

- Usually only 1 tooth of dorsal rostral series situated on carapace posterior to orbit; carapace usually without pterygostomian tooth . . . . .
- . . . . . *L. rathbunae* (Chace, 1970:59, figs. 1-4)  
(Western Atlantic from eastern Florida to Yucatan; 13-119 meters)
14. Antennular peduncle with stylocerite reaching nearly to or beyond distal end of basal segment . . . . . 15  
Antennular peduncle with stylocerite not nearly reaching distal end of basal segment . . . . . 19
15. Antennal scale 3 times as long as wide. Second pereopod with 13-28 carpal articles . . . . . 16  
Antennal scale 3<sup>1</sup>/<sub>2</sub> to 4<sup>1</sup>/<sub>2</sub> times as long as wide. Second pereopod with 32-40 carpal articles . . . . . 18
16. Only posteriormost tooth of dorsal rostral series situated on carapace posterior to orbital margin. Second pereopod with 13-15 carpal articles . . . . .  
. . . . . *L. anchisteus* (Chace, 1972:125, figs. 53, 54)  
(West Indies; littoral)
- Two teeth of dorsal rostral series situated on carapace posterior to orbital margin. Second pereopod with 19-28 carpal articles . . . . . 17
17. Dorsal antennular flagellum without trace of accessory branch . . . . . 78. *L. kuekenthali*  
Dorsal antennular flagellum with accessory branch consisting of single segment . . . . . *L. unicornis* (Holthuis and Maurin, 1952:198, figs. 1, 2)  
(Morocco; 4-5 meters)
18. Carapace without pterygostomian tooth . . . . . *L. morelandi* (Yaldwyn, 1971:90)  
(New Zealand; littoral and sublittoral rocky bottoms)  
Carapace with pterygostomian tooth . . . . . *L. olavoii* (Fransen, 1991:63, figs. 1-34)  
(Azores and Salvage Islands; 135-360 meters)
19. Rostrum with only 1 ventral tooth. Antennal scale 6 times as long as wide . . . . . *L. stenolepis* (Crosnier and Forest, 1973:177, figs. 55, 56a-e)  
(Cape Verde Islands; 275-150 meters)
- Rostrum with 2-6 ventral teeth. Antennal scale 3-4 times as long as wide . . 20
20. Rostrum as long as carapace, overreaching antennular peduncle. Third pereopod with dactyl simple, not biunguiculate . . . . . *L. kempii*, new name  
(Burma; 37 meters)
- Rostrum no more than <sup>2</sup>/<sub>3</sub> as long as carapace, not overreaching antennular peduncle. Third pereopod with dactyl biunguiculate . . . . . 21
21. Second pereopod with merus subdivided by single articulation near proximal end, ischium with single articulation near distal end. Color scarlet with four white spots on each side of carapace, white antennular and antennal flagella, and white ambulatory pereopods . . . . . 77. *L. debelius*  
Second pereopod segmentation and color not as indicated above . . . . . 22
22. Orbital angle fused with antennal tooth, not visible in dorsolateral view as distinct tooth in nearly horizontal plane. First pereopod with chela more than 1<sup>1</sup>/<sub>2</sub> times as long as carpus . . . . . 23  
Orbital angle visible in dorsolateral view as distinct tooth in nearly horizontal plane. First pereopod with chela little longer than carpus . . . . . 24
23. Carapace with pterygostomian tooth. Antennal scale slightly more than 3 times as long as wide. Second pereopod with 28-32 carpal articles . . . . .  
. . . . . *L. californica* (Stimpson, 1866:48)  
(Southern California, Baja California; tidepools to 61 meters)

Carapace without pterygostomian tooth. Antennal scale 4 times as long as wide.

Second pereopod with 21 or 22 carpal articles . . . . .  
 . . . . . *L. porteri* (Rathbun, 1907:49, pl. 3: fig. 4)  
 (Chile)

24. Antennal scale slightly more than 3 times as long as wide, extending forward about as far as end of antennular peduncle. Second pereopod with 22–26 carpal articles . . . . . \*79. *L. philippinensis*, new species  
 Antennal scale 4 times as long as wide, overreaching antennular peduncle. Second pereopod with 30–33 carpal articles . . . . . *L. wurdemanni* (Gibbes, 1850:197)  
 (Western Atlantic from Virginia to Estado de São Paulo, Brazil; sublittoral to 30 meters)

#### 76. *Lysmata amboinensis* (De Man, 1888)

*Hippolysmata vittata* var. *amboinensis* De Man, 1888:495 [type locality: Ambon, Indonesia].

*Hippolysmata* (*Hippolysmata*) *amboinensis*.—Holthuis, 1947:70, figs. 12–14.

*Lysmata grabhami*.—Bruce, 1974:107, pl. 1 [not *Hippolysmata grabhami* Gordon, 1935].

*Lysmata amboinensis*.—Hayashi, 1975b:286, figs. 1–4, pl. 5 [part].—Debelius, 1984:112 [fig.].—Manning and Chace, 1990:112.

DIAGNOSIS.—Rostrum not overreaching antennular peduncle; rostral formula 1–2 + 4–5/3–4. Carapace with pterygostomian tooth. Antennule with stylocerite very short, not nearly reaching midlength of basal segment, dorsal flagellum without accessory branch. Antennal scale reaching as far as or slightly beyond end of antennular peduncle,  $4\frac{1}{2}$  to  $5\frac{1}{3}$  times as long as wide, distolateral tooth barely to distinctly overreaching blade. Third maxilliped with exopod not overreaching midlength of antepenultimate segment. First pereopod with chela slightly longer than carpus. Second pereopod with carpus composed of 19–21 articles. Third pereopod with dactyl biunguiculate. In life, median white stripe abruptly broadened into transverse band near posterior margin of 6th abdominal somite, interrupted on anterior  $\frac{1}{3}$  of telson. Maximum postorbital carapace length more than 13 mm.

RANGE.—Red Sea, Mombasa, Gulf of Tonkin, Okinawa, Japan, Philippines, and Indonesia to Hawaii and Society Islands.

REMARKS.—Minor but apparently constant differences in color pattern between Indo-Pacific and Atlantic examples of what Hayashi (1975b) and others believed to be a nearly pantropical species suggest the desirability of retaining the name *L. grabhami* (Gordon, 1935) for the Atlantic form for the time being (see Manning and Chace, 1990:23). The differences in color are clearly depicted in the delightful book by Debelius (1984:112).

In an attempt to find morphological characters to support the apparent differences in color pattern, I discovered that the suborbital angle is quite distinct in Smithsonian material of *L. grabhami*, suggesting a possible variance from the probably immature holotype of *L. amboinensis*, as illustrated by Holthuis (1947, fig. 13). As the Indo-Pacific form is not yet represented in our collections, I sought advice in the matter from Holthuis. In response, Charles Fransen, with his usual kind cooperation,

prepared excellent drawings of the anterior regions in dorsal aspect of two topotypic specimens of *L. amboinensis* that he had collected at Ambon, with postorbital carapace lengths of 9.6 and 6.6 mm. The orbital angle in the larger specimen is identical with that in Atlantic specimens of similar size. It is much less prominent but still present in the smaller specimen, which is subequal in size to the holotype of *L. amboinensis*. It is apparent, therefore, that there is no significant difference in this regard between *L. amboinensis* and *L. grabhami*, and that this character should be used with caution in identifying immature specimens of *Lysmata*.

#### 77. *Lysmata debelius* Bruce, 1983

*Lysmata debelius* Bruce, 1983a:115, figs. 1–9 [type locality: Polillo Island, east of Luzon, Philippines; 28 meters].

DIAGNOSIS.—Rostrum not overreaching antennular peduncle, rostral formula 1 + 4/2. Carapace with antennal tooth discrete from orbital angle, without pterygostomian tooth. Antennule with stylocerite reaching beyond midlength of basal segment but not to distal end of that segment, dorsal flagellum without accessory branch. Antennal scale 4 times as long as wide, distolateral tooth barely overreaching subtruncate distal margin of blade. Third maxilliped with exopod reaching beyond midlength of antepenultimate segment. First pereopod with chela twice as long as carpus. Second pereopod with carpus composed of 16 articles. Third pereopod with dactyl biunguiculate. In life, deep scarlet, except for brilliant white distal part of merus, propodus, and dactyl of ambulatory pereopods, large, circular spot on epistome, submedian and dorsal carapace, anterior, central, and posterior branchiostegite, and small central spot between 4 large spots on lateral surface of carapace. Maximum postorbital carapace length mm.

RANGE.—Sri Lanka; Ryukyus; Polillo Island, Philippines; and Bali, Indonesia; 10–28 meters.

#### 78. *Lysmata kuekenthali* (De Man, 1902)

*Merhippolyte orientalis*?—De Man, 1902:849, pl. 26: fig. 56 [not *M. orientalis* Bate, 1888].

*Hippolyte kuekenthali* De Man, 1902:850 [type locality: Ternate, Indonesia].

*Hippolysmata kuekenthali*.—Kemp, 1914:115, pl. 6: fig. 11.

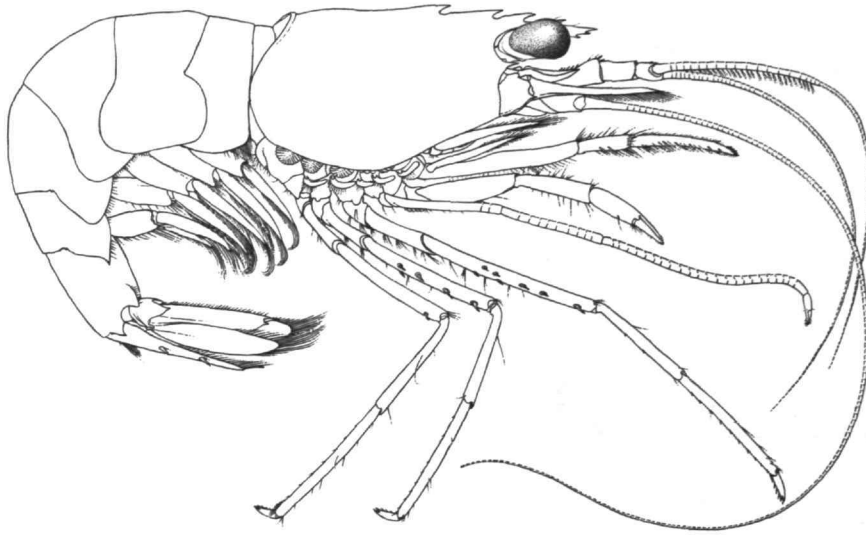


FIGURE 19.—*Lysmata philippinensis*, new species, male holotype from Albay Gulf, carapace length 5.1 mm.

*Hippolysmata marleyi* Stebbing, 1919:120 [type locality: Sezela, Natal, South Africa].

*Hippolysmata* (*Hippolysmata*) *kukenthali*.—Holthuis, 1947:69.

**DIAGNOSIS.**—Rostrum not overreaching antennular peduncle, rostral formula  $2 + 2-5/1-3$ . Carapace with antennal tooth not fused with orbital angle, without pterygostomial tooth. Antennule with stylocerite slightly overreaching or falling short of distal margin of basal segment of peduncle, dorsal flagellum without accessory branch. Antennal scale barely overreaching antennular peduncle, about 3 times as long as wide, distolateral tooth reaching about to distal margin of blade. First pereopod with chela  $1\frac{1}{2}$  times as long as carpus. Second pereopod with carpus composed of 19–21 articles. Third pereopod with dactyl biunguiculate. Maximum postorbital carapace length about 10 mm.

**RANGE.**—South Africa, Seychelles, Sri Lanka, Japan, and Indonesia; littoral and sublittoral.

**REMARKS.**—Through the cooperation of William J. Cooke in Kailua, Hawaii, I have been able to compare material of the species referred to *Hippolysmata kukenthali* by Edmondson (1946:252) with six syntypes of De Man's species received through the kind offices of L.B. Holthuis. The Hawaiian species is quite distinct from *L. kuekenthali*, especially in the number of carpal articles of the second pereopod and of lateral spines on the merus of the third pereopod. As suspected by Mr. Cooke, that form seems to be indistinguishable from *L. anchisteus* Chace, 1972, from the tropical western Atlantic.

**\*79. *Lysmata philippinensis*, new species**

FIGURES 19, 20

**DIAGNOSIS.**—Rostrum (Figures 19, 20a–c) not overreaching antennular peduncle, rostral formula  $2 + 2-3/2$ . Carapace

with prominent antennal tooth not fused with orbital angle, latter clearly visible in dorsolateral view as distinct, blunt tooth in nearly horizontal plane (Figure 20c), occasionally with pterygostomial tooth on usually rounded anterolateral margin of carapace (Figure 20a). Fifth abdominal somite with pleuron sharply pointed posteroventrally, 4th somite with pleuron rounded (Figure 19). Antennular peduncle with sharply pointed stylocerite not nearly reaching distal margin of basal segment (Figure 20f, dorsolateral flagellum with 1-segmented accessory branch (Figure 20g,h). Antennal scale barely, if at all overreaching antennular peduncle (Figure 20i), slightly more than 3 times as long as wide, distolateral tooth slightly overreaching distal margin of blade. Third maxilliped with exopod overreaching midlength of antepenultimate segment (Figure 19). First pereopod (Figure 19) with chela very slightly longer than carpus. Second pereopod (Figure 19) with carpus composed of 22–26 articles. Third pereopod with dactyl biunguiculate (Figure 20r), with 2–4 (usually 3) movable spines on flexor margin proximal to terminal pair (Figure 19). Maximum postorbital carapace length 8 mm.

