CAMPAGNE DE LA CALYPSO
AU LARGE DES CÔTES ATLANTIQUES
DE L'AMÉRIQUE DU SUD (1961-1962). I

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DECAPOD CRUSTACEA : ALPHEOIDA

BY

MARTIN L. CHRISTOFFERSEN *

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Abstract

Twenty-nine species of the families Alpheidae, Ogyrididae, Hippolytidae and Processidae collected by the *Calypso* along the eastern coast of South America are identified and provided with complete references. Additional material from several North and South American institutions, as well as that collected mainly by the author along the east coast of Brazil, is included in the study of most of these 29 species. Four new species are described : *Processa brasiliensis* sp. n., from Atol das Rocas to the south of Bahia; *Alpheus maxilliplanus* sp. n., from Paraíba to São Paulo; *A. pouang* sp. n., from São Paulo to Uruguay; and *A. puapeba* sp. n., from Espirito Santo to the north of Argentina. The remaining species were already known from the northern West Atlantic; for all but two, their distribution is seen to extend southwards. In addition to the new species, eight are recorded from Brazil and Continental South America for the first time : *Alpheus amblyonyx* Chace, *Synalpheus brevicarpus* (Herrick), *S. hemphilli* Coutière, *S. sanctithomae* Coutière, *Thunor rathbunae* (Schmitt), *Merhippolyte americana* Holthuis, *Processa bermudensis* (Rankin) and *P. hemphilli* Manning and Chace. Six species constitute the first references of this group for Uruguay : *Exhippolysmata oplophoroides* (Holthuis),

Résumé

Ce travail présente les déterminations et les références complètes concernant vingt-neuf espèces des familles Alpheidae, Ogyrididae, Hippolytidae et Processidae, qui proviennent du matériel recueilli par la *Calypso* sur la côte est de l'Amérique du Sud. Nous ajoutons à l'étude de la plupart de ces espèces les observations faites sur du matériel complémentaire provenant soit de diverses institutions d'Amérique du Nord et d'Amérique du Sud, soit principalement des récoltes effectuées par l'auteur le long de la côte est du Brésil. Quatre nouvelles espèces sont décrites : *Processa brasiliensis* sp. n., de l'Atol das Rocas jusqu'au sud de Bahia; *Alpheus maxilliplanus* sp. n., de Paraiba à São Paulo; *A. pouang* sp. n., de São Paulo à l'Uruguay; et *A. puapeba* sp. n., depuis l'Espirito Santo jusqu'au nord de l'Argentine. Les autres espèces étaient déjà connues dans la région nord de l'Atlantique occidental; toutes, sauf deux, ont maintenant une distribution prolongée vers le sud. En plus des nouvelles espèces, huit autres espèces sont signalées pour la première fois sur les côtes du Brésil et de l'Amérique du Sud : *Alpheus amblyonyx* Chace, *Synalpheus brevicarpus* (Herrick), *S. hemphilli* Coutière, *S. sanctithomae* Coutière, *Thunor rathbunae* (Schmitt), *Merhippolyte americana* Holthuis, *Processa bermudensis*

* Departamento de Zoologia, Universidade de São Paulo. Present address : Universidade Federal da Paraíba, Centro de Ciências Exatas e da Natureza, Departamento de Biologia. 58000-João Pessoa-PB, Brasil.

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Processa guyanae Holthuis, *Alpheus pouang* sp. n., *A. puapeba* sp. n., *Merhippolyte americana* Holthuis and *Processa hemphilli* Manning and Chace; the three latter species are indicated for Argentina for the first time. Regarding vertical distribution and temperature data, 24 species are considered shallow warm water forms; *Processa guyanae* Holthuis, *Alpheus pouang* sp. n., *A. puapeba* sp. n. and *Merhippolyte americana* Holthuis are deeper, colder water species, whereas *Processa hemphilli* Manning and Chace is both eurybathic and eurythermic.

