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ON SOME LITTORAL SHRIMPS COLLECTED  
FROM MICRONESIA

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# On Some Littoral Shrimps Collected from Micronesia<sup>(1)</sup>

Ituo KUBO

(Received April 16, 1940)

Some littoral shrimps obtained from Kusaie and Palau Islands were placed at my disposal through the courtesy of Dr. Teiso ESAKI of the Kyūshū Imperial University. They are referable to seven species belonging to four families and six genera. Of these, two, namely, *Athanas esakii* and *Synalpheus kusaiensis*, proved to be new to science and it is with honour that the former is dedicated to Dr. ESAKI. Two other species, viz., *Stenopus hispidus* OLIVIER and *Gnathophyllum americanum* GUÉRIN, are the cosmopolitan and all the others are Indo-Pacific forms.

In this study, the present author has endeavoured to make accurate observation on mouth-parts and pleopods in order to supplement the papers already published on these shrimps by many authors.

Body length, unless otherwise noted, is measured from orbital notch to distal margin of telson.

I wish to express my hearty thanks to Professor Arata TERAO for his kind supervision during the course of this study, and also to Dr. Teiso ESAKI for his favour of the valuable specimens.

## Family HIPPOLYTIDAE BATE (1888)

BATE, 1888, p. 576; ORTMANN, 1891, p. 493; RATHBUN, 1902, p. 113;  
SCHIMMEL, 1921, p. 47.

### *Lysmata chiltoni* KEMP

(Text-figs. 1~4)

*Lysmata chiltoni*, KEMP, 1914, pp. 110~112, Pl. 6, figs. 1~4.

Mandible without both incisor process and palp, molar process furnished with a band of setae near its distal margin (Fig. 1, A). Maxillule

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(1) Contribution from the Zoological Laboratory, Imperial Fisheries Institute, No. 103.

Results of Professor T. ESAKI's Micronesia Expeditions, 1936-'38, No. 36.

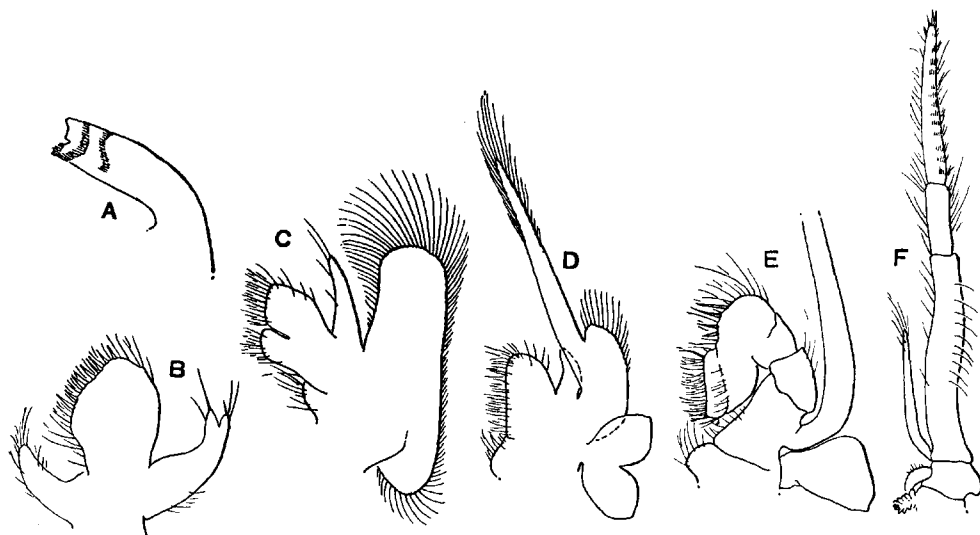


Fig. 1. Mouth-parts of *Lysmata chiltoni* KEMP. *A*, mandible,  $\times 35$ ; *B*, first maxilla,  $\times 35$ ; *C*, second maxilla,  $\times 25$ ; *D*, first maxilliped,  $\times 20$ ; *E*, second maxilliped,  $\times 25$ ; *F*, third maxilliped,  $\times$  ca. 10.

cross-shaped, inner endite slender, endopodite provided with apical lobe (Fig. 1, *B*). Maxilla with ear-shaped exopodite; endopodite papilla-like and unsegmented; inner distal lacinia broad, divided distally into two distal broader and proximal narrower lobes; inner proximal lacinia rudimentary (Fig. 1, *C*). All three maxillipeds provided with exopodite. First maxilliped carries rather narrow lobe on basal outer margin of exopodite, endopodite thumb-like. Third maxilliped pediform, penultimate segment a little shorter than half of last segment, and antepenult one still shorter (Fig. 1, *D*~*F*). First cheliped about half times as long as body, ratios against movable finger: palm 1.5, carpus and merus 2, ischium 1; both fingers with almost straight cutting edges and inturned tips (Fig. 3, *A*). Second leg very slender, more or less shorter than body, palm and movable finger subequal in length, proportions to chela: carpus 7.0, merus and ischium about 3.5; both fingers unarmed, movable finger decidedly longer than fixed one; ischium, merus and carpus annulated such as 4, 14, 23 respectively (Fig. 3, *B*). Third one somewhat stouter and shorter than second one, ratios against dactylus: propodus 3.5, carpus 2.5, merus 5.0, ischium 1.2; dactylus armed with three bristles along posterior margin, propodus provided with six equidistant bristles along posterior margin

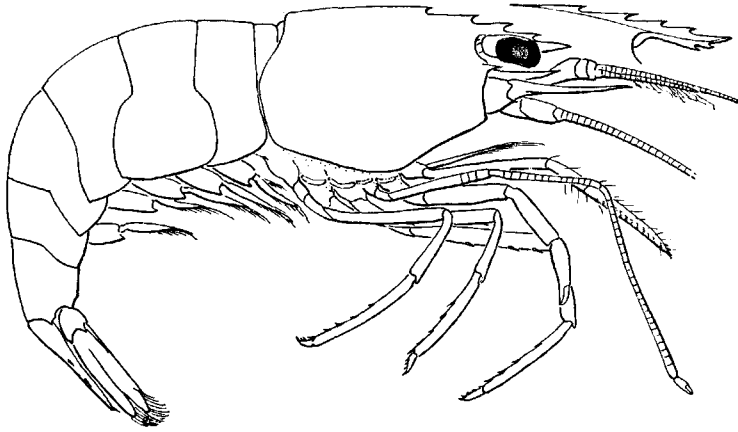


Fig. 2. *Lysmata chiltoni* KEMP, ♂, × 6.

(Fig. 3, *C*). Fourth and fifth legs closely resemble third one in general aspect, but somewhat shorter. Endopodite of first abdominal appendage tapering in both sexes, but without tuft of microscopic curled hairs on its distal border in female (Fig. 4, *A* and *F*). Endopodite of second pleopod provided with a shorter stylamblys and a longer appendix musculina in male (Fig. 4, *B*), but stylamblys only in female (Fig. 4, *G*).

