iles Principe, São Tomé et Annobon (1956), et Campagne aux Iles du Cap Vert (1959), Part 19. Résultats scientifiques des Campagnes de la "Calypso," 7(27). Annales de l'Institut Océanographique, Monaco*, 44:199-314, 33 figures.
- Dana, J.D.
- 1852a. *Conspectus Crustaceorum quae in Orbis Terrarum circumnavigatione, Carolo Wilkes e Classe Reipublicae Foederatae Duce, lexit et descripsit. Proceedings of the Academy of Natural Sciences of Philadelphia*, 1852:10-28.

- 1852b. Crustacea, Part 1. In *United States Exploring Expedition during the Years 1838, 1839, 1840, 1841, 1842, under the Command of Charles Wilkes, U.S.N.* Volume 13, 685 pages. Philadelphia.
1855. Crustacea. In *United States Exploring Expedition during the Years 1838, 1839, 1840, 1841, 1842, under the Command of Charles Wilkes, U.S.N.*, Atlas: 1-27, 96 plates. Philadelphia.
- De Haan, W.
1833-1850. Crustacea. In P.F. von Siebold, *Fauna Japonica sive Descriptio Animalium, quae in Itinere per Japoniam, Jussu et Auspiciis Superiorum, qui Summum in India Batava Imperium Tenent, Suscepto, Annis 1823-1830 Collegi, Notis, Observationibus et Adumbrationibus Illustravit.* i-xxxii, ix-xvi, 1-243, plates A-J, L-Q, 1-55, circ. tab. 2 Lugduni-Batavorum. [Leiden].
- De Man, J.G.
1888a. Bericht über die von Herrn Dr. J. Brock im indischen Archipel gesammelten Decapoden und Stomatopoden. *Archiv für Naturgeschichte*, 53(1):215-600, plates 7-22a.
- 1888b. Report on the Podophthalmous Crustacea of the Mergui Archipelago, Collected for the Trustees of the Indian Museum, Calcutta, by Dr. John Anderson, F.R.S., Superintendent of the Museum. *The Journal of the Linnean Society*, 22:1-312, 19 plates.
1897. Bericht über die von Herrn Schiffscapitän Storm zu Atjeh, an den westlichen Küsten von Malakka, Borneo und Celebes sowie in der Java-See gesammelten Decapoden und Stomatopoden. Fünfter Theil. *Zoologische Jahrbücher, Abteilung für Systematik, Geographie und Biologie der Thiere*, 9:725-790, plates 12-14.
1902. Die von Herrn Professor Kükenthal im Indischen Archipel gesammelten Dekapoden und Stomatopoden. In Kükenthal, Ergebnisse einer zoologischen Forschungsreise in den Molukken und Borneo. *Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft*, 25(3):467-929, plates 19-27.
1908. Diagnoses of New Species of Macrurous Decapod Crustacea from the "Siboga-Expedition." *Notes from the Leyden Museum*, 30:98-112.
- 1909a. Diagnoses of New Species of Macrurous Decapod Crustacea from the "Siboga-Expedition," *Tijdschrift der Nederlandsche Dierkundige Vereeniging*, series 2, 11(2):99-125.
- 1909b. Note sur quelques espèces du genre *Alpheus* Fabr. appartenant au groupe *brevisirostris* de M. *Mémoires de la Société Zoologique de France*, 22:146-164, plates 7, 8.
- 1909c. Description of a New Species of the Genus *Alpheus* Fabr. from the Bay of Batavia. *Proceedings of the Zoological Society of London*, 1909:663-666, plate 70.
1910. Diagnoses of New Species of Macrurous Decapod Crustacea from the "Siboga-Expedition." *Tijdschrift der Nederlandsche Dierkundige Vereeniging*, series 2, 11:287-319.
1911. The Decapoda of the Siboga Expedition, II: Family Alpheidae. *Siboga-Expeditie*, 398a¹:133-465, supplement (1915), plates 1-23.
1920. Diagnoses of Some New Species of Penaeidae and Alpheidae with Remarks on Two Known Species of the Genus *Penaeopsis* A.M.-Edw. from the Indian Archipelago. *Zoologische Mededeelingen Uitgegeven Vanwege's Rijks Museum van Natuurlijke Historie te Leiden*, 5(3):103-109.
- De Saussure, H.