(Rankin) et *P. hemphilli* Manning et Chace. Six espèces constituent les premières références de ce groupe pour l'Uruguay : *Exhippolysmata oplophoroides* (Holthuis), *Processa guyanae* Holthuis, *Alpheus pouang* sp. n., *A. puapeba* sp. n., *Merhippolyte americana* Holthuis et *Processa hemphilli* Manning et Chace, les trois dernières étant signalées de l'Argentine pour la première fois. En ce qui concerne la distribution en fonction de la profondeur et de la température, vingt-quatre espèces sont considérées comme des formes d'eaux peu profondes et chaudes; *Processa guyanae* Holthuis, *Alpheus pouang* sp. n., *A. puapeba* sp. n. et *Merhippolyte americana* Holthuis sont des espèces d'eaux plus profondes et plus froides; *Processa hemphilli* Manning et Chace est eurybathique et eurytherme.

INTRODUCTION

The research vessel *Calypso* collected Alpheoid shrimps at 57 stations along the eastern coast of South America, in an area extending from 3°48.0′ S, 32°26.4′ W to 35°05′ S, 52°33′ W. To the 29 species identified in this collection I have added samples from several sources. The bulk of the original material comes from the collections of :

- Instituto Oceanográfico da Universidade de São Paulo (IOUSP) mainly samples collected during several cruises of the oceanographic vessel *Prof. W. Besnard* and the research vessel *Emília* on the Continental Platform between the Cabo de São Tomé, Rio de Janeiro, and the Mouth of the Rio de la Plata, Argentina;
- Museu Nacional, Rio de Janeiro (MNRJ);
- Museu de Zoologia da Universidade de São Paulo (MZUSP); and from samples I have collected along the intertidal and shallow subtidal coastal zone between the States of Espirito Santo and Rio Grande do Sul.

I have further included material examined at the following institutions :

- American Museum of Natural History, New York (AMNH);
- The Academy of Natural Sciences, Philadelphia (ANSP);
- Duke University Marine Laboratory, North Carolina (DML);
- Institute of Marine Sciences, North Carolina (IMS);
- Museum of Comparative Zoology, Harvard University, Massachusetts (MCZ);
- United States National Museum, Smithsonian Institution, Washington, D.C. (USNM);
- Yale University Peabody Museum (YPM).

The *Calypso* specimens are deposited in the Muséum national d'Histoire naturelle, Paris (MNHN).

In compiling the synonymies, information on type material and type localities, as well as all references known to me for each name, have been included. Measurements may contain errors of about 0.25 mm; specimens were always measured along the dorsal midline, and the numbers given indicate combined rostral and carapace lengths plus combined abdominal and telson lengths (in two cases the rostral and carapace lengths are given separately); measurements for the chelae refer to length : height : width of propodus, in its largest dimensions (the width is not given when very close or equal to height). The indication « several spec. » in the lists of examined material refers to more than 10 individuals.

The names of the collectors of the samples treated herein are as follows : **A.A.**, A. Agassiz; **Ab.**, Abdalla; **A.B.S.**, A.B. Smith; **A.B.W.**, A. B. Williams; **A.C.**, A. Coelho; **A.E.V.**, A.E. Verrill; **A.F.C.**, A.F. Chestnut; **A.H.**, A. Heilprin ; **A.I.K.**, A.I. Kanagawa ; **A.L.**, A. Loveridge; **A.L.C.**, A.L. Castro; **Ar.**, Arnaldo; **A.R.**, A. Rosas; **A.S.F.D.**, A.S.F. Ditadi; **A.S.Pa.**, A.S. Packard, Jr.; **A.S.Pe.**, A.S. Pearse; **A.W.G.**, A.W. Greeley; **B.H.**, B. Hartt; **B.S.**, B. Schreve; **Ca.**, Carvalho; **C.E.J.**, C.E. Jenner; **C.J.**, C. Jesus; **D.C.T.**, D.C. Tabb; **D.F.**, D. Fast; **D.M.D.**, D.M. Dexter; **D.W.**, D. Williams; **E.B.**, E. Bayer; **E.D.**, E. Deichmann; **E.E.D.**, E.E. Deubler, Jr.; **E.G.**, E. Garbe; **E.J.M.**, E.J. Magalhães; **E.J.P.**, E.J. de Paula; **E.P.**, E. Palmer; **F.G.**, F. Gün-