**MATERIAL.**—PHILIPPINES. Albay Gulf, east of southern Luzon, sta 5453,  $13^{\circ}12'N$ ,  $123^{\circ}49'18''E$  [267 m], 7 June 1909 (944–1004), 12' Agassiz beam trawl: 3 males [4.7–5.5], 1 [5.1] is holotype (USNM 264048) 3 ovig. females [7.4–8.0]. The depth from which the single lot was taken was estimated from the Coast Survey chart for the area; no sounding and therefore no bottom sample were obtained at this station.

**RANGE.**—Known only from the type locality in Albay Gulf, Luzon, Philippines.

**REMARKS.**—This species seems to be closely related to *L. kuekenthali*, which is known from Indonesia westward to South Africa in depths of no more than 11 meters. The Philippine material had not come to my attention when the type specimens



FIGURE 20.—*Lysmata philippinensis*, new species, male holotype from Albay Gulf, carapace length 5.1 mm: *a*, anterior carapace, right aspect; *b*, same, left aspect; *c*, anterior carapace and appendages, dorsal aspect; *d*, thoracic sternum, denuded except projections; *e*, tail fan, dorsal aspect; *f*, right antennular peduncle, dorsomesial aspect; *g*, dorsolateral antennular flagellum, junction of setiferous and nonsetiferous portions, dorsal aspect; *h*, same, ventral aspect; *i*, right antennal peduncle and scale, ventral aspect; *j*, right mandible, anterior aspect; *k*, right 1st maxilla; *l*, right 2nd maxilla; *m*, right 1st maxilliped; *n*, right 2nd maxilliped; *o*, right 3rd maxilliped, denuded distal end; *p*, right 1st pereopod, denuded chela; *q*, right 2nd pereopod, denuded chela and distal carpal articulation; *r*, right 3rd pereopod, denuded dactyl; *s*, right 1st pleopod, posterior aspect; *t*, same, endopod; *u*, right 2nd pleopod, anterior aspect; *v*, same, appendix masculina and tip of appendix interna.

of *L. kuekenhali* mentioned above were available to me for direct comparison, but the species described here seems to differ from *L. kuekenhali* in the shorter stylocerite on the antennular peduncle, longer pereopods, 22–26 rather than 19–22 articles in the carpus of the second pereopod, and usually three rather than two movable spines on the flexor margin of the dactyl and five to seven instead of three spines on the lateral and flexor surface of the merus of the third pereopod.

The disconcerting presence of a small but distinct pterygostomian tooth on one side of each of two of the six specimens of the species engenders some doubt about the diagnostic significance of that character in other species of the genus, but it is probably reasonable to assume that the indicated eight per cent chance of the occurrence of this aberration is a specific, not a generic attribute.

ETYMOLOGY.—The specific name obviously reflects the region from which the species is currently known.

#### \*80. *Lysmata ternatensis* De Man, 1902

*Palaemon dentatus* De Haan, 1844, pl. 45: fig. 13 [type locality: Japan; not *Palaemon dentatus* Roemer, 1841:106, pl. 16: fig. 24].

*Lysmata seticaudata*.—De Haan, 1849:176 [not *L. seticaudata* (Risso, 1816)].

*Lysmata seticaudata* var. *ternatensis* De Man, 1902:846 [type locality: Ternate, Indonesia, possibly also Ambon and, less likely, Japan].

*Hippolysmata acicula* Rathbun, 1906:912, pl. 24: fig. 6 [type locality: Puolo Point, Kauai, Hawaii; S.51°30' E4.9°].

*Lysmata affinis* Borradaile, 1915:209 [type locality: recorded from four localities in the Laccadive Islands, Chagos Archipelago, and the Seychelles].

*Lysmata dentata* Holthuis, 1947:64.

DIAGNOSIS.—Rostrum not overreaching antennular peduncle, rostral formula 2 + 3–4/2–5. Carapace with antennal tooth fused with orbital angle and with pterygostomian tooth. Fifth abdominal somite with pleuron pointed, 4th somite with pleuron rounded. Antennular peduncle with stylocerite nearly reaching distal margin of basal segment, dorsolateral flagellum with accessory branch long, composed of 10 articles. Antennal scale distinctly overreaching antennular peduncle, about 4 times as long as wide, distolateral tooth overreaching distal margin of blade. Third maxilliped with exopod not quite reaching midlength of antepenultimate segment. First pereopod with chela very slightly longer than carpus. Second pereopod with carpus composed of up to 29 articles. Third pereopod with dactyl biunguiculate. Maximum postorbital carapace length at least 6 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 ovig. female [5.2].

RANGE.—Seychelles, Laccadives, Chagos Archipelago, Japan, and Indonesia; to a depth of 62 meters.

REMARKS.—This species was apparently first called *Palaemon dentatus* by De Haan on plate 45 in the crustacean volume of Von Siebold's *Fauna Japonica*. On the assumption that this

plate was issued in 1841, there was no clear challenge to the priority of the name. When Holthuis (1953) corrected the date of that plate to 1844, however, De Haan's species became a junior homonym of *Palaemon dentatus* Roemer, 1841, a fossil lobster now known as *Hoploparia dentata* (Roemer, 1841) (see generic "Remarks").

At Holthuis's suggestion, I compared the ovigerous female holotype of *Hippolysmata acicula* Rathbun, 1906, with the ovigerous female of similar size from *Albatross* station 5555 that I had originally identified as *Lysmata dentata* (De Haan). The only apparent differences are that (1) the Hawaiian specimen has only two postorbital teeth in the midline of the carapace, compared with three in the Philippine example, (2) the similarly long accessory antennular flagellum is composed of ten articles in *L. acicula* and only eight in the other, and (3) the second pereopod has 29 articles in *L. acicula*, 21 and 26 in the other. I am convinced from the current state of knowledge of the species of *Lysmata* that these two specimens represent a single species, especially as the anterodorsal region of the carapace appears slightly deformed in the Hawaiian specimen, as if it might have borne three postorbital teeth originally.

The probable synonymy of *L. acicula* with *L. affinis* Borradaile, 1915, denies the latter priority over the other synonyms of *L. dentata* (De Haan), but the earliest replacement name is obviously *Lysmata seticaudata* var. *ternatensis* De Man, 1902, if we accept the Holthuis (1947:64) synonymy. I am tempted to do so on the assumption that the subspecies type series is limited to the single, probably juvenile specimen cited at the opening of De Man's discussion (1902:846). That assumption would possibly defer the certainty of final determination of the identity of *L. ternatensis* until more of the growth stages of the species are known. Holthuis (in litt.), however, notes that the examination of De Man's type material might be desirable. He defines that material, in addition to "the juvenile male from Ternate" as "the four specimens that De Man mentioned in 1888 (*Archiv für Naturgeschichte*, 53:492) as *L. seticaudata*, and which in 1902 he placed in his new subspecies *Ternatensis*." He eliminates from the type series the "Japanese specimens of *L. seticaudata* of De Haan and Ortmann ... mentioned by De Man (1902)" because "he only thought them probably identical with his new subspecies and did not definitely identify them."

#### 81. *Lysmata trisetacea* (Heller, 1861)

*Hippolyte trisetacea* Heller, 1861:29 [type locality: Red Sea].

*Lysmata pusilla* Heller, 1862b:287, pl. 3: fig. 26 [type locality: Red Sea].

*Hippolysmata paucidens* Rathbun, 1906:913, pl. 24: fig. 4 [type locality: Waikiki Beach, Oahu, Hawaii].

*Lysmata chiltoni* Kemp, 1914:110, pl. 6: figs. 1–4 [type locality: Meyer Island, Kermadec Islands, New Zealand].

*Lysmata trisetacea*.—Holthuis, 1947:19, 65.—Chace, 1962:614.

DIAGNOSIS.—Rostrum not overreaching antennular peduncle, rostral formula 1–2 + 2–3/1–2. Carapace with antennal

tooth fused with orbital angle, obliterating latter, without pterygostomian tooth. Antennule with stylocerite reaching as far as or slightly beyond distal margin of basal segment, dorsal flagellum with accessory flagellum as long as or longer than fused portion, composed of 8 articles. Antennal scale distinctly overreaching stout antennular peduncle, more than 3 times as long as wide, distolateral tooth falling slightly short of or slightly beyond distal margin of blade. Third maxilliped with exopod reaching nearly or quite to distal end of antepenultimate segment. First pereopod with chela  $1\frac{1}{2}$  times as long as carpus. Second pereopod with carpus composed of 19–24 articles. Third pereopod with biunguiculate dactyl. Maximum postorbital carapace length fully 6 mm.

RANGE.—Red Sea and Kermadec Islands, New Zealand, to Micronesia, Hawaii, and Clipperton Island; littoral.

### 82. *Lysmata vittata* (Stimpson, 1860)

*Hippolysmata vittata* Stimpson, 1860:26 [type locality: Hong Kong].

*Nauticaris unirecedens* Bate, 1888:608, pl. 110: fig. 1 [type locality: Hong Kong].

*Hippolysmata durbanensis* Stebbing, 1921a:20, pl. 5 [type locality: Durban Bay, South Africa].

*Hippolysmata (Hippolysmata) vittata*.—Hayashi and Miyake, 1968b:156, fig. 17.—Bruce, 1990c:601, figs. 23–28.

DIAGNOSIS.—Rostrum not overreaching antennular peduncle, rostral formula 2–3 + 2–5/1–5. Carapace with antennal tooth not fused with orbital angle, with pterygostomian tooth. Antennule with stylocerite reaching about to midlength of basal segment, dorsal flagellum without accessory branch. Antennal scale reaching about as far as end of antennular peduncle, about 3 times as long as wide, distolateral tooth reaching about as far as distal margin of blade. Third maxilliped with exopod reaching fully as far as midlength of antepenultimate segment. First pereopod with chela about  $1\frac{2}{5}$  times as long as carpus. Second pereopod with carpus composed of 15–31 articles. Third pereopod with biunguiculate dactyl. Maximum postorbital carapace length more than 7 mm.

RANGE.—Eastern Africa to Hong Kong, Japan, Philippines, Indonesia, and Australia; littoral to 54 meters.

REMARKS.—As currently conceived, *L. vittata* seems to be quite variable, especially in regard to the rostral formula and the number of articles in the carpus of the second pereopod.

### \**Lysmatella* Borradaile, 1915

*Lysmatella* Borradaile, 1915:206 [type species, by monotypy: *Lysmatella prima* Borradaile, 1915:209; gender: feminine].

DIAGNOSIS.—Integument not rigid. Rostrum (Figure 21a,b) armed dorsally and ventrally, without ventral blade or tongue-like lobe extending ventrally from lateral carina. Carapace (Figure 21a,b) not inflated, not abruptly depressed on frontal region, without dentate crest in midline at base of rostrum, without numerous appressed teeth on lateral surface, without supraorbital or subocular tooth posterodorsal to orbital angle, latter not large or obtuse, without hepatic tooth or branchiostegal tooth or denticles, but with marginal, unarticu-

lated antennal tooth and pterygostomian tooth. Abdomen (Figure 21c) with 1st pleuron entire, not bifurcate; 6th somite without prominent spines, without articulated plate at posteroventral angle and pleuron not curving around base of uropod. Telson (Figure 21d,e) not tapering to sharp posterior end, posterolateral angles not sharply produced, bearing 2 pairs of dorsolateral spines. Eyestalk (Figure 21f) not concealed by carapace, cornea not narrower than stalk. Antennule (Figure 21g,h) with stylocerite not in vertical plane, not bifid; 2nd segment without sharp, curved lateral tooth; 3rd segment without dorsodistal tooth on movable plate, dorsal flagellum slender, not short or brush-like, bearing minute, 2-segmented accessory "flagellum." Antennal peduncle not overreaching antennular peduncle, without 3 strong ventral spines; antennal scale (Figure 21i) barely overreaching antennular peduncle, lateral tooth not near midlength, lateral margin not spinose. Mandible (Figure 21j) without palp or incisor process. First maxilliped (Figure 21m) with caridean lobe clearly discrete from exopodal lash, epipod bilobate. Second maxilliped (Figure 21n) with terminal segment narrow and applied laterally to preceding segment, exopod not unusually wide with nonbilobate epipod and vestigial podobranch. Third maxilliped (Figure 21o,p) with distal segment not flattened, with epipod and coxal exite. Pereopods without exopods, epipods, or arthrobranchs. First pereopod (Figures 21q,r) with fingers shorter than palm, chela  $1\frac{1}{3}$  times as long as carpus, latter not excavate to receive propodus, ischium distally produced. Second pereopods (Figure 21s) symmetrical, fingers shorter than palm, carpus subdivided into 20–24 articles. Third pereopod (Figure 21t,u) with dactyl and propodus not prehensile in functional males.

RANGE.—Maldives and Andaman islands, Japan, Philippines, and Indonesia; to a depth of 62 meters.

REMARKS.—*Lysmatella* differs from *Lysmata* only in the complete absence of epipods on any of the pereopods, compared with their strong development on the four anterior pairs in the latter genus.

Only one species of *Lysmatella* is known.

### \*83. *Lysmatella prima* Borradaile, 1915

FIGURE 21

*Lysmatella prima* Borradaile, 1915:209; 1917:404, pl. 58: fig. 7.