1857. Note carcinologique sur la famille des Thalassides et sur celle des Astacides. *Revue et Magasin de Zoologie Pure et Appliquée*, (2)9:99-102.
- Edmondson, C.H.
1925. Crustacea. In *Marine Zoology of Tropical Central Pacific. Bernice P. Bishop Museum Bulletin*, 27:3-62, figures 1-8.
1930. New Hawaiian Crustacea. *Bernice P. Bishop Occasional Papers*, 9(10): 18 pages, 6 figures, 1 plate.
- Fabricius, J.C.
1775. *Systema Entomologiae, sistens Insectorum Classes, Ordines, Genera, Species, adiectis Synonymis, Locis, Descriptionibus, Observationibus.* 832 pages. Flensburgi et Lipsiae: Officina Libraria Kortii.
1798. *Supplementum Entomologiae systematicae.* 572 pages. Hafniae.
- Forskål, P.
1775. *Descriptiones Animalium, Avium, Amphibiorum, Piscium, Insectorum, Vermium.* 19 + xxxii + 164 pages. Havniae.
- Guérin, F.E.
1829-1838. Crustacées, Arachnides et Insectes. In L.J. Duperrey, *Voyage autour du monde, exécuté par ordre du Roi, sur la corvette de Sa Majesté, La Coquille, pendant les années 1822, 1823, 1824 et 1825.* Zoologie 2 (no. 2, sect. 1): 1-47 (Crustacés), 48-319 (Arachnides et Insectes); plates 1-5 (Crustacés), 1-21 (Insectes). Paris: Arthus Bertrand. [See Holthuis (1961) for dates of publication of plates.]
- Haan, W. de. See De Haan.
- Hallstone, S.
1835. Descriptions of Some Species of Crustaceous Animals; with Illustrations and Remarks by J.O. Westwood. *The Magazine of Natural History and Journal of Zoology, Botany, Mineralogy, Geology, and Meteorology*, 8:261-277, 394, 395, 549-553.
- Haswell, W.A.
1882. Description of Some New Species of Australian Decapoda. *Proceedings of the Linnean Society of New South Wales*, 6(4):750-763.
- Hay, W.P.
1917. Preliminary Descriptions of Five New Species of Crustaceans from the Coast of North Carolina. *Proceedings of the Biological Society of Washington*, 30:71-73.
- Heller, C.
1861. Synopsis der im rothen Meere vorkommenden Crustaceen. *Verhandlungen der k. k. Zoologisch-botanisch Gesellschaft in Wien*, 11:3-32.
- 1862a. Beiträge zur Crustaceen-Fauna des rothen Meeres. Zweiter Theil. *Sitzungsberichte der Akademie der Wissenschaften in Wien*, 44(1):241-295, plates 1-3.
- 1862b. Neue Crustaceen gesammelt während der Weltumseglung der k. k. Fregatte *Novara*: Zweiter vorläufiger Bericht. *Verhandlungen der Kaiserlich-königlichen Zoologisch-botanisch Gesellschaft in Wien*, 12:519-528.
- Hilgendorf, F.
1879. Die von Hrn. W. Peters in Moçambique gesammelten Crustaceen. *Monatsbericht der Königl. Akademie Wissenschaften zu Berlin*, 1878:782-852, plates 1-4.
- Hobbs, H.H., Jr.
1973. Two New Troglitic Shrimps (Decapoda: Alpheidae and Palaemonidae) from Oaxaca, Mexico. *Association for Mexican Cave Studies Bulletin*, 5:73-80, 3 figures.
1983. The African Shrimp Genus *Potamalpheops* in Mexico (Decapoda, Alpheidae). *Crustaceana*, 44(2):221-224, 1 figure.
- Holthuis, L.B.
1951. The Caridean Crustacea of Tropical West Africa. *Atlantide Report*, 2:7-187, figures 1-34.
1955. The Recent Genera of the Caridean and Stenopodidean Shrimps (Class Crustacea: Order Decapoda: Supersection Natantia) with Keys for Their Determination. *Zoologische Verhandlungen Uitgegeven door het Rijksmuseum van Natuurlijke Historie te Leiden*, 26: 157 pages, 105 figures.
1961. On the Dates of Publication of the Crustacean Plates in Duperrey's "Voyage Autour du Monde...sur...La Coquille." *Crustaceana*, 3(2):168, 169.
- Holthuis, L.B., and E. Gottlieb
1958. An Annotated List of the Decapod Crustacea of the Mediterranean Coast of Israel, with an Appendix Listing the Decapoda of the Eastern Mediterranean. *Bulletin of the Research Council of Israel*,