Branchial arrangement of posterior five segments of thorax is as follows:—

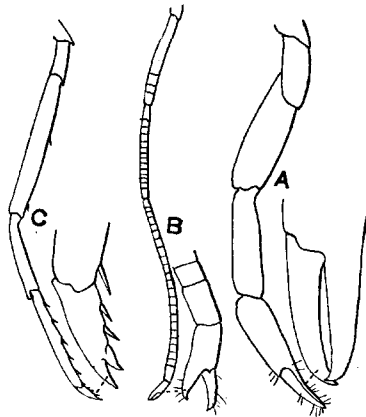


Fig. 3. Body parts of *Lysmata chiltoni* KEMP. *A*, first thoracic leg, × ca. 10; *B*, second thoracic leg, × 6; *C*, third thoracic leg, × 6.

	IV	V	VI	VII	VIII
Pleurobranchiae	1	1	1	1	1
Arthrobranchiae	—	—	—	—	—
Podobranchiae	—	—	—	—	—
Mastigobranchiae	1	1	1	1	—

The above mentioned description and figures are based on a male specimen measuring 12.0 mm in body length. One ovigerous female, 18.0 mm long and three males ranging 6.0~9.0 mm in body length were also examined.

Locality: Kusaie, Caroline Islands.

Distribution: Meyer Island (Kermadec).

*Note:* The appendix masculina of endopodite of second pleopod appears even in such a small specimen measuring 6.0 mm in body length, although it is still shorter than the stylamblys (Fig. 4, *E*), thus enabling one to easily distinguish both sexes of this shrimp.

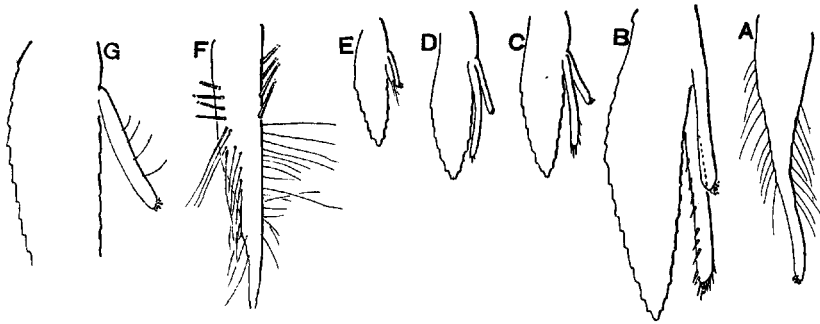


Fig. 4. First (*A* and *F*) and second (*B*~*E* and *G*) pleopods of male (*A*~*E*) and female (*F* and *G*) of different body length. All figures are magnified 35 times. *A*, *B*, 16 mm long; *C*, 9 mm; *D*, 8 mm; *E*, 6 mm; *F*, and *G*, 12 mm.

As described above, the specimens at my disposal are discrepant from KEMP's description of this species in some points, especially in the number of articulation of merus and carpus of second leg, but such differences are nothing but individual variations.

### *Saron marmoratus* (OLIVIER)

(Text-figs. 5~6)

*Hippolyte marbré*—*H. marmoratus*, MILNE-EDWARDS, 1837, p. 379, pl. 25, fig. 8.

*Hippolyte gibbosus*, DANA, 1852, p. 565, pl. 36, fig. 4.

*Saron marmoratus*, BORRADAILE, 1898, p. 1009; KEMP, 1914, p. 84.

*Saron gibberosus*, DE MAN, 1903, p. 852, pl. 1, fig. 1; COUTIÈRE, 1910, p.

71.

Body moderate, shell smooth. Rostrum large, laterally compressed and remarkably curved upwards in distal half, about 1.2 times as long as carapace, dorsal carina extending backwards to anterior two-thirds of carapace, six teeth on upper border: three outside and three inside frontal margin of carapace, lower border provided with seven teeth (Fig. 5, *A*). Suborbital spine well developed, branchiostegal one present but small, pterygostomian angle spiniform. Sixth abdominal segment with movable spinule on each side near base of uropod (Fig. 5, *B*). Telson subrectangular but gradually decreasing its width posteriorly, each dorso-alteral margin armed with two bristles dividing it into three intervals with ratios, 1.4:1:1.4, distal margin ends in a minute spiniform process at middle, armed with two pairs of outer shorter and inner longer bristles (Fig. 5, *B*). Antennular peduncle

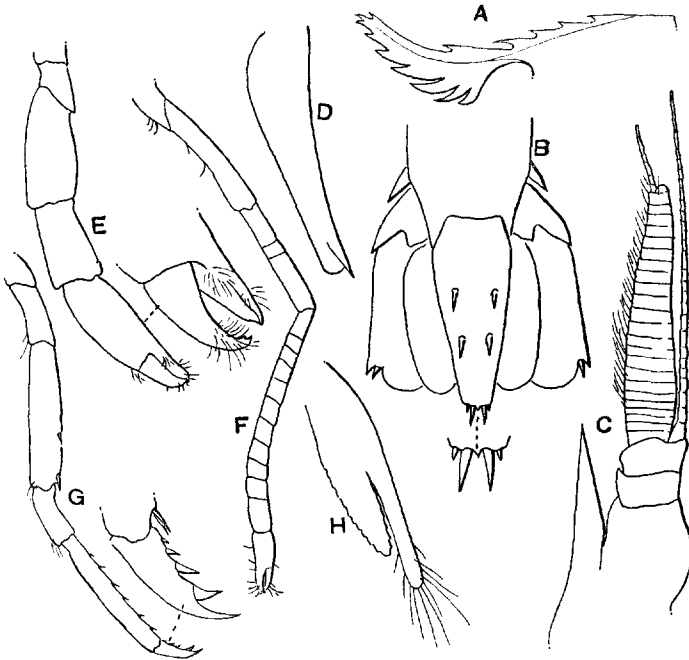


Fig. 5. Body parts of *Saron marmoratus* (OLIVER), ♂. *A*, rostrum,  $\times$  ca. 10; *B*, tail fan,  $\times$  ca. 10; *C*, antennule,  $\times$  ca. 10; *D*, antennular scale,  $\times$  6; *E*, first thoracic leg,  $\times$  ca. 7; *F*, second thoracic leg,  $\times$  ca. 7; *G*, third leg,  $\times$  6; *H*, endopodite of second pleopod,  $\times$  25.

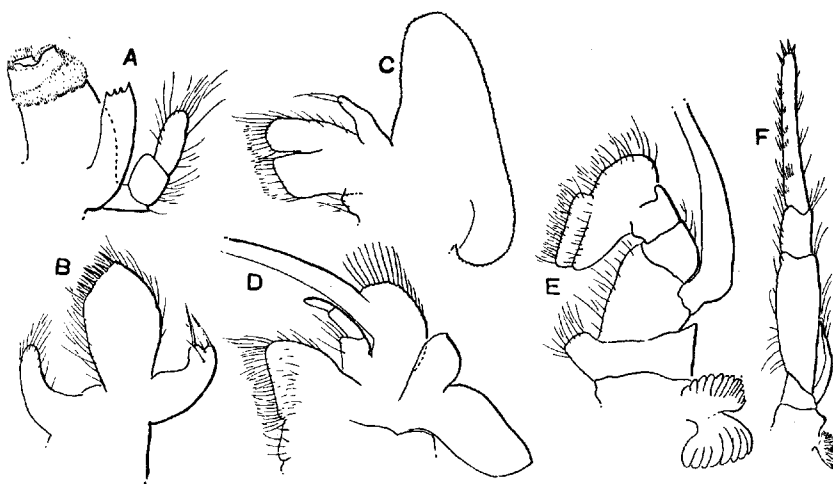


Fig. 6. Mouth-parts of *Saron marmoratus* (OLIVER), ♂. A, mandible,  $\times 25$ ; B, maxillule,  $\times 25$ ; C, maxilla,  $\times 20$ ; D, first maxilliped,  $\times 20$ ; E, second maxilliped,  $\times 20$ ; F, third maxilliped,  $\times 6$ .