THER; **F.H.B.**, F.H. BRADLEY; **F.H.W.**, F.H. WEIBEGAHN; **F.J.S.**, F.J. SCHWARTZ; **Fo.**, FOSTER; **F.R.**, F. ROHDE; **G.B.G.**, G.B. GOODE; **G.S.N.**, G.S. NEIVA; **G.S.P.**, G.S. POSNER; **G.W.B.**, G.W. BRYCE, Jr.; **H.C.Y.**, H.C. YARROW; **H.H.**, H. HEMPHILL; **H.J.**, H. JAKOBI; **H.J.P.**, H.J. PORTER; **H.L.**, H. LUEDERWALDT; **H.S.**, H. SCHUBART; **H.S.B.**, H.S. BROOKS; **H.S.L.**, H.S. LOPES; **I.E.G.**, I.E. GRAY; **J.A.**, J. DE ARREU; **J.Bec.**, J. BECKER; **J.Ber.**, J. BERTOLETTI; **J.C.A.**, J.C. ARMSTRONG; **J.D.**, J. DAY; **Je.**, JENNER; **J.F.-F.**, J. FAUSTO-FILHO; **J.L.F.**, J.L. FIGUEIREDO; **J.S.K.**, J.S. KINGSLEY; **J.S.S.**, J.S. SCHWENGEL; **Ke.**, KELLOG; **Ku.**, KURTY; **L.F.**, L. FORNERIS; **L.F.D.**, L.F. DUARTE; **L.H.**, L. HOWELL; **Li.**, LIN; **L.M.**, L. MCCLOSKEY; **L.N.T.**, L.N. TOSTES; **L.R.T.**, L.R. TOMMASI; **L.W.E.F.**, L.W.E. FAHY; **M.A.S.**, M.A. SANTOS; **M.H.S.**, M.H. SPAULDING; **M.I.**, M. IWAI; **M.J.C.-V.**, M.J. CERAME-VIVAS; **M.J.L.**, M.J. LINDNER; **M.L.C.**, M.L. CHRISTOFFERSEN; **M.M.D.S.**, M.M.D. SILVA; **M.T.L.**, M.T. LOPEZ; **My.**, MYERS; **N.J.H.**, N.J. HEBLING; **N.S.**, N. SANTOS; **P.B.W.**, P.B. WHELPLEY; **Ph.**, PHILLIPS; **P.J.**, P. JURBERG; **P.K.**, P. KIRKHOWN; **P.R.**, P. ROHE; **R.A.M.**, R.A. MCCLEAN; **R.A.W.**, R.A. WOODMANSEE; **R.B.M.**, R.B. MANNING; **R.C.**, R. CLAYTON; **R.E.K.**, R.E. KNOWLTON; **R.K.**, R. KRONE; **R.M.D.**, R.M. DARNELL; **Ro.**, ROTHCHILD; **R.Ra.**, R. RATHBUN; **R.Re.**, R. REYNOLDS; **R.S.**, R. SCHENKMAN; **R.V.B.**, R.V. BEVERIDGE; **R.W.**, R. WASS; **R.W.F.**, R.W. FOSTER; **S.A.R.**, S. A. RODRIGUES; **S.D.M.**, ?; **S.R.**, S. ROSS; **T.H.B.**, T.H. BEAN; **V.A.**, V. ALMEIDA; **Ve.**, VERNBERG; **V.M.J.**, V.M. JONES; **W.C.N.**, W.C. NOCE; **W.H.J.**, W.H. JACQUES; **W.J.B.**, W.J. BELL; **W.L.**, W. LUND; **W.L.S.**, W.L. SCHMITT; **W.S.**, W. STIMPSON; **Y.M.R.L.**, Y.M.R. LEITE.

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SPECIES ASSEMBLAGES

The species studied herein may be divided into three groups, according to the water masses in which they occur (Table I).

The first and largest group consists of shallow warm water species (from the intertidal zone or close to surface to not more than 100 m deep; maximum temperatures above 24 °C). In this group may be included all the remaining species not shown in Table I for lack of data on both temperature and salinity. The two species known exclusively from estuarine regions, *Alpheus maxilliplanus* sp. n. and *Ogyrides occidentalis* (Ortmann), show the largest salinity fluctuations (03.07, 37.0 ‰).