- 7B(1-2):1-126, maps 1, 2, figures 1-15, plates 1-3. [Also issued as *Bulletin Sea Fisheries Research Station* (Haifa), Number 18].
- Holthuis, L.B., and T. Sakai
1970. *Ph. F. Von Siebold and Fauna Japonica—A History of Early Japanese Zoology*. 323 pages, 32 plates. Tokyo.
- International Commission on Zoological Nomenclature (ICZN)
1955. Opinion 334. Validation, under Plenary Powers, of the Generic Names Crangon Fabricius 1798, and Alpheus Fabricius 1789 (Class Crustacea, Order Decapoda). In *Opinions and Declarations Rendered by the International Commission on Zoological Nomenclature*, 10(1):1-44.
- 1961, amended 1964. *International Code of Zoological Nomenclature* [second edition; XV International Congress of Zoology]. xx + 176 pages. London: The International Trust for Zoological Nomenclature.
1963. Opinion 673. *Jousseaumia* Sacco, 1894 (Gastropoda): Emendation under the Plenary Powers to *Jousseauinea*. In *The Bulletin of Zoological Nomenclature*, 20(5):325-328.
- 1985a. *International Code of Zoological Nomenclature* [third edition; XX General Assembly of the International Union of Biological Sciences]. xx + 338 pages. London: International Trust for Zoological Nomenclature, in Association with British Museum (Natural History).
- 1985b. Opinion 1367. *Alpheus lottini* Guérin, 1829 (Crustacea, Decapoda) Conserved. In *The Bulletin of Zoological Nomenclature*, 42(4):361-364.
- Johnson, D.S.
1962. A Synopsis of the Decapoda Caridea and Stenopodidea of Singapore, with Notes on Their Distribution and a Key to the Genera of Caridea Occurring in Malayan Waters. *Bulletin of the National Museum, Singapore*, 30:44-79, plate 2.
- Kensley, B.F.
1969. Decapod Crustacea from the South-west Indian Ocean. *Annals of the South African Museum*, 52(7):149-181, 16 figures.
1972. *Shrimps & Prawns of Southern Africa*. 65 pages, 30 figures. Cape Town: South African Museum.
1981. On the Zoogeography of Southern African Decapod Crustacea, with a Distributional Checklist of the Species. *Smithsonian Contributions to Zoology*, 338: 64 pages, 4 figures.
- Kingsley, J.S.
1878. A Synopsis of the North American Species of the Genus *Alpheus*. *Bulletin of the United States Geological Survey*, 4:189-199.
- Kubo, I.
1936. A Description of a New Alpheoid Shrimp from Japan. *Journal of the Imperial Fisheries Institute*, 31(2): 43-46, plate 13.
1938. A New Snapping Shrimp Belonging to the Genus *Synalpheus*. *Annotationes Zoologicae Japonenses*, 17(1):89-92, figures 1, 2.
1940a. Notes on the Japanese Shrimps of the Genus *Athanas* with a Description of One New Species. *Annotationes Zoologicae Japonenses*, 19(2):99-106, figures 1-5.
1940b. On Some Littoral Shrimps Collected from Micronesia. *Journal of the Imperial Fisheries Institute*, 34(1): 77-99, figures 1-15.
1951. Some Macrurus Decapod Crustacea Found In Japanese Waters, with Descriptions of Four New Species. *Journal of the Tokyo University of Fisheries*, 38(2):259-289, 16 figures.
- Lanchester, W.F.
1901. On the Crustacea Collected during the "Skeat" Expedition to the Malay Peninsula, Together with a Note on the Genus *Actaeopsis*. *Proceedings of the Zoological Society of London*, 1901:534-574, plates 33, 34.
- Latreille, P.A.
1810. *Considérations générales sur l'ordre naturel des animaux composant les classes des Crustacés, des Arachnides, et des Insectes, avec un tableau méthodique de leurs genres, disposés en familles*. 444 pages. Paris.
- Leach, W.E.
1813-1814. Crustaceology. In Brewster, *The Edinburgh Encyclopaedia*, 7(2):383-437, plate 221.
- Lockington, W.N.
1877. Remarks on the Crustacea of the Pacific Coast, with Descriptions of Some New Species. *Proceedings of the California Academy of Sciences*, 7(1):28-36.
- Man, J.G. de. See De Man
- Miers, E.J.
1875. On Some New or Undescribed Species of Crustacea from the Samoa Islands. *Annals and Magazine of Natural History*, series 4, 16:341-344.
1881. On a Collection of Crustacea Made by Baron Hermann-Maltzan at Goree Island, Senegambia. *Annals and Magazine of Natural History*, series 5, 8:204-220, 259-281, 364-377, plates 13-16.
1884. Crustacea. In *Report of the Zoological Collections Made in the Indo-Pacific Ocean during the Voyage of H.M.S. "Alert" 1881-2*, pages 178-322, 513-575, plates 18-34.
- Milne-Edwards, A.
1873. Description de quelques Crustacés nouveaux ou peu connus provenant du Musée de M. C. Godeffroy. *Journal des Muséum Godeffroy*, 1(4):77-88, plates 1, 2. [Pages 1-12, plates 12, 13 on separate.]
- Milne Edwards, H.
1837. *Histoire naturelle des Crustacés, Comprenant l'Anatomie, la Physiologie et la Classification de ces Animaux*, 2: 532 pages, atlas, plates 1-14, 14 bis, 15-25, 25bis, 26-42. Paris: Librairie encyclopédique de Roret.
- Miya, Y.
1972. The Alpheidae (Crustacea, Decapoda) of Japan and Its Adjacent Waters, Part I. *Publications from the Amakusa Marine Biological Laboratory, Kyushu University*, 3(1):23-101, plates 1-14.
1974. The Alpheidae (Crustacea, Decapoda) of Japan and Its Adjacent Waters, Part II. *Publications from the Amakusa Marine Biological Laboratory, Kyushu University*, 3(2):103-195, plates 15-31.
1984. *Batella bifurcata* Miya & Miyake, 1968, a Junior Synonym of *B. parvimanus* (Bate, 1888) (Decapoda, Alpheidae). *Crustaceana*, 47(2):217-219, figure 1.
- Miya, Y., and S. Miyake
1968a. Revision of the Genus *Athanas* of Japan and the Ryukyu Islands, with Description of a New Species (Crustacea, Decapoda, Alpheidae). *Publications from the Amakusa Marine Biological Laboratory, Kyushu University*, 1(2):129-162, figures 1-13.
1968b. Redefinition of the Genus *Batella* (Crustacea, Decapoda, Alpheidae), with Description of a New Species from Kyushu, Japan. *Ohmu*, 1(5):113-120, 4 figures.
1969. Description of *Alpheus bellulus* sp. nov. Associated with Gobies from Japan (Crustacea, Decapoda, Alpheidae). *Publications of the Seto Marine Biological Laboratory*, 16(5):307-314, 2 figures.
- Nardo, G.D.
1847. *Sinonimia moderna delle specie registrate nell' opera intitolata: Descrizione de Crostacei, de Testacei e de Pesci che abitano le lagune e golfo veneto rappresentatizdall' Abate Stefano Chierighini*. 127 pages.
- Nobili, G.
1901. Decapodi e Stomatopodi Eritrei del Museo Zoologico dell'Università di Napoli. *Annuario del Museo Zoologico della R. Università di Napoli*, (N.S.), 1(3):1-20.
1905. Quatre Décapodes nouveaux du golfe Persique (récoltes de MM. J. Bonnier et Ch. Pérez). *Bulletin du Muséum d'Histoire Naturelle*, 11:238, 239.
1906. Diagnoses préliminaires de Crustacés, Décapodes et Isopodes