3-segmented, its basal segment carries a prominent lateral spine extending beyond distal margin of this peduncle, penultimate and ultimate segments subequal in length and about one-fourth of basal one, ultimate segment provided with an inner thinner and an outer thicker flagella, the latter proximally uniramous with 24 joints and distally biramous with inner shorter and outer longer branches, the inner branch consisting of 6 segments (Fig. 5, C). Antennal scale slender, outer margin terminates in a stout spine reaching well beyond distal margin of lamella (Fig. 5, D). Mandible with three-segmented palp, incisor process bearing four teeth along distal margin, molar process stout, provided with a band of thickly set setae in subterminal region (Fig. 6, A). Maxillule cross-shaped, apical lobe of endopodite rudimentary (Fig. 6, B). Maxilla with unsegmented endopodite, inner proximal endite absent but distal one two-lobed (Fig. 6, C). First maxilliped with three-segmented endopodite, basal outer lobe of exopodite rather small (Fig. 6, D). Third maxilliped stout, pediform, provided with small exopodite, about 0.4 times as long as body, proportions against ultimate segment: penultimate 0.3, antepenult 0.9, tip armed with four bristles (Fig. 6, F). First cheliped rather stout, about 0.3 times as long as body, ratios against movable finger: palm 2.3, carpus 1.8, merus 2.5, movable finger with inturned tip which bears minute subterminal tooth, fixed finger

unarmed (Fig. 5, *E*). Second cheliped slender, a little shorter than half of body, ratios to movable finger: palm 1.5, carpus 8.5, merus 4.5, ischium 5.0, carpus 11-segmented, its 1st and 11th segments equal in length and about twice as long as second to tenth subequal segments, merus three-segmented, middle one the shortest and about one-third of proximal one, distal joint the longest and about one and half times as long as proximal one (Fig. 5, *F*). Third leg slightly shorter than second one, proportions against dactylus: propodus and merus 3.0, carpus and ischium 1.1, merus with two spinules on posterior margin (Fig. 5, *G*), dactylus acutely pointed, somewhat recurved backwards, posterior margin armed with a series of distally larger four teeth.

Fourth leg entirely resembles preceding one in general aspects and proportions. Fifth leg similar to fourth one but merus carries one spinule only near posterior distal margin. Endopodite of first abdominal appendage simple. Endopodite of second pleopod with an appendix interna extending much beyond tip of endopodite (Fig. 5, *H*). Hindmost thoracic sternum armed with a pair of spines. Abdomen provided with two spines on first to third sterna but one middle spine on fourth and fifth sterna.

Branchial formula runs as follows:—

	IV	V	VI	VII	VIII
Pleurobranchiae	1	1	1	1	1
Arthrobranchiae	1	1	1	1	—
Podobranchiae	—	—	—	—	—
Mastigobranchiae	1	1	1	1	—

The above mentioned description and figures are mainly based on a specimen ( $\delta$ ?) measuring 23.0 mm long. Other two specimens ( $\delta$ ?), 13.5 mm and 39.2 mm in body length were also examined, the latter one secured by Mr. S. SAITÔ from Truck Island (Caroline) in 1937.

Locality: Kusaie: Malem; Truck Isl. (S. SAITÔ) (Caroline).

Distribution: Australia (MILNE-EDWARDS); Hawaiian Is. (Randall); Oceania and Malay Archipelago (DANA, DE MAN, BORRADAILE); Ceylon (PEARSON), Mozambique (BIANCONI, HILGENDORF); Zanzibar (ORTMANN); Arabian coast (NOBILI); Red Sea (HELLER, NOBILI); Karachi; Andamans; Port Canning (KEMP).

*Note:* The three specimens which came under my examination are entirely the same in all the important characters. All these, judging from general aspects, appear to be male, though the endopodite of the second



abdominal appendage is provided with an appendix interna only as mentioned above.

It seems that the third maxilliped grows faster than the whole body; the percentage ratio of the maxilliped to the body is 40 in the specimen obtained from the Kusaie, 23 mm long, whereas it is 70 in the specimen from the Truck, 39.2 mm long.

Unfortunately, the descriptions of DE MAN (1903) and COUTÈRE (1910) were not accessible but the specimens under my examination agree well with those of MILNE-EDWARDS (1837), DANA (1852) and KEMP (1914) of this species.

Family GNATHOPHYLLIDAE KINGSLEY (1879)

ORTMANN, 1890, p. 536; RATHBUN, 1902, p. 126; HAY and SHORE, 1918, p. 395; HULT, 1938, p. 6.

*Gnathophyllum americanum* GUÉRIN

(Text-figs. 7~9)

*Gnathophyllum americanum*, RATHBUN, 1902, p. 126.

*Gnathophyllum fasciolatum*, STIMPSON, 1860, p. 28.

Body small. Rostrum short, about one-third of carapace, not reaching to distal margin of antepenult segment of antennular peduncle, obliquely truncate above, upper border armed with five teeth exclusively anterad from posterior margin of orbital notch, but lower border without tooth (Fig. 7, *A*). Antennular spine present, supraorbital and hepatic one absent. Antero-lateral angle of carapace not spiniform. First to fifth abdominal pleura rounded on inferior margin. Telson shorter than uropods, subrectangular but gradually tapering posteriorly to two-fifth its width, distal margin pointed and provided with three pairs of bristles, intermediate one the longest, each dorso-lateral margin armed with two rather long bristles, one at one-seventh and the other at five-sevenths (Fig. 7, *B*). Eyes rather large, well pigmented, cornea with conical, obtuse protuberance. Antennular peduncle three-segmented, basal joint depressed, broad, armed on outer side with proximal leaf-shaped process and distal prominent spine, third joint as long as second one, outer flagellum thicker than inner one, its uniramous basal portion five-segmented, with inner ramus three-jointed (Fig. 7, *C*). Antennular scale triangulary broad, with straight pointed outer margin which does not surpass inner lamella (Fig. 7, *D*).