*Hippolysmata (Lysmatella) prima*.—Kemp, 1916:404.—Holthuis, 1947:72.

DIAGNOSIS.—See generic "Diagnosis" above.

MATERIAL.—PHILIPPINES. Off Jolo Island, Sulu Archipelago, sta 5139, 6°06'N, 121°02'30"E, 37 m, coral sand, 14 Feb (1313–1317), 12' Agassiz beam trawl, mud bag: 1 female [2.7]; sta 5142, 6°06'10"N, 121°02'40"E, 38 m, coral sand and shells, 15 Feb (1033–1044), 12' Agassiz beam trawl, mud bag: 3 females [2.6–3.2].—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: 7 females [3.3–4.9], 3 ovig. [4.8–4.9], 1 juv [2.0].—Off Tawitawi, Sulu Archipelago, sta 5152, 5°22'55"N, 120°15'45"E, 62 m, white sand, 18 Feb 1908 (1528–1543), 12' Agassiz beam trawl, mud

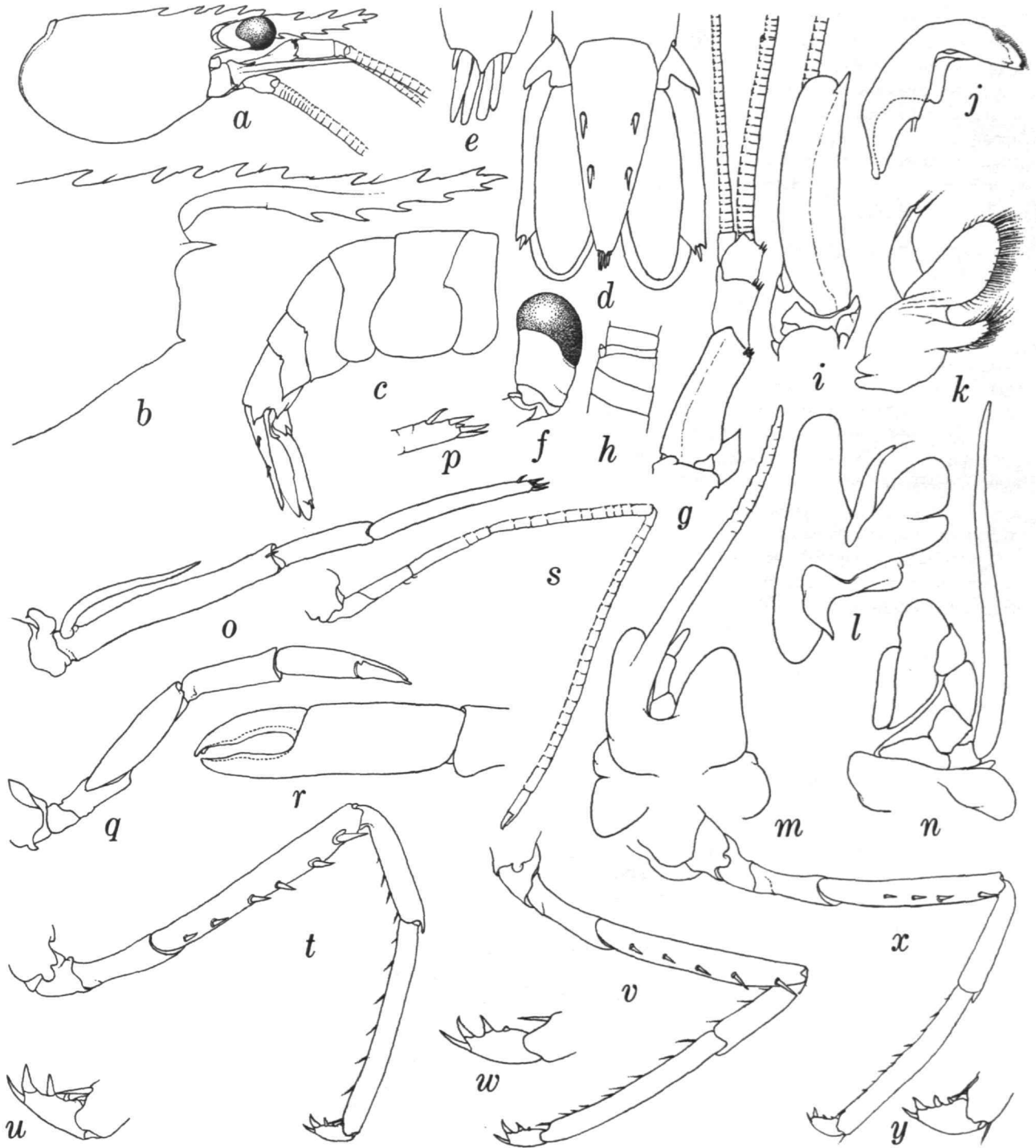


FIGURE 21.—*Lysmatella prima*, ovigerous female with carapace length of 4.9 mm from Albatross sta 5146: a, carapace and anterior appendages; b, anterior carapace; c, abdomen; d, telson and uropods; e, posterior end of telson; f, right eye; g, right antennule, dorsomesial aspect; h, same, accessory branch of dorsal flagellum; i, right antenna, dorsal aspect; j, right mandible; k, right 1st maxilla; l, right 2nd maxilla; m, right 1st maxilliped; n, left 2nd maxilliped; o, right 3rd maxilliped; p, same, distal end; q, right 1st pereopod; r, same, chela; s, right 2nd pereopod; t, right 3rd pereopod; u, same, dactyl; v, right 4th pereopod; w, same, dactyl; x, right 5th pereopod; y, same, dactyl.

bag: 1 ovig. female [4.5]; sta 5157, 5°12'30"N, 119°55'50"E, 33 m, fine sand, 21 Feb 1908 (0904–0909), 9' Johnston oyster dredge: 8 females (2.4–4.5), 1 ovig. [3.9].

RANGE.—See generic "Range" above. It may be significant, or merely coincidental, that two rather uncommon, monotypic hippolytid genera, *Gelastocaris* and *Lysmatella*, were taken during the *Albatross* Philippine Expedition only from a single identical area of the Sulu Archipelago.

### *Merguia* Kemp, 1914

FIGURE 22

*Merguia* Kemp, 1914:121 [type species, by monotypy: *Hippolyte oligodon* De Man, 1888:277; gender: feminine].

DIAGNOSIS.—Integument not rigid. Rostrum armed dorsally, unarmed ventrally, without ventral blade or tongue-like lobe extending ventrally from lateral carina. Carapace not inflated, not abruptly depressed on frontal region, without dentate crest in midline at base of rostrum, without numerous appressed teeth on lateral surface, without supraorbital tooth or subocular tooth posterodorsal to orbital angle, latter not large or obtuse, without hepatic, branchiostegal or pterygostomial teeth, but with marginal, unarticulated antennal tooth. Abdomen with 1st pleuron entire, not bifurcate; 6th somite without prominent spines, without articulated plate at posteroventral angle and pleuron not curving around base of uropod. Telson not tapering to sharp posterior end, posterolateral angles not sharply produced, bearing 2 pairs of dorsolateral spines. Eyestalk not concealed by carapace, cornea not narrower than stalk. Antennule with stylocerite not in vertical plane, not bifid; 2nd segment without sharp lateral tooth; 3rd segment without dorsodistal tooth on movable plate, dorsal flagellum slender, not short or brush-like. Antennular peduncle not overreaching antennular peduncle, without 3 strong ventral spines; antennal scale not overreaching antennular peduncle, lateral tooth not near midlength, lateral margin not spinose. Mandible without palp or incisor process. First maxilliped with caridean lobe not very discrete from exopodal lash, epipod bilobate. Second maxilliped with terminal segment somewhat obliquely applied to preceding segment, exopod not unusually wide, with nonbilobate epipod but without podobranch. Third maxilliped with distal segment not flattened, with epipod and arthrobranch, but without exopod. Pereopods without exopods, epipods, or arthrobranchs. First pereopod with fingers shorter than palm, not terminating in distal spines, chela slightly longer than carpus, latter not excavate to receive propodus, ischium not much produced distally.

Second pereopods equal, fingers no longer than palm, carpus subdivided into 20–27 articles. Third pereopod with dactyl and propodus not prehensile in functional males.

RANGE.—Mergui Archipelago, Indonesia, and western Atlantic from Panama and Surinam to Estado de Paraiba, Brazil;

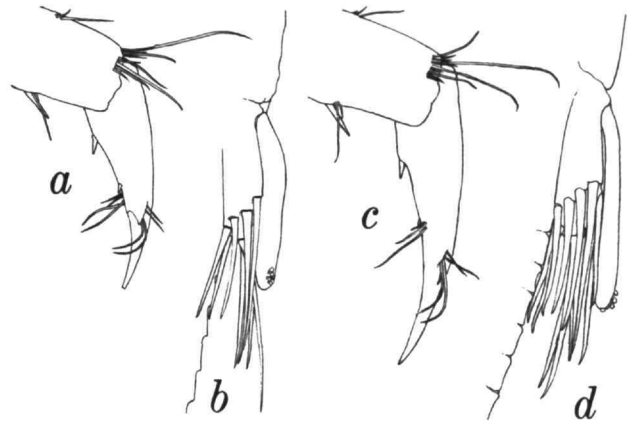


FIGURE 22.—Dactyl of right 3rd pereopod and right appendix masculina of *Merguia*, a,b, *M. oligodon*; c,d, *M. rhizophorae*: a,b, male with carapace length of 4.1 mm from Boera, Papua New Guinea (USNM 169678); c,d, male with carapace length of 4.0 mm from Galeta Island, Caribbean coast of Panama (USNM 127510).

from semiterrestrial habitats. In a personal communication, accompanied by the suggestion that I publish the information herein, C.B. Powell of the Department of Zoology, University of Port Harcourt, Port-Parcourt, Nigeria, has informed me that he found specimens of *Merguia* in high-salinity mangrove creeks in the eastern Niger Delta. Powell also made the pertinent comment that the Nigerian specimens might possibly be exotic rather than truly West African, because of their ability to survive semiterrestrial conditions (see Abele, 1970).

REMARKS.—Two nominal species of *Merguia* have been described: *M. oligodon* from the Mergui Archipelago and Indonesia and *M. rhizophorae* from Panama and Estado da Paraiba, Brazil, and possibly Surinam. In recording specimens of the latter species from Surinam, Holthuis (1959:109) noted that, in male specimens, "the dactylus of the last three pairs of pereopods is slender and unarmed" rather than bearing "two posterior spines" and being "less slender" as in the Brazilian holotype of *M. rhizophorae*. Comparison of these appendages in males of *Merguia* of similar size from New Guinea and Panama failed to reveal any significant differences (Figure 22a,c). The only structure that seems to disagree in these two specimens is the appendix masculina (Figure 22b,d), which bears eight long spines in the specimen from New Guinea and 12 in the Panamanian example, but Holthuis (1959, fig. 15n) shows only eight spines in the Surinam material. Obviously, further study will be required to determine whether these interesting shrimps that behave like insects belong to one, two, or three species.

### 84. *Merguia oligodon* (De Man, 1888)

*Hippolyte oligodon* De Man, 1888:277, pl. 18: figs. 1–6 [type locality: Elphinstone Island, Mergui Archipelago].



*Merguia oligodon*.—Kemp, 1914:121, pl. 7: figs. 8, 9.—Holthuis, 1947:75, fig. 15; 1958:231, figs. 1, 2.

DIAGNOSIS.—See generic "Diagnosis" above.

RANGE.—Mergui Archipelago and Indonesia; in semiterrestrial habitats.

REMARKS.—See generic "Remarks" above.

### *Mimocaris Nobili, 1903*

*Mimocaris Nobili, 1903:6* [type species, by monotypy: *Mimocaris heterocarpoides* Nobili, 1903:6; gender: feminine].

DIAGNOSIS.—Rostrum armed dorsally and ventrally, without ventral blade or tongue-like lobe extending ventrally from lateral carina. Carapace not inflated, not abruptly depressed on frontal region, with semblance of dentate crest in midline at base of rostrum, without numerous appressed teeth on lateral surface, without supraorbital tooth or subocular tooth postero-dorsal to orbital angle, latter not large or obtuse, without hepatic tooth or branchiostegal tooth or denticles, but with prominent, marginal, unarticulated antennal tooth and even larger pterygostomial tooth. Abdomen with 1st pleuron bifurcate; 6th somite with single paired distolateral spine, without articulated plate at posteroventral angle and pleuron not curving around base of uropod. Telson tapering to sharp posterior end, posterolateral angles not sharply produced. Eyestalk not concealed by carapace, cornea not narrower than stalk. Antennule with dorsal flagellum not short or brush-like. Antennal scale overreaching antennular peduncle, lateral tooth not near midlength, lateral margin not spinose. Mandible without palp or incisor process. Second pereopods symmetrical.

RANGE.—Sarawak, Malaysia, and east coast of Sumatra, Indonesia.

REMARKS.—Only one species is known.

### 85. *Mimocaris heterocarpoides* Nobili, 1903

*Mimocaris heterocarpoides* Nobili, 1903:6, fig. 2 [type locality: Pulau Burong, Sarawak, Malaysia, 1°44'N, 110°48'E or 1°44'N, 109°52'E].—Balss, 1933:86.

DIAGNOSIS.—See generic "Diagnosis" above.

RANGE.—Northwestern Borneo and eastern Sumatra; littoral.