- nouveaux recueillis par M. le Dr G. Seurat aux îles Touamotou. *Bulletin du Muséum d'Histoire Naturelle*, Paris, 12:256-270.
- Olivì, G.
1792. *Zoologia Adriatica ossia Catalogo ragionato degli Animali del Golfo e delle Lagune di Venezia; preceduto da una Dissertazione sulla Storia fisica e naturale del Golfo; e accompagnato da Memorie, ed Osservazioni di Fisica Storia naturale ed Economia.* xxxii + 334 pages, plates 1-9.
- Olivier, A.C.
1811. *Palaemon: Palaemon.* In Olivier, *Encyclopedie methodique: Histoire naturelle: Insectes.* 8:662-667.
- Ortmann, A.
1890. Die Unterordnung Natantia Boas: Die Decapoden-Krebse des Strassburger Museums, mit besonderer Berücksichtigung der von Herrn Dr. Döderlein bei Japan und bei dem Liu-Kiu-Inseln gesammelten und z. im Strassburger Museum aufbewahrten Formen, I. *Zoologische Jahrbucher Abteilung für Systematik, Geographie und Biologie der Thiere*, 5:437-542, plates 36, 37.
1894. Crustaceen. In R. Semon, *Zoologische Forschungsreisen in Australien und dem malayischen Archipel. V. Denkschriften Medizinisch-Naturwissenschaftliche Gesellschaft zu Jena*, 8:3-80, plates 1-3.
- Paulson, O.
1875. *Podophthalmata i Edriophthalmata (Cumacea). Izsledovaniya Rakoobraznykh Krasnago Morya s Zametkami Otnositel'no Rakoobraznykh Drugikh Morie.* xiv + 144 pages, 21 plates. Kiev. [English translation: Podophthalmata and Edriophthalmata (Cumacea). Part I in *Studies on Crustacea of the Red Sea with Notes Regarding Other Seas.* 134 pages, 21 plates. Jerusalem: Israel Program for Scientific Translations, 1961. Published for the National Science Foundation and Smithsonian Institution, Washington, D.C.]
- Pictet, F.-J., and A. Humbert
1866. *Nouvelles recherches sur les poissons fossiles du Mont Liban.* vii + 114 pages, 19 plates. Geneva and Paris: Rambos et Schuchardt.
- Pocock, R.L.
1890. Crustacea. In Ridley, *Notes on the Zoology of Fernando Noronha.* *Journal of the Linnean Society, Zoology*, 20:506-526.
- Potts, F.A.
1915. The Fauna Associated with the Crinoids of a Tropical Coral Reef: with Especial Reference to Its Colour Variations. *Papers from the Department of Marine Biology of the Carnegie Institution of Washington*, 8(3):71-96, 7 figures, 1 plate.
- Powell, C.B.
1979. Three Alpheid Shrimps of a New Genus from West African Fresh and Brackish Waters: Taxonomy and Ecological Zonation (Crustacea Decapoda Natantia). *Revue de Zoologie Africaine*, 93(1):116-150, 8 figures.
- Rafinesque, C.S.
1814. *Précis des découvertes et travaux somiologiques de Mr. C.S. Rafinesque-Schmaltz, entre 1800 et 1814, ou choix raisonné de ses principales découvertes en zoologie et en botanique, pour servir d'introduction à ses ouvrages futurs.* 55 pages. Palermo.
1815. *Analyse de la Nature ou Tableau de l'Univers et des Corps organises.* 224 pages. Palermo.
- Ramadan, M.M.
1936. Report on a Collection of Stomatopoda and Decapoda from Ghardaga, Red Sea. *Bulletin of the Faculty of Science, The Egyptian University*, 6:1-43, plates 1, 2.
- Randall, J.W.
1840. Catalogue of the Crustacea Brought by Thomas Nuttall and J.K. Townsend, from the West Coast of North America and the Sandwich Islands, with Descriptions of Such Species as Are Apparently New, Among which Are Included Several Species of Different Localities, Previously Existing in the Collection of the Academy. *Journal of the Academy of Natural Sciences of Philadelphia*, 8:106-147, plates 3-7.