Mandible without incisor process and palp (Fig. 8, *A*). Maxillule

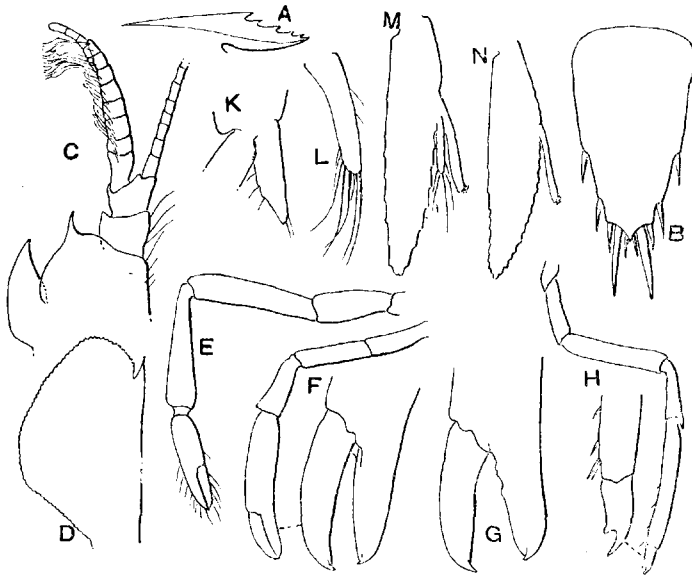


Fig. 7. Body parts of *Gnathophyllum americanum* GUÉRIN, female (A~H, L and N) measuring 12 mm in body length, and male (M and K), 6 mm long. A, rostrum,  $\times$  ca. 10; B, telson,  $\times$  20; C, antennule,  $\times$  20; D, antennal scale,  $\times$  20; E, first leg,  $\times$  ca. 10; F, smaller leg of second pair of legs,  $\times$  25; G, tip of larger leg of second one,  $\times$  25; H, fifth leg,  $\times$  6; K and L, first pleopod,  $\times$  35; M and N, second pleopod,  $\times$  50 in M and  $\times$  25 in N.

cross-shaped, inner endite and endopodite remarkably small and the latter without apical lobe (Fig. 8, B). Maxilla with ear-shaped scaphognathite and papilla-like endopodite, inner lacinia absent (Fig. 8, C). All three maxillipeds provided with exopodite. First maxilliped with small, unsegmented endopodite, basal lateral lobe of exopodite rather small, inner distal lacinia large, fringed with thickly set hairs along its inner margin, but proximal one almost rudimentary (Fig. 8, D). Second maxilliped 5-segmented, basal three joints greatly enlarged, propodus very small, dactylopodite unusually elongated, its inner margin fringed with characteristic hairs (Fig. 8, E). Third maxilliped five-segmented, antepenult segment extraordinarily broad, about three times as broad as penultimate segment, ultimate one a little longer than half of antepenult one and somewhat longer and thinner than penultimate one (Fig. 8, F). First cheliped slender, about half times the body in length and about 1.5 times as long as third maxilliped, proportions to movable finger: palm 1.1, carpus and merus 3.0,

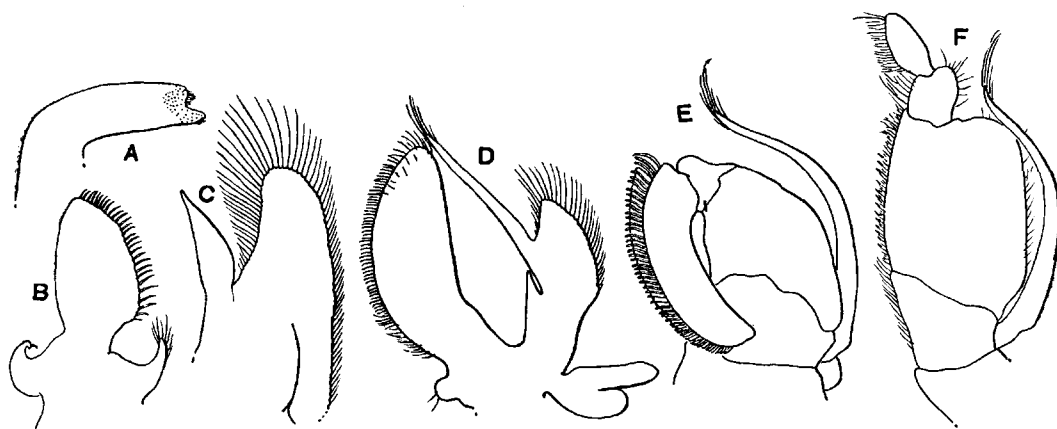


Fig. 8. Mouth-parts of *Gnathophyllum americanum* GUÉRIN, ♀. *A*, mandible,  $\times 36$ ; *B*, maxillule,  $\times 20$ ; *C*, maxilla,  $\times 25$ ; *D*, first maxilliped,  $\times 20$ ; *E*, second maxilliped,  $\times 15$ ; *F*, third maxilliped,  $\times 15$ .

ischium 1.4, both cutting edges of fingers unarmed and straight (Fig. 7, *E*). Second cheliped asymmetrical, smaller leg a little longer than preceding leg, ratios against movable finger: palm 2.0, carpus and ischium 1.1, merus 1.0, both prehensile edges without tooth; larger chela with three, irregular, small teeth in proximal half of cutting edge of fixed finger (Fig. 7, *F* and *G*). Third leg about 1.5 times as long as first one, proportions to dactylus: propodus 3.8, carpus 1.7, merus 3.0, ischium 1.5, dactylus biunguiculate, propodus armed with several bristles along distal half of posterior margin, carpus, merus and ischium unarmed (Fig. 7, *H*). Endopodite of first abdominal appendage narrow, much shorter than exopodite, distal margin fringed with long hairs (Fig. 7, *L*). Endopodite of second pleopod provided with bar-shaped stylamblys only on inner margin (Fig. 7, *N*).

Colour in alcohol: body crossed by 19 reddish narrow bands (Fig. 9).

The description mentioned above is based on an ovigerous female specimen measuring 12.0 mm in body length. A male specimen, 6.0 mm long was also examined. They were collected on 22th of December, 1937.

Locality: Kusaie, Malem (Caroline Islands).

Distribution: Port Jackson, Australia (STIMPSON); Port Stephens, Australia (HASWELL); Tahiti (ORTMANN); Cuba (GUÉRIN); St. Thomas, West Indies; Gulf of Mexico (Albatross); Bermudas (GOODE, coll.); Porto Rico (RATHBUN).

Note: Sex recognition is easy by examining first and second abdominal

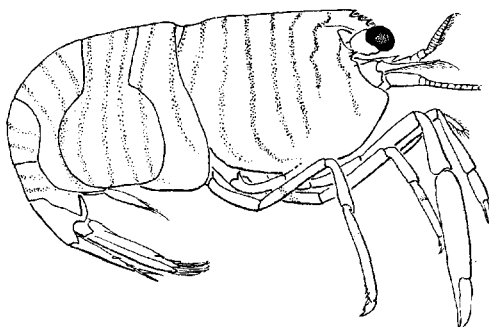


Fig. 9. Lateral view of *Gonathophyllum americanum*, GUÉRIN,  
♀, 12 mm in body length, × 6.

appendages, viz., male differs from female in having such characters: (1) endopodite of first pleopod much smaller, (2) endopodite of second pleopod furnished with a stylamblys and an appendix masculina on its inner margin (Fig. 7, *K* and *M*).