### \**Paralebbeus* Bruce and Chace, 1986

*Paralebbeus* Bruce and Chace, 1986:237 [type species, by monotypy: *Paralebbeus zothecculatus* Bruce and Chace, 1986:238; gender: masculine].

DIAGNOSIS.—Integument not rigid. Rostrum unarmed on dorsal and ventral midline, without ventral blade or tongue-like lobe extending ventrally from lateral carina. Carapace inflated, especially in female, not abruptly depressed on frontal region, without dentate crest in midline at base of rostrum, without numerous appressed teeth on lateral surface, with or without

supraorbital tooth, without subocular tooth postero-dorsal to orbital angle, latter distinct but not large or obtuse, without hepatic tooth or branchiostegal tooth or denticles, but with marginal, unarticulated antennal tooth and, sometimes, small pterygostomial tooth. Abdomen with 1st pleuron entire, not bifurcate; 6th somite without prominent spines, without articulated plate at posteroventral angle and pleuron not curving around base of uropod. Telson not tapering to sharp posterior end, posterolateral angles not sharply produced, bearing 1–6 pairs of dorsolateral spines. Eyestalk not concealed by carapace, cornea not narrower than stalk, without ocellus. Antennule with stylocerite not in vertical plane, not bifid; 2nd segment without dorsodistal tooth on movable plate, dorsal flagellum not short or brush-like. Antennal peduncle not overreaching antennular peduncle, without 3 strong ventral spines; antennal scale overreaching antennular peduncle, lateral tooth not near midlength, lateral margin not spinose. Mandible with incisor process and 2-segmented palp. First maxilliped with caridean lobe clearly discrete from exopodal lash, epipod slightly bilobate. Second maxilliped with terminal segment narrow and applied somewhat diagonally to preceding segment, exopod not unusually wide, with nonbilobate epipod and podobranch. Third maxilliped with distal segment not noticeably flattened, with epipod but without exopod, arthrobranch, or prominent coxal exite. Pereopods without exopods, with terminally hooked epipods on three anterior pairs, without arthrobranchs. First pereopod with fingers shorter than palm, movable finger terminating in 2 blunt teeth, chela  $2\frac{1}{2}$ – $3\frac{1}{2}$  times as long as carpus, latter shallowly excavate to receive propodus, ischium not produced into long saber-shaped process. Second pereopods symmetrical, fingers shorter than palm, carpus subdivided into 7 articles, 3rd and 7th longest. Third pereopod prehensile with dactyl and propodus not prehensile in male.

RANGE.—Philippines, Indonesia, and off northern Western Australia; fully documented specimen extracted from small chambers in hexactinellid sponges; 452–1023 meters.

REMARKS.—The justification for recognizing two distinct species among the seven admittedly variable specimens of *Paralebbeus* now known may be lost when additional material becomes available. Some of the characters offered in the following key will almost certainly prove to be fallacious in due time, but some of them, such as the arrangement of the stout spines on the distal segment of the third maxilliped and of the two terminal teeth on the movable finger of the first pereopod, seem to indicate that the Philippine female taken by the *Albatross* in 720 meters represents a new depth record for *P. zothecculatus* from the *Soela* cruises off northern Western Australia, whereas the Indonesian male and female trawled by the *Albatross* in 763 and 1023 meters may belong to a different species. It is to call attention to that possibility that I have decided to recognize a second species of the genus.

Key to Species of *Paralebbeus*

- Paired supraorbital teeth conspicuous [Figure 24c]; telson with 4–6 dorsolateral teeth on each side [Figure 24d]; mandible with distalmost tooth of incisor process not much longer than other teeth on distal margin [Figure 24g]; 3rd maxilliped with 10–12 stout spines arranged nearly in circle on distal segment [Figure 24n]; 1st pereopod with movable finger bearing 2 blunt distal teeth arising from nearly same level and reaching about same distance distally [Figure 24p,q]; merus of anteriorly extended 2nd pereopod distinctly overreaching merus of anteriorly extended 3rd pereopod [Figure 23] . . . . . \*86. *P. zotheculatus*
- Supraorbital teeth vestigial or absent [Figures 26c, 28c]; telson with 1–3 dorsolateral teeth on each side [Figures 26d, 28d]; mandible with distalmost tooth of incisor process distinctly longer than other teeth on distal margin [Figures 26g, 28h]; 3rd maxilliped with about 18 stout spines arranged in compressed oval pattern on distal segment [Figures 26n, 28n]; 1st pereopod with movable finger bearing 2 blunt distal teeth arising from different levels and reaching unequal distances distally [Figures 27b, 28q]; merus of anteriorly extended 2nd pereopod not distinctly overreaching merus of anteriorly extended 3rd pereopod [Figure 25a,b] . . . . . \*87. *P. zygius*, new species

\*86. *Paralebbeus zotheculatus* Bruce and Chace, 1986

FIGURES 23, 24

*Paralebbeus zotheculatus* Bruce and Chace, 1986:238, figs. 3–6 [type locality: west of Imperieuse Reef, Western Australia, 17°30.1'S, 118°28.9'E; in hexactinellid sponge from 505–506 meters].

DIAGNOSIS.—See “Key to Species of *Paralebbeus*” above.

MATERIAL.—PHILIPPINES. Western end of Verde Island Passage, east of Lubang Islands, sta 5119, 13°45'05"N, 120°30'30"E, 720 m, green mud, sand, 6.5°C, 21 Jan 1908 (1324–1356), 12' Tanner beam trawl: 1 female [9.7].

RANGE.—Philippines and off Western Australia; 452–720 meters.

\*87. *Paralebbeus zygius*, new species

FIGURES 25–28

DIAGNOSIS.—See “Key to Species of *Paralebbeus*” above.

MATERIAL.—INDONESIA. West of Halmahera; sta 5618, 0°37'00"N, 127°15'00"E, 763 m, gray mud, 27 Nov 1909 (1444–1504), 12' Agassiz beam trawl: 1 male paratype [6.9].—Selat Butung, Sulawesi (Celebes), sta 5648, 5°35'00"S, 122°20'00"E, 1023 m, green mud, 4.0°C, 16 Dec 1909 (1629–1652), 12' Agassiz beam trawl: female holotype [11.7] (USNM 264050).

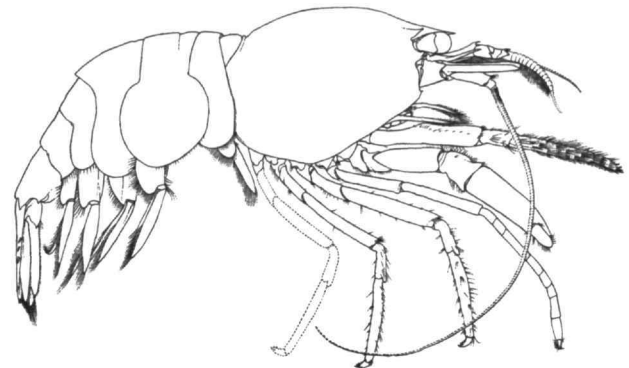


FIGURE 23.—*Paralebbeus zotheculatus*, female with carapace length of 9.7 mm from Albatross sta 5119.

TYPE LOCALITY.—Selat Butung, Sulawesi (Celebes), Indonesia; 5°35'00"S, 122°20'00"E; 1023 meters.

RANGE.—Known only from the two Indonesian localities mentioned above.

ETYMOLOGY.—From the Greek *zygius*, *-a*, *-um*, “belonging to the yoke,” in reference to the pair of very similar species herein recognized in the genus *Paralebbeus*.

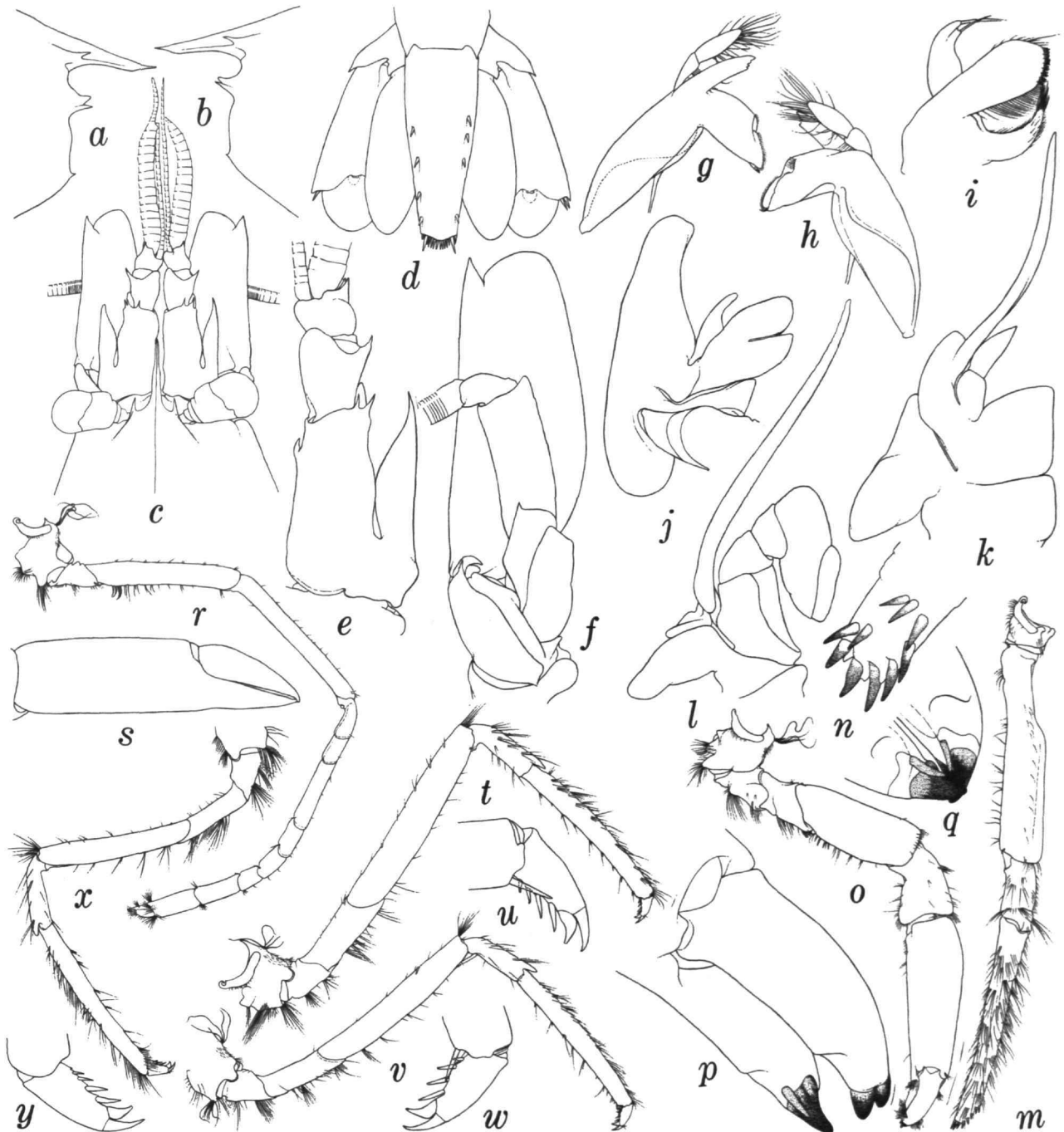


FIGURE 24.—*Paralebbeus zothecculatus*, female with carapace length of 9.7 mm from *Albatross* sta 5119: a, anterior carapace, right aspect; b, same, left aspect; c, anterior carapace and appendages, dorsal aspect; d, telson and uropods; e, right antennular peduncle, dorsomesial aspect; f, right antennular peduncle, ventral aspect; g, right mandible, aboral aspect; h, same, oral aspect; i, right 1st maxilla; j, right 2nd maxilla; k, right 1st maxilliped; l, right 2nd maxilliped; m, right 3rd maxilliped, lateral aspect; n, same, distal end, dorsal aspect; o, right 1st pereopod; p, same, fingers; q, same, tips; r, right 2nd pereopod; s, same, chela; t, right 3rd pereopod; u, same, dactyl; v, right 4th pereopod; w, same, dactyl; x, left 5th pereopod; y, same, dactyl.