- Rathbun, M.J.
1901. The Brachyura and Macrura of Porto Rico. *United States Fish Commission Bulletin for 1900* [1902], 20:1-127, 129-137 [index], 24 figures, 1 plate, frontispiece. [Preprint.]
- Richters, F.
1880. Decapoda. In K. Mobius, *Beiträge zur Meeresfauna der Insel Mauritius und der Seychelles.* Pages 139-178, plates 15-18.
- Risso, A.
1816. *Histoire naturelle des Crustacés des Environs de Nice*, 175 pages, plates 1-3. Paris: Librairie Grecoque-Latine-Allemande.
- Roux, P.
1831. *Mémoire sur la classification des Crustacés de la tribu des Salicoques.* 39 pages, 1 table. Marseille.
- Saint Laurent, M. de, and R. Cleva
1981. Résultats des campagnes MUSORSTOM, I: Philippines (18-28 Mars 1976), tome 1, part 7: Crustacés Décapodes: Stenopodidea. *Collection Memoires ORSTOM*, 91:151-188, figures 1-17.
- Saussure, H. de. See De Saussure.
- Savigny, J.-C.
1817. Crustacés. In *Description de l'Égypte, ou recueil des observations et des recherches qui ont été faites en Égypte pendant l'Expédition de l'Armée Française, publié par les ordres de Sa Majesté l'Empereur Napoléon le Grand: Histoire naturelle, Crustacés.* 13 plates.
- Say, T.
1817-1818. An Account of the Crustaceans of the United States. *Journal of the Academy of Natural Sciences of Philadelphia*, 1:57-80 [includes plate 4], 97-101, 155-169 (1817); 235-253, 313-319, 374-401, 423-441, 445-458 (1818). [Facsimile reproduction, Lehre, Germany: Verlag von J. Cramer, 1969.]
- Schmitt, W.L.
1921. The Marine Decapod Crustacea of California with Special Reference to the Decapod Crustacea Collected by the United States Bureau of Fisheries Steamer "Albatross" in Connection with the Biological Survey of San Francisco Bay during the Years 1912-1913. *University of California Publications in Zoology*, 23: 470 pages, 165 figures, 50 plates.
1936. Macruran and Anomuran Crustacea from Bonaire, Curaçao and Aruba. Number 16 in *Zoologische Ergebnisse einer Reise nach Bonaire, Curaçao und Aruba im Jahre 1930. Zoologische Jahrbücher, Abteilung für Systematik, Ökologie und Geographie der Tiere*, 67:363-378, plates 11-13.
1939. Decapod and Other Crustacea Collected on the Presidential Cruise of 1938 (with Introduction and Station Data). *Smithsonian Miscellaneous Collections*, 98(6): 29 pages, 2 figures, 3 plates.
- Shelford, R.
1909. Crustacea. *Zoological Record*, 45(10):2598-2632.
- Sollaud, E.
1932. Sur un alpheidé d'eau douce, *Alpheopsis Monodi* n. sp., recueilli par M. Th. Monod au Cameroun. *Bulletin de la Société Zoologique de France*, 57:375-386, 2 figures.
- Stebbing, T.R.R.
1915. South African Crustacea (Part VIII. of S.A. Crustacea, for the Marine Investigations in South Africa). *Annals of the South African Museum*, 15(2):57-104, plates 13-25. [Plates 77-89 of Crustacea.]
- Stimpson, W.
1860. Crustacea Macrura. Pars VIII of Prodrromus descriptionis animalium evertibratorum, quae in Expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missa, Cadwaladaro Ringgold et Johanne Rodgers Ducibus, observavit et descripsit. *Proceedings of the Academy of Natural Sciences of Philadelphia* (1860):22-47.
- Suzuki, H.
1970. Taxonomic Review of Four Alpheid Shrimps Belonging to the