The specimens at my disposal closely resemble RATHBUN'S description (1902) of the Port Rican specimen in principal characters, but show some discrepancies as given in the following table:—

Items	RATHBUN'S specimen	Present specimen
(1) A small subterminal tooth of lower margin of rostrum .....	present	absent
(2) Distal margin of telson .....	armed with 2 pairs of bristles	armed with 3 pairs of bristles
(3) Number of colour bands of body .....	13~16	19

But I am inclined to think that these differences are merely fluctuations within one species.

#### Family ALPHEIDAE BATE (1888)

*Alpheidae*, BATE, 1888, p. 528; RATHBUN, 1902, p. 104.

*Crangonidae* (= *Alpheidae*), HAY and SHORE, 1918, p. 382; SCHIMITT, 1921, p. 73.

#### *Synalpheus kusaiensis* sp. nov.

(Text-fig. 10)

Rostrum short, slender, sharply pointed, about 0.08 times as long as carapace, not reaching to distal margin of basal segment of antennular peduncle. Frontal spines broad, about three times as broad as base of

rostrum, extending a little short of rostrum (Fig. 10, *A* and *B*). Telson shorter than uropods, inverted subtrapezoid in outline, tapering posteriorly almost by half, each dorso-lateral margin armed with two bristles, one at the middle and the other at three-fourths, distal margin slightly convex, armed with two inner longer and outer shorter pairs of bristles close to postero-lateral angles (Fig. 10, *C*). Antennular peduncle 3-segmented, with distal two segments subequal in length, stylocerite extending to middle of penultimate joint. Antennal peduncle much longer than antennular one, basicerite provided with an external spine which is somewhat shorter than stylocerite. Distal spine of antennal scale projecting far beyond end of lamella. Carpopodite much longer than antennular peduncle and reaches to tip of distal spine of antennal scale (Fig. 10, *A*). Third maxilliped pedi-form, exopodite present, ratios against pro-dactylopodite: carpopodite 0.25, ischio-meropodite 1.1, ultimate segment fringed with several bristles at apex, penultimate one with bristles on distal upper margin (Fig. 10, *E*). First cheliped asymmetrical, larger leg about 0.85 times as long as body, ratios against movable finger: palm 2.9, ischium 1.1, movable finger carries a large tooth on cutting edge close to base; palm somewhat depressed, a little more than twice as long as wide (Fig. 10, *F*); smaller one about 0.35 times as long as body, proportions against movable finger: palm 1.5, carpus 0.7, merus 2.0, fingers unarmed on prehensile edges and inturned at tips (Fig. 10, *G*). Second leg slender, a little shorter than half of body, movable finger and palm subequal in length, both cutting edges of chela unarmed; carpus six-segmented, about five times as long as movable finger; merus about 0.8 times of carpus, about five times as long as wide; ischium a little shorter than merus (Fig. 10, *H*). Third leg about half of body in length, proportions to dactylus: propodus 3, carpus 2, merus 4.5, ischium 1.8, dactylus biunguiculate, propodus armed with five bristles along its posterior margin, carpus carries a bristle on distal posterior margin (Fig. 10, *K*). Succeeding two pairs of legs closely resemble third pair of legs in general aspects, but fifth one slightly shorter than third one (Fig. 10, *L*). Endopodite of second abdominal appendage lamellar, with minute stylamblys only (Fig. 10, *M*). Postero-lateral angle of outer uropods provided with three spinules, middle one the longest and largest (Fig. 10, *D*).

Type specimen: female measuring 10 mm long.

Type locality: Kusaie, Malem (Caroline Islands).

Dimensions (in mm) run as follows:—

Body length	10.0	Second leg	4.2
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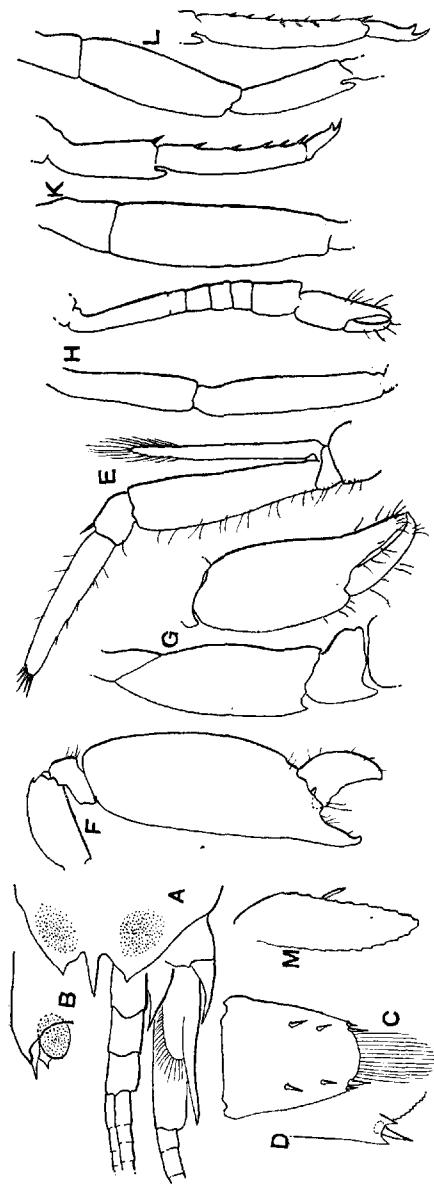


Fig. 10. Body parts of *Synalpheus kusaiensis* sp. nov. *A*, upper aspect of frontal region,  $\times 20$ ; *B*, rostral region in profile,  $\times 15$ ; *C*, telson,  $\times 20$ ; *D*, postero-lateral angle of outer uropod,  $\times 35$ ; *E*, third maxilliped,  $\times 20$ ; *F*, larger leg of first pair of thoracic legs (inner view),  $\times 7$ ; *G*, smaller leg of first pair of thoracic legs,  $\times 20$ ; *H*, second thoracic leg,  $\times 20$ ; *I*, third thoracic leg,  $\times 20$ ; *J*, fourth one,  $\times 20$ .

Carapace	3.5	Third leg	5.0
First leg (larger)	8.5	Fourth leg	5.3
" (smaller)	3.4	Fifth leg	4.5

The present species is closely allied to *Synalpheus heroni* (COUTIÈRE, 1909, p. 42, Fig. 24) and jointly belongs to *neomeris* group but it is easily separated from the latter in having the following characters:—(1) dactylus of ambulatory legs, without prominence near the base of the ventral hook, (2) palm of larger cheliped of first pair of legs about three times as long as movable finger (2.4 times in *S. heroni*), (3) distal spine of scaphocerite does not stretch beyond terminal margin of carapocerite.

### *Synalpheus tumidomanus* (PAULSON)

(Text-figs. 11 and 12)

*Synalpheus tumidomanus*, COUTIÈRE, 1909, p. 24, fig. 5; DE MAN, 1911, pp. 258–260.