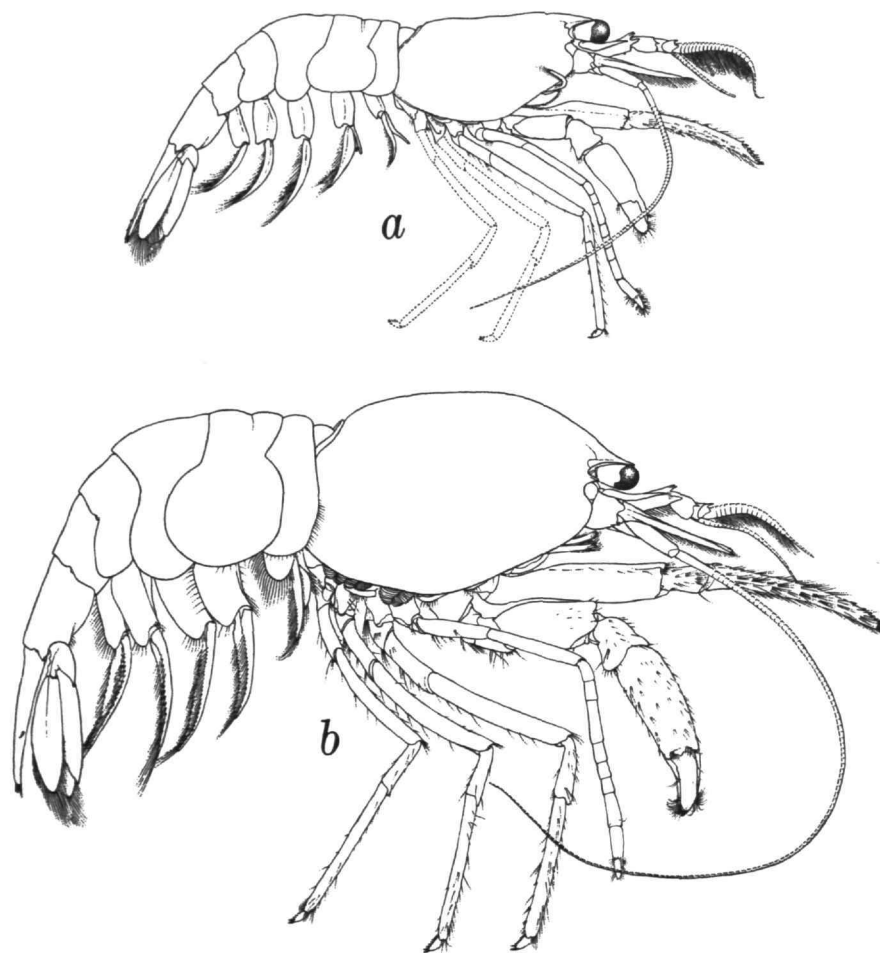


FIGURE 25.—*Paralebbeus zygius*, new species: *a*, male paratype from Molucca Passage, Indonesia, *Albatross* sta 5618, carapace length 6.9 mm; *b*, female holotype from Selat Butung, Celebes, Indonesia, *Albatross* sta 5648, carapace length 11.7 mm.

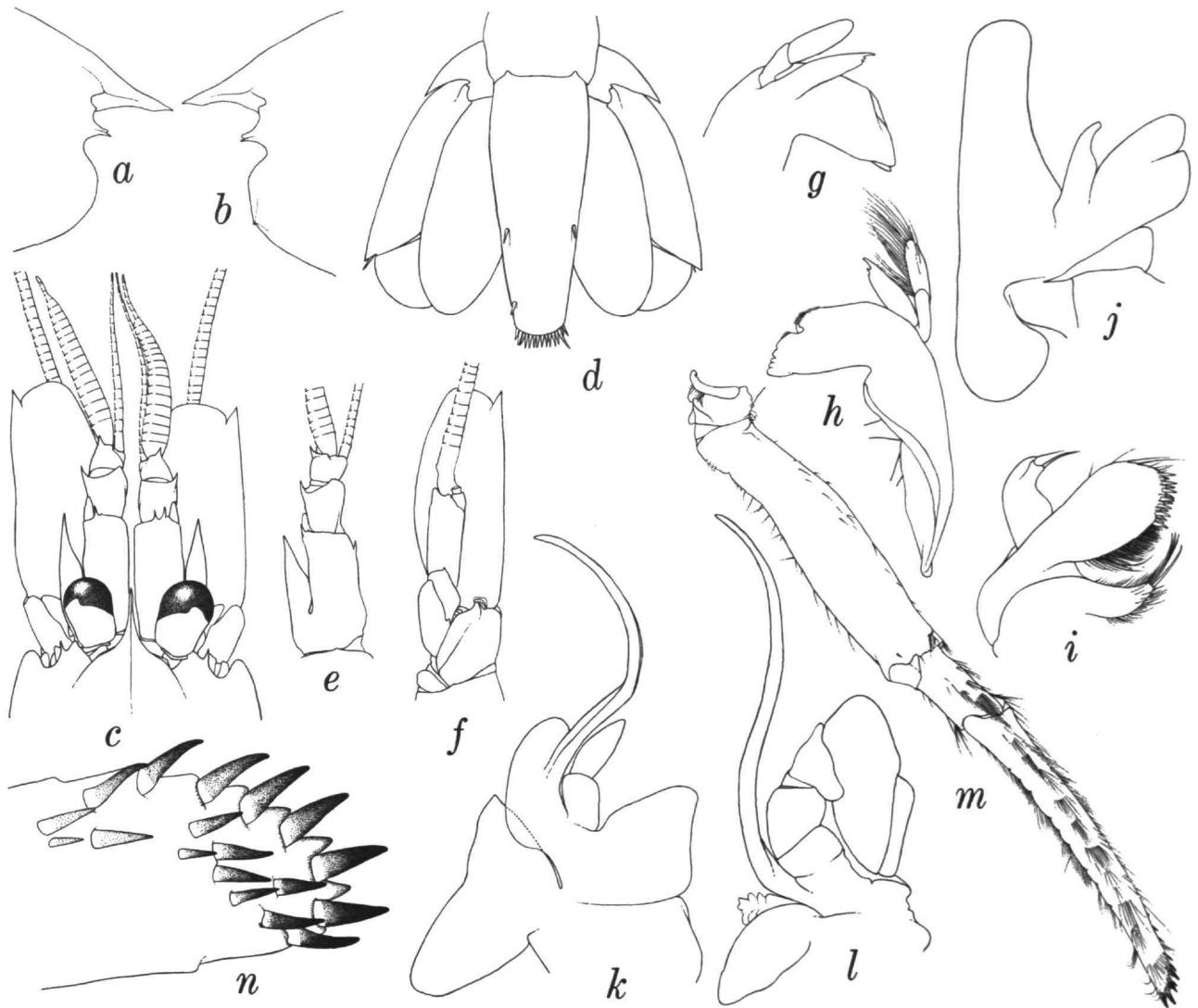


FIGURE 26.—*Paralebbeus zygius*, new species, female holotype with carapace length of 11.7 mm from *Albatross* sta 5648: *a*, anterior carapace, right aspect; *b*, same, left aspect; *c*, anterior carapace and appendages, dorsal aspect; *d*, telson and uropods; *e*, left antennular peduncle, dorsomesial aspect; *f*, left antennular peduncle, ventral aspect; *g*, right mandible, aboral aspect; *h*, same, oral aspect; *i*, right 1st maxilla; *j*, right 2nd maxilla; *k*, right 1st maxilliped; *l*, right 2nd maxilliped; *m*, right 3rd maxilliped, lateral aspect; *n*, same, distal end, dorsal aspect.

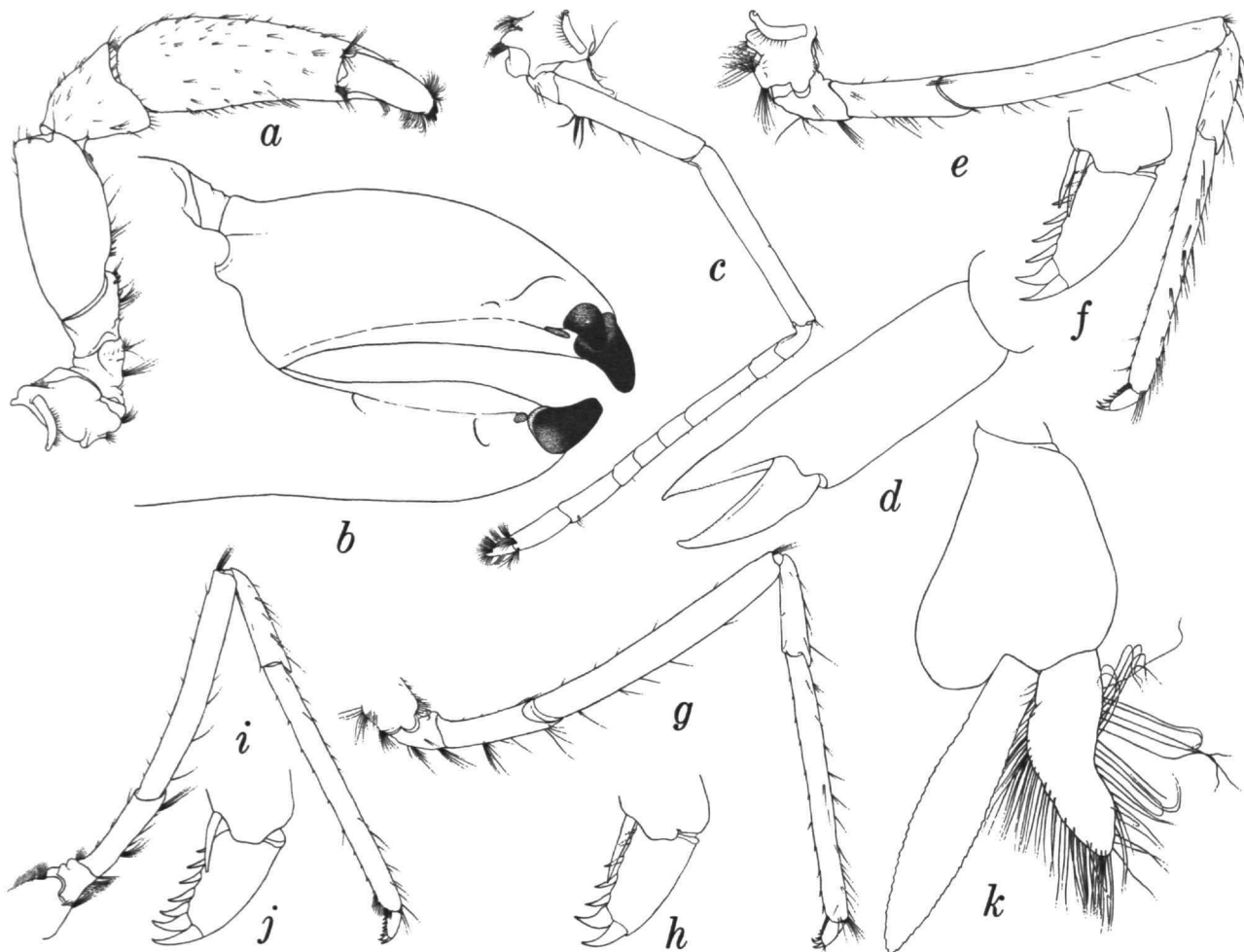


FIGURE 27.—*Paralebbeus zygius*, new species, female holotype with carapace length of 11.7 mm from *Albatross* 5648: *a*, right 1st pereopod; *b*, same, fingers; *c*, right 2nd pereopod; *d*, same, chela; *e*, right 3rd pereopod; *f*, same, dactyl; *g*, right 4th pereopod; *h*, same, dactyl; *i*, right 5th pereopod; *j*, same, dactyl; *k*, right 1st pleopod.

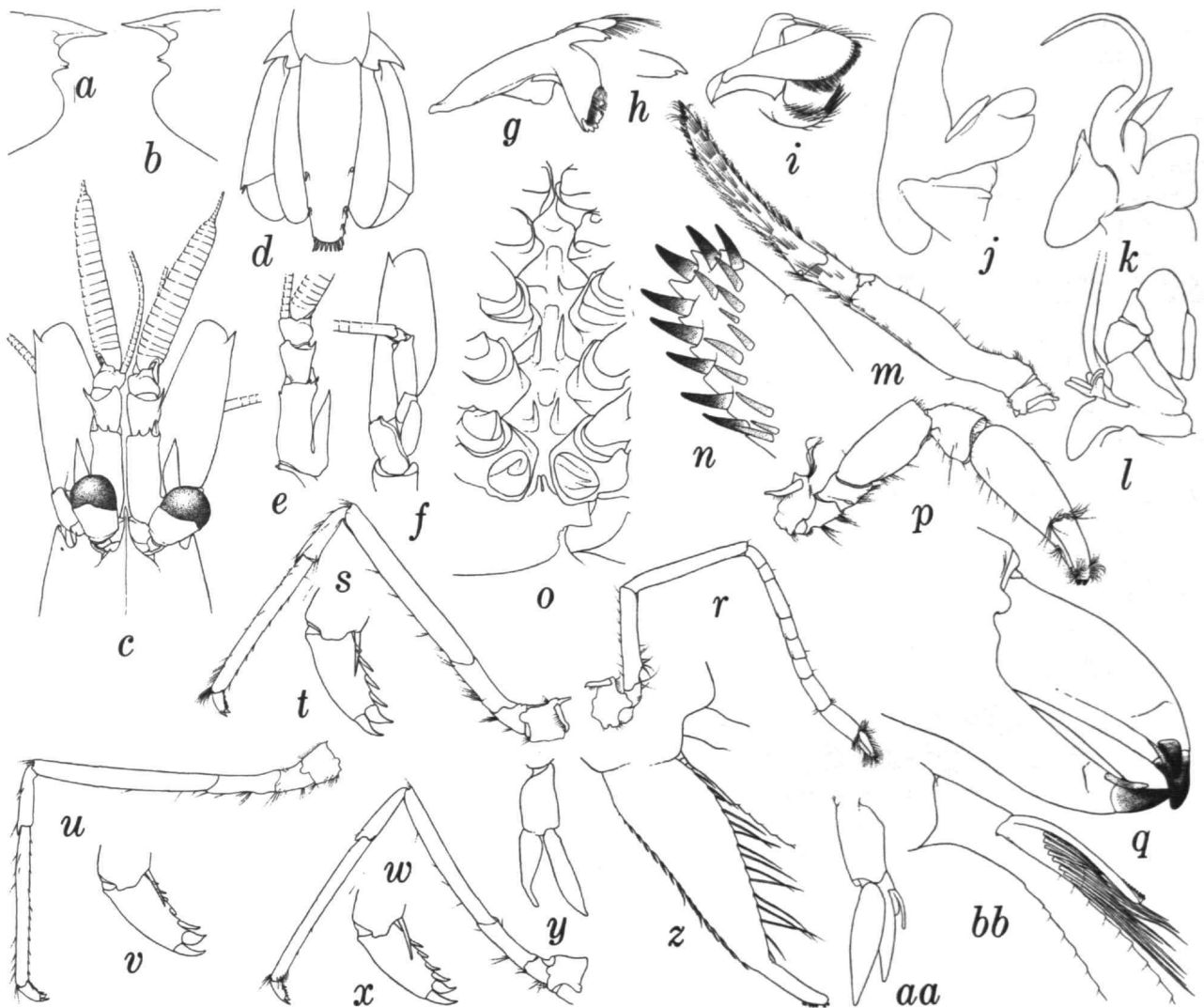


FIGURE 28.—*Paralebbeus zygius*, new species, male paratype with carapace length of 6.9 mm from Albatross sta 5618: a, anterior carapace, right aspect; b, same, left aspect; c, anterior carapace and appendages, dorsal aspect; d, telson and uropods; e, right antennular peduncle, dorsomesial aspect; f, right antennal peduncle, ventral aspect; g, right mandible, aboral aspect; h, same, end of incisor process; i, right 1st maxilla; j, right 2nd maxilla; k, right 1st maxilliped; l, right 2nd maxilliped; m, right 3rd maxilliped, lateral aspect; n, same, distal end, dorsal aspect; o, thoracic sternum; p, right 1st pereopod; q, same, fingers; r, right 2nd pereopod; s, left 3rd pereopod; t, same, dactyl; u, left 4th pereopod; v, same, dactyl; w, left 5th pereopod; x, same, dactyl; y, right 1st pleopod, posterior aspect; z, same, endopod; aa, right 2nd pleopod; bb, same, appendix masculina and appendix interna.