- Genus *Athanas* with Reference to Their Sexual Phenomena. *Science Reports of the Yokohama National University*, section 2, 17:1-38, figures 1-21, plates 1-4.
1971. On Some Commensal Shrimps Found in the Western Region of Sagami Bay. *Researches on Crustacea, Carcinological Society of Japan*, 4(5):1-31, figures 1-12, plates 1-3.
- Tiwari, K.K.
1963. Alpheid Shrimps (Crustacea: Decapoda: Alpheidae) of Vietnam. *Annales de la Faculté des Sciences de Saigon*, 1963:269-362, 32 figures.
- Weber, F.
1795. *Nomenclator entomologicus secundum Entomologiam systematicum ill. Fabricii adjectis speciebus recens detectis et varietatibus*. viii + 171 pages. Chilonii et Hamburgi.
- White, A.
1847. *List of the Specimens of Crustacea in the Collection of the British Museum*. viii + 141 pages. London: British Museum.
- Wicksten, M.K.
1983. Shallow Water Caridean Shrimps of the Gulf of California, Mexico. *Allan Hancock Foundation Monograph*, 13: 59 pages, 8 figures.
1984a. New Records of Snapping Shrimps (Family Alpheidae) from California. *Proceedings of the Biological Society of Washington*, 97(1):186-190.
- 1984b. *Alpheopsis harperi* (Decapoda: Alpheidae): A New Species of Snapping Shrimp from Texas. *Northeast Gulf Science*, 7(1):97-100, 1 figure.
- Yaldwyn, J.C.
1971. Preliminary Descriptions of a New Genus and Twelve New Species of Natant Decapod Crustacea from New Zealand. *Records of the Dominion Museum*, 7(10):85-94.
- Yokoya, Y.
1936. Some Rare and New Species of Decapod Crustaceans Found in the Vicinity of the Misaki Marine Biological Station. *Japanese Journal of Zoology*, 7(1):129-146, 10 figures.
- Yu, S.-C.
1931. Description de deux nouvelles crevettes de Chine. *Bulletin du Muséum National d'Histoire Naturelle*, series 2, 3(6):513-516.
- Zehntner, L.
1894. Crustacés de l'Archipel Malais; Voyage de MM. M. Bedot et C. Pictet dans l'Archipel Malais. *Revue Suisse de Zoologie et Annales du Musée d'Histoire Naturelle de Genève*, 2:135-214, plates 7-9.