Body small. Rostrum slender, somewhat longer than supraorbital spine, about 0.19 times as long as carapace, reaching to about middle of penultimate segment of antennular peduncle. Supraorbital spines well developed, but a little shorter than rostrum, basal breadth about twice as much as that of rostrum (Fig. 11, *A*). Telson subrectangular but gradually reducing its width posteriorly, ratios against width measured at antero-lateral angles: length ca. 1.2, width measured at postero-lateral angles ca. 0.5, each dorso-lateral margin armed with two equidistant bristles; distal margin convex, provided with many long feathered setae and also pairs of outer shorter and inner longer bristles close to the angles (Fig. 11, *B*). Antennular peduncle 3-segmented, middle segment about half times as long as basal one and a little longer than last one which has an acute process outwardly projecting from base and reaching its distal margin (Fig. 11, *C*). Antennal scale slender; its outer spinous part projecting far beyond inner lamellar one and extending to terminal margin of carapocerite (Fig. 11, *C*). Mandible with two-segmented palp, distal margin of incisor process armed with six teeth (Fig. 12, *A*). Maxillule cross-shaped; inner lacinia narrow; outer lacinia rather broad, and fringed with thickly set setae along inner distal margin; endopodite without apical lobe (Fig. 12, *B*). Maxilla provided with ear-shaped scaphognathite, endopodite slender and simple; inner distal endite lamellar, bifid, but proximal one simple and greatly reduced (Fig. 12, *C*). First maxilliped with two-lobed mastigobranchia, basal outer lobe of exopodite narrow (Fig. 12, *D*). Third maxilliped pediform, provided

with exopodite; penultimate joint very short, about quarter of ultimate one, antepenult joint one and half times as long as ultimate one (Fig. 12, *E*). First cheliped asymmetrical; movable finger of larger chela armed with one prominent tooth directed obliquely backwards near base of cutting edge; fixed finger unarmed, with straight cutting edge; palm heavy and swollen, proportions to movable finger: length 2.5, width at middle 1.3 (Fig. 11, *E*); smaller leg about 0.6 times as long as larger one, and a little shorter than half of body, ratios against movable finger: palm 1.5, 0.9 (in width), carpus 0.6, merus 2.0, prehensile edges of both fingers unarmed (Fig. 11, *F*). Second cheliped slender, about 0.6 times as long as body, ratios to movable

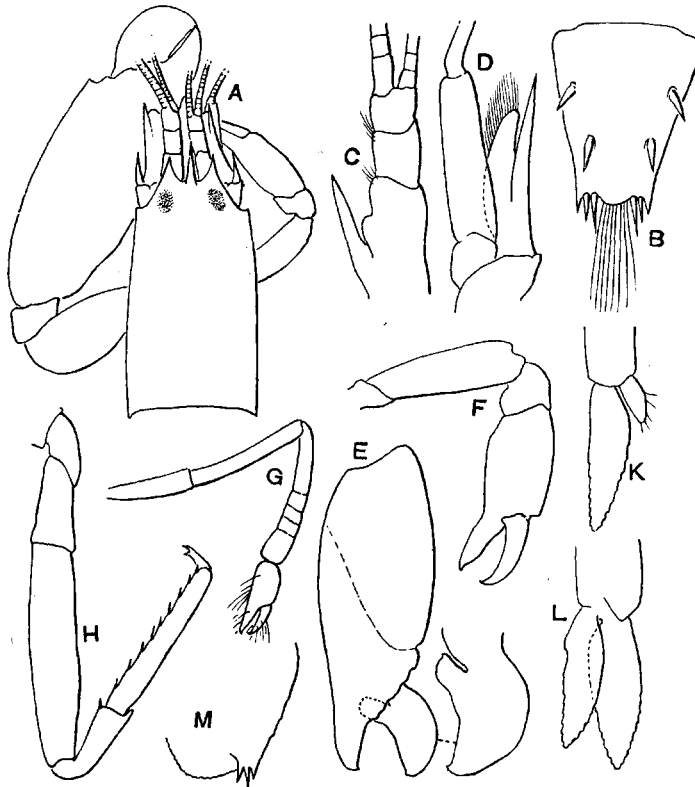


Fig. 11. Body parts of *Synalpheus tumidomanus* (PAULSON). *A*, upper aspect of cephalo-thorax region,  $\times$  ca. 10; *B*, telson,  $\times$  25; *C*, antennular peduncle,  $\times$  25; *C*, antennular peduncle,  $\times$  25; *D*, basal parts of antenna,  $\times$  25; *E*, larger chela of first leg,  $\times$  ca. 10; *F*, smaller leg of first pair of legs:  $\times$  15; *G*, second leg,  $\times$  15; *H*, third one,  $\times$  25; *K*, first pleopod,  $\times$  35; *L*, second pleopod,  $\times$  35; *M*, outer uropod,  $\times$  25.



finger: palm 1, carpus 4, merus 3, ischium 2; carpus five-jointed, first joint as much as half of its entire length (Fig. 11, *G*). Third leg a little shorter than second leg, ratios to dactylus: propodus 4.6, carpus and ischium 2.2, merus 6.0; dactylus biunguiculate; propodus armed with 9 equidistant bristles along posterior margin, length about 7 times as much as width at middle; carpus provided with a bristle on posterior distal margin; merus unarmed, length about 4.4 times as much as width (Fig. 11, *H*). Fourth and fifth legs closely resemble third one in feature but somewhat shorter than the third one. Endopodites of first and second abdominal appendage lamellar, but the first one decidedly smaller than the latter (Fig. 11, *K* and *L*). Outer uropod armed with three spines at postero-lateral angle (Fig. 11, *M*).

The foregoing description is based on a single male specimen measuring 8.5 mm in body length, obtained from west coast of Babeldaob, Palau Islands at a depth of 30 m on February 21st, 1938.

Distribution: Red Sea (PAULSON); Kabaëna-island, Timor (DE MAN).

Differences of thoracic legs in proportion between the present specimen and DE MAN's description as shown in Table 1 should not be taken significant for taxonomy since they are variable.

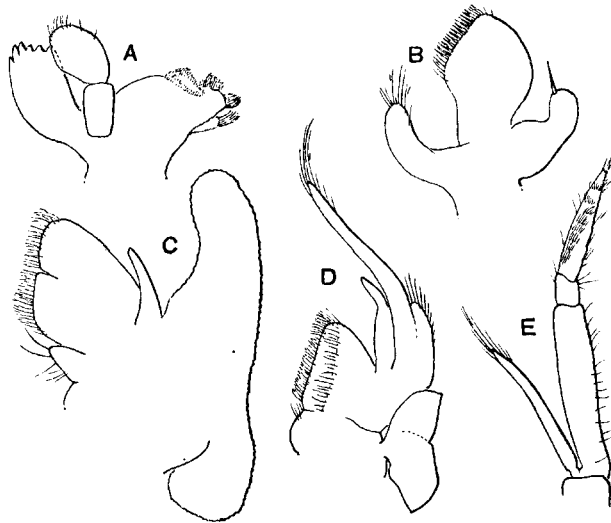


Fig. 12. Mouth-parts of *Synalpheus tumidomanus* (PAULSON) except second maxilliped. *A*, mandible,  $\times 50$ ; *B*, maxillule,  $\times 50$ ; *C*, maxilla,  $\times 50$ ; *D*, first maxilliped,  $\times 35$ ; *E*, third maxilliped,  $\times 20$ .