### *Parhippolyte* Borradaile, 1900

*Parhippolyte* Borradaile, 1900:414 [type species, by monotypy: *Parhippolyte uveae* Borradaile, 1900:414; gender: feminine].

DIAGNOSIS.—Integument not rigid. Rostrum armed dorsally and ventrally, without strong ventral blade or tongue-like lobe extending ventrally from lateral carina. Carapace not inflated, not abruptly depressed on frontal region, without dentate crest

in midline at base of rostrum, without appressed teeth on lateral surface, without supraorbital tooth, with subocular tooth posterodorsal to orbital angle, latter distinct, rather large and obtuse or rounded, without antennal or hepatic tooth, with marginal branchiostegal tooth, branchiostegal margin not denticulate, without pterygostomial tooth. Abdomen with somites not dorsally carinate or posteromesially dentate, 1st pleuron entire, not bifurcate; 6th somite without proximal

spines, without articulated plate at posteroventral angle and pleuron not curving around base of uropod. Telson not tapering regularly to sharp posterior end, posterolateral angles not sharply produced, bearing 2 pairs of dorsolateral spines. Eystalk movable, not concealed by carapace. Stylocerite in vertical plane, not bifid; 3rd segment of antennular peduncle without movable plate; dorsal flagellum not short or brush-like. Antennal scale overreaching antennular peduncle, lateral tooth not near midlength, lateral margin not spinose. Mandible without incisor process, with 3-jointed palp. Second maxilliped with terminal segment elongate and applied somewhat laterally to preceding segment, exopod not unusually wide, with nonbilobate epipod and podobranch. Third maxilliped with terminal segment not flattened, with epipod, exopod, and arthrobranch. Pereopods without exopods, with epipods and arthrobranches on 4 anterior pairs; 1st pereopod with fingers shorter than palm, movable finger not terminating in more than 2 blunt teeth; 2nd pereopods fairly symmetrical, fingers shorter than palm, carpus subdivided into more than 30 articles; 3rd

pereopod with dactyl and propodus not prehensile in males, propodus subdivided, carpus not very spinose.

RANGE.—Anchialine pools from western Indian Ocean to Hawaii in the tropical Pacific, and Bermuda in the western Atlantic.

REMARKS.—As suggested by the following key, the genus *Parhippolyte* is currently believed to comprise only three species. Although a thorough comparative study of *P. uveae* from populations in different parts of its extensive range would be desirable as collections accumulate, it is very possible that no change in that conclusion is likely. The variability noted by Wear and Holthuis (1977:128) in eight Philippine specimens from a single pool, as regards the number of ventral rostral teeth, the presence or absence and the disposition of the spine on the antennal lobe (which is assumed to be of prime generic or even potentially familial importance), and the intensity and extent of the red coloration of the animal would seem to allude to a variable species that could adapt readily to environmental inconstancy over a broad range.

#### Key to Species of *Parhippolyte*

1. Suborbital lobe bluntly triangular; appendix masculina on male 2nd pleopod distinctly longer than appendix interna . . . . . *P. misticia* (Clark, 1989:446, figs. 1–4)  
(Palau, Caroline Islands; cave)
- Suborbital lobe rounded; appendix masculina on male 2nd pleopod not overreaching appendix interna, except by length of distal spines . . . . . 2
2. Suborbital lobe broader than long; appendix masculina on male 2nd pleopod reaching as far as distal end of appendix interna, distal spines not included . . . . . *P. sterreri* (C.W. Hart and Manning, 1981:442, figs. 1–28)  
(Bermuda; anchialine cave)
- Suborbital lobe longer than broad; appendix masculina on male 2nd pleopod not reaching as far as distal end of appendix interna, distal spines not included . . . . . 88. *P. uveae*

#### 88. *Parhippolyte uveae* Borradaile, 1900

*Parhippolyte uveae* Borradaile, 1900:414, pl. 38 [type locality: Uvea, Loyalty Islands].—Manning and Hart, 1984:657, fig. 4.

*Ligur uveae*.—Gordon, 1936b:102, fig. 1.—Monod, 1968:772, figs. 1–8.—Wear and Holthuis, 1977:125, fig. 1, pls. 1, 2.—Maciolek, 1983:607, 609, 612, 616, figs. 1, 2.

DIAGNOSIS.—Suborbital lobe rounded, longer than broad, sometimes with marginal denticle in addition to suborbital tooth. Appendix masculina shorter than appendix interna, distal spines not included. Maximum postorbital carapace length at least 27 mm.

RANGE.—Aldabra (western Indian Ocean), Tiniguiban Island (between Panay Gulf and Guimaras Strait, Philippines), Halmahera (Indonesia), Palau (Caroline Islands), Loyalty Islands, Fiji Archipelago, Bikini (Marshall Islands), Funafuti

(Ellice Islands), and Hawaii; in anchialine pools.

REMARKS.—See generic "Remarks." It also should be noted that *P. uveae* is very closely related to *P. sterreri* from Bermuda.

#### \**Saron Thallwitz*, 1891

*Saron Thallwitz*, 1891a:99 [type species, by monotypy: *Hippolyte gibberosus* H. Milne Edwards, 1837:378 (= *Palaemon marmoratus* Olivier, 1811:663); gender: masculine].

DIAGNOSIS.—Integument not especially rigid. Rostrum overreaching antennular peduncle, armed dorsally and ventrally, with strong ventral blade, not projecting between bases of antennules, or series of strong ventral teeth, without tongue-like lobe extending ventrally from lateral carina. Carapace without discrete dentate crest in midline at base of rostrum, without longitudinal lateral carinae, without appressed



teeth on lateral surface, without supraorbital tooth, without abrupt depressions on frontal or orbital regions, without subocular tooth posterodorsal to orbital angle, latter not large, with antennal tooth, latter neither submarginal nor basally articulated, without hepatic tooth, with branchiostegal tooth, branchiostegal margin not denticulate, with pterygostomial tooth. Abdominal somites not dorsally carinate or posteromedially dentate, 1st pleuron not bifurcate, 4th and 5th pleura pointed, not denticulate, 6th somite not armed with 7 strong spines, with plate articulated at posteroventral angle, pleuron not curving around base of uropod. Telson not tapering to sharp point, posterior margin subtruncate or slightly concave, posterolateral angles not sharply produced. Eyestalk movable, not concealed by carapace, cornea with ocellus. Antennule with stylocerite not lying in vertical plane, not bifid or semicircular; 2nd peduncular segment without sharp, curved lateral tooth; 3rd segment without sharp dorsodistal tooth or movable dorsodistal plate; dorsolateral flagellum proximally stout but not unusually short or brush-like. Antennal peduncle sometimes overreaching antennular peduncle, not armed with 3 strong ventral spines; antennal scale overreaching antennular peduncle, without lateral tooth near midlength or small movable lateral spines. Mandible with both palp and incisor process. First maxilliped with caridean lobe quite distinct from

exopodal lash, epipod bilobate. Second maxilliped with terminal segment elongate and applied somewhat laterally to preceding segment, exopod not unusually wide, with somewhat bilobate epipod and with podobranch. Third maxilliped with distal segment not flattened, with exopod, epipod, small arthrobranch, and coxal exite. Pereopods without exopods, with epipods and arthrobranches on 1st to 4th pairs, epipods with terminal hook. First pereopod with fingers shorter than palm, not terminating in interlocking spines, chela 1 1/2 to 2 1/3 times as long as carpus, carpus not deeply excavate for reception of chela. Second pereopods symmetrical, fingers shorter than palm, carpus subdivided into 10-17 articles. Third pereopod with dactyl not gradually tapering to acute apex, armed with teeth on flexor margin, dactyl and propodus not prehensile in functional males, propodus not subdivided, carpus not conspicuously spinose. Uropod with lateral margin of lateral branch terminating in small fixed tooth with larger movable spine mesial to it.

RANGE.—Red Sea and eastern Africa to Hawaii, Marquesas Islands, and Tuamotu Archipelago; littoral.

REMARKS.—All four of the known species of *Saron* have been recorded from the Philippine-Indonesian region. They may be distinguished in the following key adapted from the lists of characters provided by Hayashi (1989:29, 30).

**Key to Species of *Saron***

1. Rostrum usually longer than carapace; antennal peduncle with inconspicuous distoventral tooth on basicerite; 2nd pereopod with 9-13 carpal articles; 5th pereopod with 1 or 2 subdistal meral spines . . . . . 2
- Rostrum usually shorter than carapace; antennal peduncle with prominent distoventral tooth on basicerite; 2nd pereopod with 14-17 carpal articles; 5th pereopod without subdistal meral spine . . . . . 3
2. Orbital margin single; antennular peduncle without erect spine on 3rd segment; 2nd pereopod with movable finger not finely serrate on opposable margin . . . . . \*90. *S. marmoratus*
- Orbital margin double; antennular peduncle with erect spine on 3rd segment; 2nd pereopod with movable finger finely serrate on opposable margin . . . . . 91. *S. neglectus*
3. Rostrum dorsally concave, curving upward in distal 1/2, 2/5 to 3/5 as deep as long, ventral teeth decreasing in size anteriorly . . . . . 89. *S. inermis*
- Rostrum dorsally convex, curving downward in distal 1/2, 4/5 as deep as long, ventral teeth subequal in size . . . . . 92. *S. rectirostris*

**89. *Saron inermis* Hayashi, 1983**

*Saron* sp. Grosskopf, 1982:381, 1 figure.  
*Saron inermis* Hayashi, 1983:117 [type locality: Indonesia]; 1989:27, figs. 5-8, photos 2, 3.

DIAGNOSIS.—Rostrum shorter than carapace, curved upward in distal 1/2. Carapace with double orbital margin. Antennular peduncle without erect spine on 3rd segment. Antennal peduncle with prominent distoventral tooth. Second pereopod with movable finger smooth, not finely serrate, on opposable

margin, carpus composed of 14-17 articles. Fifth pereopod without subdistal spine on merus. Maximum postorbital carapace length about 12 mm.

RANGE.—Okinawa and Indonesia.

**\*90. *Saron marmoratus* (Olivier, 1811)**

*Palaemon marmoratus* Olivier, 1811:663 [type locality: Australia].  
*Hippolyte gibberosus* H. Milne Edwards, 1837:378 [type locality: Australia].  
*Hippolyte Leachii* Guérin-Méneville, 1838:37 [type locality: Kusaie, Caroline Islands].

*Hippolyte Hemprichii* Heller, 1861:29 [type locality: Red Sea].

*Hypolite Kraussii* Bianconi, 1869:200, pl. 10: fig. 2a [type locality: Mozambique].

*Saron marmoratus*.—Ortmann, 1894:15.—Holthuis, 1947:25.—Healy and Yaldwyn, 1970:5 [color photo].—Debelius, 1984:60 [color photo].

*Nauticaris grandirostris* Pearson, 1905:79, pl. 1: fig. 6 [type locality: Galle, Sri Lanka].

**DIAGNOSIS.**—Rostrum usually longer than carapace, curved upward. Carapace with single orbital margin. Antennular peduncle without erect spine on 3rd segment. Antennal peduncle with basicerite lacking prominent distoventral tooth. Second pereopod with movable finger smooth, not finely serrate, on opposable margin, carpus composed of 9–13 articles. Fifth pereopod with 2 subdistal spines on merus. Fourth pleopod with appendix interna attached to endopod over much of length. Maximum postorbital carapace length about 13 mm.