The second group consists of deeper, colder water

TABLE 1. — *Species of Alpheoida collected by the* Calypso *in which both temperature and salinity data are available, correlated to vertical and geographical distribution. The species are arranged according to their extreme latitudinal distribution along the South American coast.*

Species	*Vertical distribution (m)*	*Temperature range (°C)*	*Salinity range (‰)*	*Geographical distribution*	*Species Assemblages*
Synalpheus hemphilli	1.5-2.1 to 48-51	24-26.1	33-35	Bermudas and North Carolina to Bahia	
Synalpheus brooksi	0-2.1 to 82.3	22-24	32-35	East Pacific; southern Florida to Bahia	
Synalpheus townsendi	Intertidal to 100	20-26	25-37	East Pacific; Bermuda and North Carolina to Rio de Janeiro	
Processa fimbriata	0-0.5 to 50	23.8-26.1	34.8-35.8	North Carolina to Rio de Janeiro	Shallow warm water Species
Alpheus normanni	Intertidal to 73	16-30	21.35-43	East Pacific ; Bermudas and Virginia to São Paulo	
Synalpheus minus	Intertidal to 85	24-26	25-37	North Carolina to São Paulo	
Alpheus formosus	Intertidal to 42	25.5-26.1	35.3	East Pacific; Bermudas and North Carolina to São Paulo	
Alpheus maxilliplanus	0.30 to 0.70-5	18.67-31.00	03.07-29.00	Paraiba to São Paulo	
Synalpheus brevicarpus	Intertidal to 51	24-34	31-40	East Pacific; Bermudas and southern Florida to Rio Grande do Sul	
Alpheus floridanus	Intertidal to 78-81	15.2-27	22.27-37.00	East Atlantic; southern Florida to Rio Grande do Sul	
Ogyrides occidentalis	0-0.30 to 52	11.0-31	03.07-37.00	Virginia to Rio Grande do Sul	
Exhippolysmata oplophoroides	5 to 45	16.7-27	15.89-35.30	North Carolina to Texas; Guyana to Brazil-Uruguay border	
Processa guyanae	30 to 331	13.45-19.48	35.33-35.81	North Carolina to Uruguay	Deeper, colder water Species
Alpheus pouang	120-121 to 268	03.89-16.99	34.30-35.85	São Paulo to Uruguay	
Merhippolyte americana	80 to 274.2	8.14-17.94	33.16-35-90	North Carolina to Buenos Aires	
Alpheus puapeba	45 to 175	8.14-21.22	32.15-36.04	Espírito Santo to Buenos Aires	
Processa hemphilli	1.8-5 to 154	10.66-32.0	29.91-38.0	East and west coast of Florida; Rio de Janeiro to Buenos-Aires	Eurybathic eurythermic Species

species (30-331 m deep; temperatures as low as 03.89 °C and not above 21.22 °C); salinities are high and constant (32.15, 36.04 ‰). To this group belong the two new species known mainly from subtropical South America, *Alpheus pouang* sp. n. and *A. puapeba* sp. n., as well as two species which also range through the West Indies to North Carolina, *Merhippolyte americana* Holthuis and *Processa guyanae* Holthuis. All four species range southwards to Uruguay or Argentina.

To the third group belongs the single species *Processa hemphilli* Manning and Chace, which does not seem restricted to any one of the water masses mentioned above. It is common from close to the surface to 154 m deep and was found further south than any other species studied herein; the temperature range is also wider than in all previous species (10.66, 32.0 °C).

LIST OF CALYPSO STATIONS IN WHICH ALPHEOIDA WERE COLLECTED (1)

St. 1 : *Alpheus amblyonyx; A. cylindricus : A. normanni; Synalpheus longicarpus.*

St. 2 : *Automate* sp.; *Synalpheus longicarpus.*

St. 4 : *Processa fimbriata; Synalpheus townsendi.*

St. 5 : *Alpheus floridanus.*

St. 7 : *Alpheopsis* sp.; *Alpheus amblyonyx.*

St. 8 : *Alpheus normanni; Processa brasiliensis; Synalpheus sanctithomae; S. townsendi.*

St. 13 : *Alpheus normanni.*

St. 17 : *Alpheus normanni.*

St. 18 : *Alpheus* sp.

St. 19 : *Alpheus normanni; Automate* sp.