Table 1.

Items		Total length		Height		Propodus	
		de MAN's specimen	Present specimen	de MAN's specimen	Present specimen	de MAN's specimen	Present specimen
Ratios to dactylus	1st leg	4.75	5.6	1.7	1.3	—	—
	3rd leg	—	—	—	—	5	4.6

*Athanas esakii* sp. nov.

(Text-fig. 13)

Rostrum nearly lanceolate, horizontal, toothless, about 0.6 times as long as carapace, extending to or a little beyond the middle of penultimate segment of antennular peduncle (Figs. 13, *A* and *B*). Carapace about 0.3 times as long as body; frontal margin armed with extra and infra-corneal spines; pterygostomial angle rounded. Telson shorter than uropods; sub-rectangular in upper aspect but gradually reducing its width posteriorly, each dorso-lateral margin armed with two bristles, one at 10/25 and the other at 18/25 of the margin; distal margin convex with two pairs of outer shorter and inner longer (about three times as long as outer one) bristles close to postero-lateral angle, between these bristles the margin is fringed with long hairs (Fig. 13, *P*). Antennular peduncle consists of three segments, basal segment bears a large pointed lateral plate on proximal outer border, ultimate segment as long as penultimate one and provided with two inner and outer rami, outer ramus thicker and shorter than inner one, its proximal portion uniramous comprising three joints, and with shorter and longer branches, shorter one consisting of six segments (Fig. 13, *C*). Antennal scale not tapering, outer margin almost straight, reaching distal margin of antennular peduncle (Fig. 13, *B*). Third maxilliped pediform, penultimate joint the shortest, about half times as long as ultimate one and a little longer than half of antepenult one (Fig. 12, *D*). First chelipeds unusually large and asymmetrical, larger chela about 0.65 times as long as body; proportions against finger: palm 3.5, carpus 0.65, merus 3.0, ischium 0.2; movable finger greatly curved inwards, fixed one provided with a large obtusely pointed tooth near middle of its prehensile edge, both fingers leaving no space between them when closed; palm and merus similarly heavy and more or less swollen, but palm three times as long as wide whereas merus about twice as long as wide; ischium armed with three bristles on distal upper border (Fig. 13, *E* and *E'*). Smaller chela about 0.75 times as long

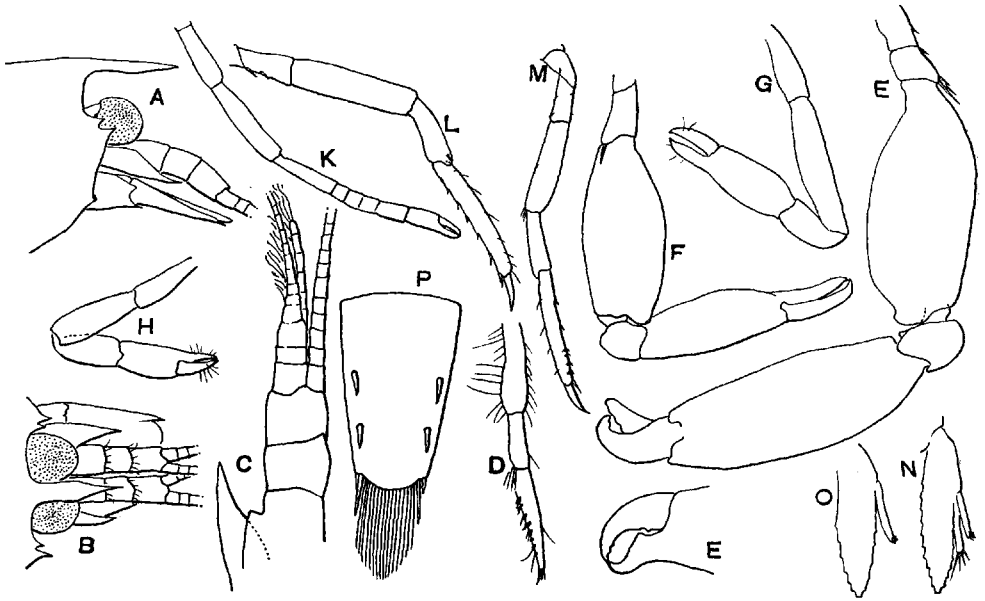


Fig. 13. Body parts of *Athanas esakii* sp. nov., male (*A*~*F* and *K*~*N*) and female (*O*, *H* and *G*). *A*, frontal region (lateral view),  $\times 20$ ; *B*, upper aspect of frontal region,  $\times 20$ ; *C*, antennule,  $\times 25$ ; *D*, third maxilliped,  $\times 25$ ; *E*, larger leg of first pair of pereopod (outer view),  $\times 20$ ; *F*, same as *E* of the smaller leg; *G*, first leg of female (right),  $\times 25$ ; *H*, same as *G* (left),  $\times 20$ ; *L*, third leg,  $\times 20$ ; *M*, fifth one,  $\times 20$ ; *N*, second pleopod,  $\times 50$ ; *O*, same as *N* of female; *P*, telson,  $\times 25$ .

as larger one; ratios against movable finger: palm 2.0, carpus 0.5, merus 2.3, ischium 0.8; both fingers almost straight with inturned tips and unarmed cutting edges, palm 2.7 times as long as wide, merus entirely resembles that of larger chela in shape and proportion, ischium provided with a bristle on upper distal margin (Fig. 13, *F*). Second cheliped very slender, about half times as long as larger cheliped of first pair, palm 1.1, carpus 5.1, merus 3.8, ischium 2.8 in proportion to movable finger (Fig. 13, *K*). Third leg stouter than second one, about 0.6 times as long as larger cheliped of first pair, proportions against dactylus; propodus 3.4, carpus 1.7, merus 3.2, ischium 1.2; dactylus sharply pointed, unarmed; propodus about one-seventh times as broad as long, posterior margin provided with seven equidistant bristles; carpus carries a bristle near distal outer border; merus unarmed, about four times as long as wide; ischium furnished with two bristles in proximal half of its posterior margin (Fig. 13, *L*). Fourth leg

resembles third one in general aspects. Fifth one shows very close resemblance to third and fourth legs, but somewhat smaller than these (Fig. 13, *M*). Endopodite of second pleopod provided with bar-shaped stylamblys and appendix masculina, which is fringed with setae along distal margin (Fig. 13, *N*).

*Female:* Female is mostly similar to male, but differs from it in such characters given in the following lines:—First cheliped decidedly smaller than those of male, larger leg about one-third of body in length, proportions against movable finger; palm 1.9, carpus 1.1, merus 2.9, ischium 1.5; both cutting edges of fingers toothless; palm and merus not swollen, the former about twice as long as wide, but the latter with width about one-fourth of its length (Fig. 13, *G*); smaller leg mostly resembles the larger one, proportions to movable finger; palm and carpus 1.4, merus 2.0, ischium 1.8 (Fig. 13, *H*). Endopodite of second pleopod with stylamblys only (Fig. 13, *O*).

Described and drawn from a male specimen measuring 7.0 mm long and an ovigerous female, 6.0 mm in body length. Other two specimens (1♂, 8.4 mm long, first cheliped wanting; 1♀, 6.2 mm long) were also examined.