**MATERIAL.**—SOUTH CHINA SEA. Southeast of Hong Kong, near sta 5300, 20°31'N, 115°49'E, from seaweed: 1 male [4.7].

**PHILIPPINES.** Maculabu Island [14°24'N, 122°49'E], 14 Jun 1909: 2 ovig. females [6.0, 9.1].—Canimo Island [14°07'N, 123°04' E], tide pool, 15 Jun 1909: 2 males [8.8, 8.8] 1 ovig. female [7.9].—Batan Island [13°15'N, 124°00'E], tide pool, 5 Jun 1909: 1 ovig. female [7.0].

**INDONESIA.** Tomahu Island, Buru [3°14'S, 126°04'E], tide pools: 2 males [6.1, 6.5].

**RANGE.**—Red Sea and eastern Africa to Hawaii, Marquesas Islands, and Tuamotu Archipelago (the type locality of Australia cited for *Palaemon marmoratus* and *Hippolyte gibberosus* is uncertain); littoral.

### 91. *Saron neglectus* De Man, 1902

*Saron neglectus* De Man, 1902:854, pl. 26: fig. 58 [type locality: Ternate, Indonesia].—Holthuis, 1947:30.—Miyake and Hayashi, 1966:146, figs. 2, 3d-f.

**DIAGNOSIS.**—Rostrum usually longer than carapace, curved upward. Carapace with double orbital margin. Antennular peduncle with erect spine on 3rd segment. Antennal peduncle with basicerite lacking prominent distoventral tooth. Second pereopod with movable finger finely serrate on opposable margin, carpus composed of 9–13 articles. Fifth pereopod with 1 subdistal spine on merus. Fourth pleopod with appendix interna attached to endopod over much of length. Maximum postorbital carapace length more than 7 mm.

**RANGE.**—Red Sea and eastern Africa to Johnstone Island; littoral.

### 92. *Saron rectirostris* Hayashi, 1984

*Saron rectirostris* Hayashi, 1984:116 [type locality: Indonesia]; 1989:23, figs. 1–4, photo 1].

**DIAGNOSIS.**—Rostrum shorter than carapace, dorsal margin curved downward. Carapace with double orbital margin.

Antennular peduncle without erect spine on 3rd segment. Antennal peduncle with prominent distoventral tooth. Second pereopod with movable finger smooth, not finely serrate, on opposable margin, carpus composed of 14–17 articles. Fifth pereopod without subdistal spine on merus. Fourth pleopod with appendix interna attached to endopod only at base. Maximum postorbital carapace length fully 12 mm.

**RANGE.**—Indonesia.

### *Thor* Kingsley, 1878

*Thor* Kingsley, 1878b:94 [type species, by monotypy: *Thor floridanus* Kingsley, 1878b:95; gender: masculine].

**DIAGNOSIS.**—Integument not rigid. Rostrum not overreaching antennular peduncle, armed dorsally with 28 teeth, ventrally with 0–2, without ventral blade, without tongue-like lobe extending ventrally from lateral carina. Carapace without discrete dentate crest in midline at base of rostrum, without longitudinal lateral carinae, without appressed teeth on lateral surface, without abrupt depressions on frontal or orbital regions, without subocular tooth posterodorsal to orbital angle, latter not large, with antennal tooth, latter not basally articulated, without hepatic tooth, without branchiostegal tooth or denticles, usually without pterygostomial tooth. Abdominal somites not dorsally carinate or posteromesially dentate, 1st pleuron not bifurcate, 4th and 5th pleura pointed, not denticulate; 6th somite not armed with 7 strong spines, without plate articulated at posteroventral angle, pleuron not curving around base of uropod. Telson not tapering gradually to sharp point, posterolateral angles not sharply produced. Eyestalk movable, not concealed by carapace, cornea with ocellus. Antennule with stylocerite often lying in vertical plane, not bifid or semicircular; 3rd peduncular segment with movable dorsodistal plate; dorsolateral flagellum stout, brush-like. Antennal peduncle seldom overreaching antennular peduncle, not armed with 3 strong ventral spines; antennal scale overreaching antennular peduncle, without lateral tooth near midlength or small movable lateral spines. Mandible without palp, with incisor process. First maxilliped with caridean lobe usually discrete from exopodal lash, epipod bilobate. Second maxilliped with terminal segment elongate triangular and applied somewhat diagonally to preceding segment, exopod not unusually wide. Third maxilliped with distal segment not flattened, with exopod, usually with epipod and coxal endite, without arthrobranch. Pereopods without exopods, epipods, or arthrobranches. First pereopod with fingers shorter than palm, not terminating in interlocking spines, chela 1<sup>2</sup>/<sub>5</sub> to 1<sup>9</sup>/<sub>10</sub> as long as carpus, carpus not deeply excavate for reception of chela. Second pereopods symmetrical, fingers shorter than palm, carpus subdivided into 6 (or 7) articles. Third pereopod with dactyl and propodus prehensile in functional males. Fourth and

5th pereopods with dactyl not gradually tapering to acute apex, biunguiculate, armed with spines proximally on flexor margin, propodus not subdivided. Uropod with lateral margin of lateral branch terminating in fixed tooth with longer, movable spine mesial to it.

RANGE.—Pantropical from Red Sea and South Africa to Ascension Island, South Atlantic; to a depth of 58 meters. Thus far, the genus is unreported from the eastern Atlantic.

REMARKS.—There seems to be little doubt that the species described by Borradaile (1915:208) as *Thor maldivensis* and subsequently consistently recognized by that name cannot be accommodated in this genus. It differs from the type species

and the other species assigned to the genus by (1) the presence of only a single tooth on the dorsal margin of the rostrum and none on the concave ventral margin, (2) six, rather than two to four, posterior spines on the telson, (3) grossly “sexually” dimorphic first pereopods, (4) two, rather than commonly three to six spines (proximal to the terminal pair) on the flexor margins of the dactyls of the fourth and fifth pereopods, and (5) most significantly, no vestige of an appendix masculina on the otherwise somewhat modified endopod of the second pleopod, rather than the prominent, densely setose appendix characteristic of *Thor*. The ten species remaining in that genus after this deduction may be distinguished by the following key.

**Key to Species of *Thor***

1. Supraorbital tooth distinct . . . . . 2  
    Supraorbital tooth typically reduced to indistinct protuberance or absent . . . . . 3
2. Telson with posterior margin mesially acute and armed with 2 pairs of spines and 1 mesial pair of plumose spines or setae; 4th and 5th pereopods with dactyl fully 3 times as long as wide . . . . . *T. spinipes* (Bruce, 1983b:1, figs. 1–6)  
    (Cobourg Peninsula, Northern Australia; littoral)  
    Telson with posterior margin convex, not mesially acute, armed with 2 pairs of spines and 2 mesial pairs of plumose setae; 4th and 5th pereopods with dactyl twice as long as wide . . . . . 96. *T. spinosus*
3. Carapace with anterolateral margin obscurely angulate . . . . . 4  
    Carapace with anterolateral margin rounded . . . . . 5
4. Carapace with minute pterygostomian tooth; telson bearing 4 pairs of posterior spines; antennal scale with distolateral tooth not nearly overreaching blade; 1st pereopod with chela not tapered or strongly compressed . . . . . 93. *T. amboinensis*  
    Carapace without pterygostomian tooth; telson bearing 3 pairs of posterior spines; antennal scale with distolateral tooth slightly overreaching blade; 1st pereopod with chela tapered and clearly compressed . . . . .  
    . . . . . *T. marguitae* (Bruce, 1978:159, figs. 1–6)  
    (Heron Island, Capricorn Islands, Australia)
5. Telson with 1 pair of barely visible lateral spines in distal 1/4 of length . . . . .  
    . . . . . 94. *T. intermedius*  
    Telson with 2–5 pairs of distinct dorsolateral spines . . . . . 6
6. Antennular peduncle without lateral projection near proximal end of stylocerite . . . . . 95. *T. paschalis*  
    Antennular peduncle with lateral protuberance near proximal end of stylocerite . . . . . 7
7. First pereopod with 1 or 2 small spines in distal 1/2 of flexor margin of merus . . . . .  
    . . . . . *T. dobkini* (Chace, 1972:133, fig. 57)  
    (Western Atlantic from North Carolina to Yucatan and north coast of Cuba; to a depth of 14 meters)  
    First pereopod with distal 1/2 of flexor margin of merus unarmed . . . . . 8

8. Telson usually bearing 5 pairs of dorsolateral spines; 2nd pereopod with 6th carpal article longest; 4th and 5th pereopods with flexor member of 2 terminal spines on dactyl wider than extensor member . . . . .  
 . . . . . *T. algicola* (Wicksten, 1987:27, figs. 1-3)  
 (Eastern Pacific from Gulf of California  
 to Panama; to a depth of 20 meters)
- Telson usually bearing 3 or 4 pairs of dorsolateral spines; 2nd pereopod with 3rd carpal article longest; 4th and 5th pereopods with 2 terminal spines on dactyl subequal . . . . . 9
9. Fourth and 5th pereopods with dactyl usually armed with 4 or 5 spinules on flexor margin proximal to distal pair of strong spines; eggs large and few, increasing in major diameter during development from 0.66 to 1.40 mm . . . . .  
 . . . . . *T. floridanus* (Kingsley, 1878b:95)  
 (Western Atlantic from North Carolina  
 to Yucatan; to a depth of 58 meters)
- Fourth and 5th pereopods with dactyls usually armed with 3 spinules on flexor margin proximal to distal pair of strong spines; eggs numerous and not very large, increasing in major diameter during development from 0.36 to 0.73 mm . . . . .  
 . . . . . *T. manningi* (Chace, 1972:137, figs. 59-61)  
 (Western Atlantic from Bermuda and North  
 Carolina to Alagoas, Brazil, and Ascension  
 Island; to a depth of 44 meters)

### 93. *Thor amboinensis* (De Man, 1888)

*Hippolyte amboinensis* De Man, 1888:535 [type locality: Ambon, Indonesia].  
*Thor discosomatis* Kemp, 1916:388, fig. 1, pl. 36: fig. 1 [type locality: Port Blair, Andaman Islands].  
*Thor amboinensis*.—Holthuis, 1947:50.—Chace, 1972:130, figs. 55, 56.

DIAGNOSIS.—Rostral formula: 0-1 + 1-3/0-1. Carapace without supraorbital tooth, with anterolateral margin obscurely angulate, with minute pterygostomial tooth. Telson with inconspicuous mesial tooth on posterior margin, with 3 or 4 pairs of dorsolateral and 4 pairs of posterior spines. Antennular peduncle with blunt lateral projection near proximal end of stylocerite. Antennal scale with distolateral tooth not reaching level of distal margin of blade. First pereopod with chela not distinctly more slender than carpus, not tapered or strongly compressed, merus unarmed on flexor margin. Second pereopod with 3rd article of carpus longest. Fourth and 5th pereopods with dactyl 3 times as long as high, armed with 3 or 4 spines proximal to terminal pair, flexor member of that pair not clearly stouter than extensor member. Appendix masculina not overreaching endopod of 2nd pleopod. Egg size increasing in major diameter from 0.48 in newly laid egg to 0.70 at maturity. Maximum postorbital carapace length more than 2.3 mm.

RANGE.—Kenya, Madagascar, Bay of Bengal, Japan, Indonesia, and Caroline Islands, and the western Atlantic from Bermuda, Florida Keys, and Yucatan to Tobago; associated with sea anemones and corals. It is possible that direct comparison of Indo-Pacific and western Atlantic populations will eventually reveal characters by which the component

specimens may be distinguished, especially if *T. amboinensis* should become popular in the aquarium trade.

### 94. *Thor intermedius* Holthuis, 1947

*Thor intermedius* Holthuis, 1947:14, 51, figs. 4-6 [type locality: "Sissie" near Misool, Indonesia; shore and reef].—Bruce, 1976, fig. 22D [rostrum].

DIAGNOSIS.—Rostral formula: 1 + 2/0. Carapace without supraorbital tooth, with anterolateral margin rounded, without pterygostomial tooth. Telson rounded posteriorly, apparently without median tooth on posterior margin, with 1 pair of barely visible lateral spines on posterior 1/4 of length, with 4 pairs of posterior spines. Antennular peduncle with lateral spinule near proximal end of stylocerite. Antennal scale with distolateral tooth not quite reaching level of distal margin of blade. First pereopod with chela distinctly more slender than carpus, with chela not tapered or strongly compressed, merus unarmed on flexor margin. Fourth and 5th pereopods with dactyl about 3 times as long as high, flexor member of terminal pair of spines not clearly stouter than extensor member. Postorbital carapace length about 2 mm.

RANGE.—Known only from the holotype from Indonesia.

### 95. *Thor paschalis* (Heller, 1862)

*Hippolyte paschalis* Heller, 1862b:276, pl. 3: fig. 24 [type locality: Red Sea].  
*Thor paschalis*.—Kemp, 1914:94, pl. 1: figs. 6-10.—Holthuis, 1947:49.—Bruce, 1976: fig. 22B [rostrum].

DIAGNOSIS.—Rostral formula: 0 + 3-4/1. Carapace without supraorbital tooth, with anterolateral margin rounded. Telson

with inconspicuous mesial tooth on posterior margin, with 3 pairs of posterior spines. Antennular peduncle without lateral projection near proximal end of stylocerite. Antennal scale with distolateral tooth slightly overreaching blade. First pereopod with chela not distinctly more slender than carpus, not tapered or strongly compressed, merus unarmed on flexor margin. Second pereopod with 3rd article of carpus longest. Fourth and 5th pereopods with dactyl about 3 times as long as high, armed with 3 spines proximal to terminal pair, flexor member of that pair not clearly stouter than extensor member. Maximum postorbital carapace length more than 1.5 mm.