REQUIREMENTS FOR SMITHSONIAN SERIES PUBLICATION

Manuscripts intended for series publication receive substantive review (conducted by their originating Smithsonian museums or offices) and are submitted to the Smithsonian Institution Press with Form SI-36, which must show the approval of the appropriate authority designated by the sponsoring organizational unit. Requests for special treatment—use of color, foldouts, case-bound covers, etc.—require, on the same form, the added approval of the sponsoring authority.

Review of manuscripts and art by the Press for requirements of series format and style, completeness and clarity of copy, and arrangement of all material, as outlined below, will govern, within the judgment of the Press, acceptance or rejection of manuscripts and art.

Copy must be prepared on typewriter or word processor, double-spaced, on one side of standard white bond paper (not erasable), with 1¼" margins, submitted as ribbon copy (not carbon or xerox), in loose sheets (not stapled or bound), and accompanied by original art. Minimum acceptable length is 30 pages.

Front matter (preceding the text) should include: **title page** with only title and author and no other information, **abstract page** with author, title, series, etc., following the established format; table of **contents** with indents reflecting the hierarchy of heads in the paper; also, **foreword** and/or **preface**, if appropriate.

First page of text should carry the title and author at the top of the page; **second page** should have only the author's name and professional mailing address, to be used as an unnumbered footnote on the first page of printed text.