Type locality: Kusaie, Caroline Islands.

The specimens at my disposal exhibit very close resemblance to *A. djiboutensis* COUÏÈRE (1897) and *A. sibogae* DE MAN (1911), but it is easily separated from the former by lacking supraorbital spine, and from the latter by the following characters: the telson rather shorter, length 2.2 times as much as width between postero-lateral angles (4.2 times in *A. sibogae*), width near proximal margin about 1.6 times of distal margin measured at postero-lateral angles (1.95 times in *A. sibogae*).

#### Family STENOPIDAE BATE (1888)

##### *Stenopus hispidus* OLIVIER

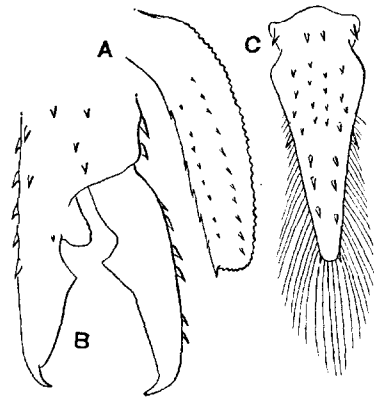
(Text-figs. 14 and 15)

*Stenopus hispidus*, MILNE-EDWARDS, 1837, pp. 407~408; DANA, 1852, p. 607, pl. 40, fig. 8; MIERS, 1880, p. 458; BATE, 1888, p. 211, pl. 30; ORTMANN, p. 539; BORRADAILE, 1898, p. 1002, Taf. 63, fig. 2; RATHBUN, 1902, pp. 99~100; 1906, p. 901; CALMAN, 1909, p. 706.

Antennal scale rather narrow, outer margin straight and furnished with 5 spinules, outer distal angle armed with a stout spine which extends

far beyond lamella, upper surface of lamella armed with two longitudinal rows of spinules (Fig. 14, *A*). Mandible with three-segmented palp, molar and incisor processes completely fused with each other, distal margin of incisor part with four blunt teeth (Fig. 15, *A*). Maxillule with slender endopodite, inner and outer laciniae equal in size, but the former with truncate distal margin bearing thickly set bristles (Fig. 15, *B*). Maxilla with rather slender endopodite, inner two laciniae equal in size and each of them subdivided longitudinally into two lobes in distal half (Fig. 15, *C*). All three maxillipeds provided with exopodite. First maxilliped with unsegmented endopodite (Fig. 15, *D*). Third maxilliped pediform, 6-segmented (Fig. 15, *F*). Third leg covered with sparsely set setae, both fingers with inturned tips, cutting edge of fixed finger armed with two prominent teeth in proximal half, movable finger with an obtusely pointed tooth which fits between teeth of fixed finger when chela closed (Fig. 14, *B*). Telson lanceolate in outline, distal half of both lateral and distal borders fringed with long hairs, near middle of each lateral border and both antero-lateral and postero-lateral angles provided with a spinule respectively, dorsal surface armed with sparsely set spinules (Fig. 14, *C*).

Fig. 14. Body parts of ovigerous female of *Stenopus hispidus* OLIVIER, 18 mm long. *A*, antennal scale,  $\times 15$ ; *B*, fingers of second pereopod,  $\times 15$ ; *C*, telson,  $\times$  ca. 10.



Egg spherical, 0.45~0.50 mm in diameter.

The description above mentioned and accompanying figures are based on an ovigerous female specimen, measuring 18.0 mm in body length. One male specimen, 14.0 mm in body length was also examined. They were obtained from Kusai, Malem (Caroline Islands) on December 21st, 1937.

Distribution: Fiji, Bermuda (BATE); Porto Rico, Dry Tortugas, Cuba.

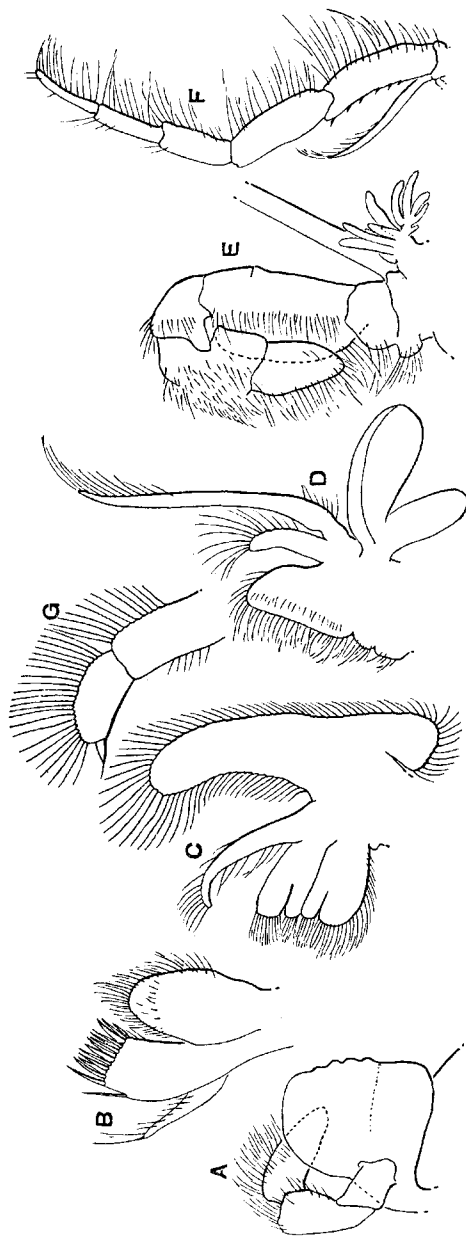


Fig. 15. Mouth-parts of *Stegopus hispidus* OLIVIER. *A*, mandible,  $\times 25$ ; *B*, maxillule,  $\times 25$ ; *C*, maxilla,  $\times 20$ ; *D*, first maxilliped,  $\times 15$ ; *E*, second maxilliped,  $\times 20$ ; *F*, third maxilliped,  $\times$  ca. 7; *G*, endopodite of first maxilliped of ovigerous female, 50 mm long,  $\times$  ca. 10.

Jamaica, Bahamas, St. Lucia, Hawaii Isl. (RATHBUN), Christmas Isl. (CALMAN).

*Note:* The mouth-parts excepting mandible, of this species, have hitherto been described and figured by BATE (1888) on the basis of a female specimen, 45 mm long. The maxilla of the present specimens, measuring 14.0~18.0 mm in body length, does not agree with that of his (figure only, without any description whatever), viz., both inner laciniae of my specimen are bifid in distal half as mentioned above, but those laciniae in BATE's figure are simple and the distal endite is remarkably slender. Moreover in his figure, the endopodite of first maxilliped is drawn as bearing three segments, while it is unsegmented in my specimens. In another male specimen, 50 mm long obtained from Kôtô-syo, Formosa and placed at my disposal through the courtesy of Mr. Oô-U-Kyô, that is entirely corresponding to BATE's figure (Fig. 15, *G*). Judging from such facts, it appears to me that such discrepancy is probably due to the difference in the size of body.

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