RANGE.—Because the older records of *T. paschalis* were made before the absence of a lateral projection on the stylocerite was adopted as a diagnostic character, the true distribution of the species is not yet fixed. It almost certainly occurs at least from the Red Sea to Japan, the Philippines, Indonesia, and the Mariana Islands.

#### 96. *Thor spinosus* Boone, 1935

*Thor spinosus* Boone, 1935:192, pl. 52 [type locality: Bali, Indonesia].—Bruce, 1976:51, figs. 16–21, 23.

DIAGNOSIS.—Rostral formula: 0–1 + 2–5/0. Carapace with distinct supraorbital tooth, with anterolateral margin rounded, without pterygostomial tooth. Telson with mesial tooth on posterior margin, with 3 pairs of dorsolateral and 2 pairs of posterior spines and 2 mesial pairs of plumose setae. Antennular peduncle with small erect lateral tooth near proximal end of stylocerite. Antennal scale with distolateral tooth not reaching level of distal margin of blade. First pereopod with chela not distinctly more slender than carpus, not tapered or strongly compressed, merus unarmed on flexor margin. Second pereopod with 3rd article of carpus longest. Fourth and 5th pereopods with dactyl stout, only twice as long as high, armed with 2–3 spines proximal to terminal pair, flexor member of that pair much stouter than extensor member. Appendix masculina not overreaching endopod of 2nd pleopod. Maximum postorbital carapace length nearly 3 mm.

RANGE.—Kenya, Seychelle Islands, Ryukyu Islands, and Indonesia; associated with corals.

#### \**Tozeuma* Stimpson, 1860

*Tozeuma* Stimpson, 1860:26 [type species, by monotypy: *Tozeuma lanceolatum* Stimpson, 1860:27; gender: neuter].

DIAGNOSIS.—Integument not rigid. Rostrum overreaching antennular peduncle, armed ventrally, rarely dorsally, with ventral blade, latter not projecting far posteroventrally between bases of antennulas, without tongue-like lobe extending ventrally from lateral carina. Carapace without dentate crest in midline at base of rostrum, without longitudinal lateral carinae, without appressed teeth on lateral surface, without abrupt depressions on frontal or orbital regions, without subocular tooth posterodorsal to orbital angle, latter not especially large, usually with antennal tooth, latter not basally articulated,

without distinct hepatic tooth, branchiostegal margin not denticulate, with or without branchiostegal tooth, with or without pterygostomial tooth. Abdomen with 6th somite not armed with 7 strong spines, without plate articulated at posteroventral angle, pleuron not curving around base of uropod. Telson not tapering gradually to sharp point. Eyestalk movable, not concealed by carapace, cornea without ocellus. Antennular peduncle with stylocerite not usually lying in vertical plane, not bifid or semicircular; 2nd peduncular segment without sharp curved lateral tooth; 3rd peduncular segment without sharp tooth or movable dorsodistal plate; dorsolateral flagellum stout, brush-like. Antennal peduncle seldom overreaching antennular peduncle, not armed with 3 strong ventral spines; antennal scale overreaching antennular peduncle, without lateral tooth near midlength or small movable lateral spines. Mandible without palp or incisor process. First maxilliped with caridean lobe usually discrete from exopodal lash, epipod not bilobate. Second maxilliped with terminal segment broadly rounded, applied obliquely to preceding segment, exopod not unusually wide. Third maxilliped with distal segment flattened, without exopod, with arthrobranch but without epipod or coxal endite. Pereopods without exopods, epipods, or arthrobranchs. First pereopod with fingers shorter than palm, not terminating in interlocking spines, chela nearly 1½ times as long as carpus, carpus not deeply excavate to receive chela. Second pereopods symmetrical, fingers shorter than palm, carpus subdivided into 3 articles. Third pereopod with dactyl and propodus not prehensile in functional males, dactyl usually tapering gradually to acute apex, armed with spines on flexor margin, propodus not subdivided. Uropod with lateral margin of lateral branch terminating in fixed tooth with movable spine mesial to it.

RANGE.—Red Sea and South Africa to Hong Kong, Japan, Philippines, Indonesia, Australia, New Zealand, and western Atlantic from Massachusetts to Bahia, Brazil; to a depth of 135 meters.

REMARKS.—The apparently substantial eastern Pacific and eastern Atlantic gaps in the otherwise pantropical distribution of *Tozeuma*, coupled with suggestive morphological variances, may one day be reflected in the generic classification. It is not beyond the realm of possibility that the genus *Angasia* may yet be resurrected for the aberrant species of *Tozeuma*. The type species of the latter genus, *T. lanceolatum*, and the probably closely related *T. armatus* have the telson tip deeply cleft, whereas *T. pavoninum* (the type species of *Angasia*) together with *T. carolinense*, *T. elongatum*, *T. erythraeum*, *T. novaezealandiae*, *T. serratum*, and *T. tomentosum*, seem to have the posterior margin of the telson transverse or slightly convex for insertion of the series of posterior spines; the configuration of the telson in the other two species (*T. cornutum* and *T. kimberi*) is unknown (the specimen of the former species from Saint John, Virgin Islands, mentioned by Chace (1972:141) is no longer immediately available for examination). The 11 species currently recognized in the genus may be identified from the following key.

Key to Species of *Tozeuma*

1. Carapace with supraocular tooth . . . . . 2  
Carapace without supraocular tooth . . . . . 4
2. Without median dorsal spine or teeth on carapace or rostrum . . . . .  
. . . . . *T. carolinense* (Kingsley, 1878b:90)  
(Western Atlantic from Massachusetts to  
Bahia, Brazil; to a depth of 75 meters)  
With median dorsal spine or teeth on carapace or rostrum . . . . . 3
3. Median dorsal spine on carapace at base of rostrum; 3 or 4 teeth on ventral margin  
of rostrum; abdomen with 4th and 5th somites dentate posteromesially; 2nd  
pereopod with 1st carpal article about as long as 2nd and 3rd articles together  
. . . . . *T. erythraeum* (Nobili, 1904:231)  
(Red Sea)  
About 5 teeth on dorsal margin of rostrum; 10–14 teeth on ventral margin; abdomen  
not posteromesially dentate on any somites; 2nd pereopod with 1st carpal article  
about  $\frac{3}{4}$  as long as 2nd and 3rd articles together . . . . .  
. . . . . *T. serratum* (A. Milne-Edwards, 1881:16)  
(Western Atlantic from Massachusetts to Gulf of  
Mexico, Barbados, and Colombia; 4–128 meters)
4. Integument hirsute . . . . . 5  
Integument smooth and bare . . . . . 6
5. Rostrum with 9 teeth on ventral margin; ambulatory pereopods with dactyls simple,  
not biunguiculate . . . . . *T. novaezealandiae* (Borradaile, 1916:86, fig. 3)  
(New Zealand)  
Rostrum with 5 teeth on ventral margin; ambulatory pereopods with dactyls  
biunguiculate . . . . . *T. tomentosum* (Baker, 1904:152, pl. 29)  
(Japan and South Australia; 37–50 meters)
6. Less than 10 teeth on ventral margin of rostrum; 5th abdominal somite without teeth  
on posterior margin of pleuron . . . . . 7  
More than 10 teeth on ventral margin of rostrum; 5th abdominal somite with 1 or 2  
teeth on posterior margin of pleuron . . . . . 8
7. Abdomen in adults with 3rd somite bearing long rod-like dorsal projection recurved  
posteriorly and bidentate terminally; 2nd pereopod with proximal carpal article  
subequal in length to 2 distal articles together . . . . .  
. . . . . *T. cornutum* (A. Milne-Edwards, 1881:16)  
(Western Atlantic: Florida Keys, Saint John (Virgin  
Islands), and off Barbados; 73 meters)  
Abdomen with 3rd somite without dorsal projection of any kind; 2nd pereopod with  
proximal carpal article subequal in length to distalmost segment alone  
. . . . . *T. pavoninum* (Bate, 1863:498, pl. 40: fig. 1)  
(Saint Vincent Gulf, South Australia; 8–22 meters)
8. Abdomen with 3rd to 5th somites dentate posteromesially . . . . . 9  
Abdomen without posteromesial teeth on any somites . . . . . 10
9. Rostrum less than twice as long as remainder of carapace; abdomen with 3rd somite  
with sharp dorsal carina terminating posteriorly in single large curved tooth  
. . . . . 97. *T. armatum*  
Rostrum 2 or 3 times as long as remainder of carapace; abdomen with 3rd somite  
with dorsal carina flattened, typically terminating posteriorly in 3 teeth  
. . . . . \*98. *T. lanceolatum*
10. Carapace not markedly depressed anteriorly . . . . .  
. . . . . *T. elongatum* (Baker, 1904:147, pl. 27: figs. 1–4)  
(South Australia; 27 meters)  
Carapace dorsally depressed anteriorly . . . . .  
. . . . . *T. kimberi* (Baker, 1904:149, pl. 27: fig. 5)  
(South Australia; 7 meters)

**97. *Tozeuma armatum* Paulson, 1875**

*Tozeuma armatum* Paulson, 1875:99, pl. 15: figs. 2–20 [type locality: Red Sea].

*Angasia armata*.—Holthuis, 1947:61, figs. 10, 11.

**DIAGNOSIS.**—Integument smooth, not hirsute. Rostrum less than twice as long as remainder of carapace, unarmed dorsally, armed ventrally with 10–30 teeth. Carapace without median tooth at base of rostrum, without supraocular tooth. Abdomen with somites 3–5 dentate posteromesially, 3rd somite with dorsal carina sharp, not flattened, without rod-like projection; 5th somite with 1 or 2 teeth on posterior margin of pleuron. Telson posteriorly bifid. Maximum postorbital carapace length 8.5 mm.

**RANGE.**—Red Sea, South Africa, Indian Ocean, Japan, Indonesia, and New Caledonia.

**REMARKS.**—See generic “Remarks.”

**\*98. *Tozeuma lanceolatum* Stimpson, 1860**

FIGURE 29

*Tozeuma lanceolatum* Stimpson, 1860:27 [type locality: Hong Kong].—Bruce, 1990c:594, figs. 18–22.

**DIAGNOSIS.**—Integument smooth, not hirsute. Rostrum fully twice as long as remainder of carapace, unarmed dorsally, armed ventrally with 20–40 teeth. Carapace without dorsomesial tooth at base of rostrum, without supraocular tooth. Abdomen with somites 3–5 dentate posteriorly, 3rd somite with flattened dorsal “carina,” typically tridentate posteriorly, without rod-like projection, 5th somite with 2 teeth on posterior margin of pleuron. Telson posteriorly bifid. Ambulatory pereopods with dactyl simple, not biunguiculate, with series of spines on flexor margin. Maximum postorbital carapace length 11.0 mm.

**MATERIAL.**—PHILIPPINES. Malampaya Sound, northwestern Palawan, sta 5342, 10°56'55"N, 119°17'24"E, 26–46 m, gray mud, 23 Dec 1908 (1435–1454), 9' Tanner beam trawl: 1 ovig. female [10.0].—Surigao Strait, east of Leyte, sta 5483,

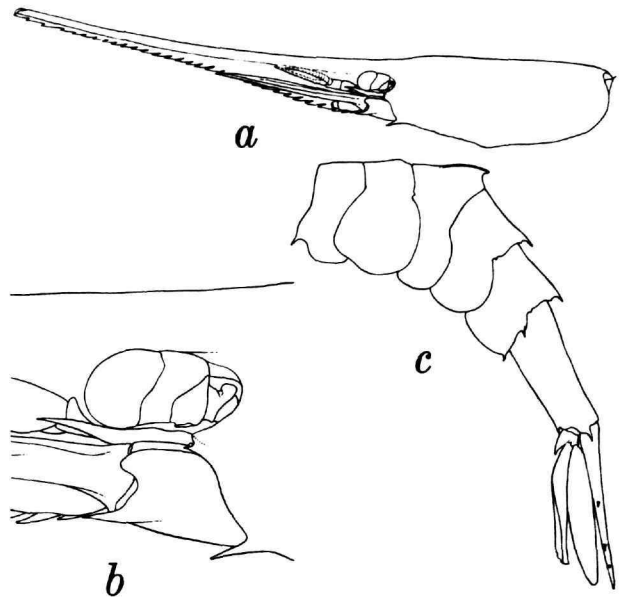


FIGURE 29.—*Tozeuma lanceolatum*, ovigerous female with carapace length of 10.0 mm from *Albatross* sta 5342: a, carapace and anterior appendages, left aspect; b, anterior carapace, left aspect; c, abdomen, left aspect.

10°27'30"N, 125°19'15"E, 135 m, sand, broken shells, 30 Jul 1909 (1000–1021), 12' Agassiz beam trawl: 1 female [9.3].

**RANGE.**—Singapore, Hong Kong, Philippines; to 135 meters.

**REMARKS.**—See generic “Remarks.”

Both Philippine specimens lack the lateral teeth at the posterior end of the flattened dorsal carina of the third abdominal somite, but both of them show evidence of injury in that area resulting in damage to the median posterior tooth and that circumstance may be responsible for the loss of the lateral teeth as well.

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