Center heads of whatever level should be typed with initial caps of major words, with extra space above and below the head, but no other preparation (such as all caps or underline, except for the underline necessary for generic and specific epithets). Run-in paragraph heads should use period/dashes or colons as necessary.

Tabulations within text (lists of data, often in parallel columns) can be typed on the text page where they occur, but they should not contain rules or numbered table captions.

Formal tables (numbered, with captions, boxheads, stubs, rules) should be submitted as carefully typed, double-spaced copy separate from the text; they will be typeset unless otherwise requested. If camera-copy use is anticipated, do not draw rules on manuscript copy.

Taxonomic keys in natural history papers should use the aligned-couplet form for zoology and may use the multi-level indent form for botany. If cross referencing is required between key and text, do not include page references within the key, but number the keyed-out taxa, using the same numbers with their corresponding heads in the text.

Synonymy in zoology must use the short form (taxon, author, year:page), with full reference at the end of the paper under "Literature Cited." For botany, the long form (taxon, author, abbreviated journal or book title, volume, page, year, with no reference in "Literature Cited") is optional.

Text-reference system (author, year:page used within the text, with full citation in "Literature Cited" at the end of the text) must be used in place of bibliographic footnotes in all Contributions Series and is strongly recommended in the Studies Series: "(Jones. 1910:122)" or "... Jones (1910:122)." If bibliographic

footnotes are required, use the short form (author, brief title, page) with the full citation in the bibliography.

Footnotes, when few in number, whether annotative or bibliographic, should be typed on separate sheets and inserted immediately after the text pages on which the references occur. Extensive notes must be gathered together and placed at the end of the text in a notes section.

Bibliography, depending upon use, is termed "Literature Cited," "References," or "Bibliography." Spell out titles of books, articles, journals, and monographic series. For book and article titles use sentence-style capitalization according to the rules of the language employed (exception: capitalize all major words in English). For journal and series titles, capitalize the initial word and all subsequent words except articles, conjunctions, and prepositions. Transliterate languages that use a non-Roman alphabet according to the Library of Congress system. Underline (for italics) titles of journals and series and titles of books that are not part of a series. Use the parentheses/colon system for volume (number): pagination: "10(2):5-9." For alignment and arrangement of elements, follow the format of recent publications in the series for which the manuscript is intended. Guidelines for preparing bibliography may be secured from Series Section, SI Press.

Legends for illustrations must be submitted at the end of the manuscript, with as many legends typed, double-spaced, to a page as convenient.

Illustrations must be submitted as original art (not copies) accompanying, but separate from, the manuscript. Guidelines for preparing art may be secured from Series Section, SI Press. All types of illustrations (photographs, line drawings, maps, etc.) may be intermixed throughout the printed text. They should be termed **Figures** and should be numbered consecutively as they will appear in the monograph. If several illustrations are treated as components of a single composite figure, they should be designated by lowercase italic letters on the illustration; also, in the legend and in text references the italic letters (underlined in copy) should be used: "Figure 9b." Illustrations that are intended to follow the printed text may be termed **Plates**, and any components should be similarly lettered and referenced: "Plate 9b." Keys to any symbols within an illustration should appear on the art rather than in the legend.

Some points of style: Do not use periods after such abbreviations as "mm, ft, USNM, NNE." Spell out numbers "one" through "nine" in expository text, but use digits in all other cases if possible. Use of the metric system of measurement is preferable; where use of the English system is unavoidable, supply metric equivalents in parentheses. Use the decimal system for precise measurements and relationships, common fractions for approximations. Use day/month/year sequence for dates: "9 April 1976." For months in tabular listings or data sections, use three-letter abbreviations with no periods: "Jan, Mar, Jun." etc. Omit space between initials of a personal name: "J.B. Jones."

Arrange and paginate sequentially every sheet of manuscript in the following order: (1) title page, (2) abstract, (3) contents, (4) foreword and/or preface, (5) text, (6) appendixes, (7) notes section, (8) glossary, (9) bibliography, (10) legends, (11) tables. Index copy may be submitted at page proof stage, but plans for an index should be indicated when manuscript is submitted.