St. 22 : *Alpheus normanni; Processa brasiliensis; Synalpheus brooksi; S. longicarpus.*

St. 24 : *Synalpheus brevicarpus; S. brooksi; S. sanctithomae; S. townsendi.*

St. 25 : *Synalpheus brooksi; S. longicarpus; S. townsendi.*

St. 27 : *Synalpheus brooksi.*

St. 31 : *Alpheus normanni; Synalpheus townsendi.*

St. 34 : *Alpheus cristulifrons; A. formosus; A.* sp.; *Synalpheus fritzmuelleri.*

St. 40 : *Synalpheus brooksi; S. longicarpus.*

St. 47 : *Alpheus floridanus.*

St. 52 : *Synalpheus townsendi.*

St. 56 : *Alpheus normanni; Processa bermudensis.*

St. 57 : *Trachycaris restricta.*

St. 58 : *Synalpheus brooksi; S. longicarpus; S. townsendi.*

St. 59 : *Alpheus floridanus.*

St. 62 : *Alpheus floridanus.*

St. 63 : *Synalpheus longicarpus; S. townsendi.*

St. 65 : *Alpheus floridanus.*

St. 66 : *Synalpheus brooksi.*

St. 69 : *Alpheus cylindricus; A. normanni; Processa brasiliensis; P. fimbriata; Synalpheus brooksi; S. townsendi.*

St. 75 : *Alpheus normanni; Trachycaris restricta.*

St. 77 : Alpheidae; *Alpheus amblyonyx; Processa brasiliensis; Synalpheus sanctithomae.*

St. 79 : Alpheidae; *Trachycaris restricta.*

St. 80 : Alpheidae; *Processa brasiliensis; P. fimbriata; Synalpheus brooksi; S. townsendi; Trachycaris restricta.*

St. 81 : *Alpheopsis* sp.; *Alpheus normanni; Synalpheus longicarpus; S. townsendi.*

St. 82 : *Alpheus normanni.*

St. 83 : Alpheidae; *Alpheus normanni.*

St. 84 : *Synalpheus brooksi; S. minus; S.* sp.

St. 84 (inside a sponge) : *Alpheus bouvieri; A.* sp.; *Synalpheus brevicarpus; S. brooksi; S. hemphilli.*

St. 85 : *Synalpheus brooksi; S. fritzmuelleri; S. minus; S. townsendi; Thunor rathbunae.*

St. 88 : *Automate* sp.

St. 89 : *Synalpheus brevicarpus; S. longicarpus; S. townsendi.*

St. 90 : *Alpheus amblyonyx; Synalpheus longicarpus; S.* sp.

St. 91 : *Synalpheus townsendi.*

St. 93 : *Alpheus intrinsecus; Exhippolysmata oplophoroides.*

St. 98 : *Alpheus normanni; Synalpheus townsendi.*

St. 110 : *Alpheus floridanus; A. maxilliplanus; A. normanni.*

St. 111 : *Alpheus floridanus.*

St. 112 : *Alpheus floridanus.*

St. 113 : *Alpheus floridanus.*

St. 114 : *Alpheus floridanus; Processa bermudensis.*

St. 118 : *Synalpheus longicarpus.*

St. 126 : *Synalpheus brevicarpus.*

St. 128 : *Ogyrides occidentalis; Processa hemphilli.*

St. 131 : *Ogyrides occidentalis.*

St. 138 : *Merhippolyte americana; Processa guyanae.*

St. 145 : *Alpheus puapeba.*

St. 149 : *Alpheus intrinsecus.*

St. 150 : *Alpheus pouang.*

St. 160 : *Alpheus puapeba.*

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(1) Station data, based on FOREST (1966), are given under each species.

Damaged specimens which I was not able to identify to species level are not treated in the Systematic Account.

SYSTEMATIC ACCOUNT

Family **ALPHEIDAE**

Alpheus amblyonyx Chace, 1972
(fig. 1)

Alpheus macrocheles, Rathbun, 1902 (not Hailstone, 1835) : 105 (Mayaguez Harbor, Puerto Rico). — Zimmer, 1916 : 386, fig. F (Saint Thomas).

? *Crangon macrocheles*, Schmitt, 1935 : 142 (Guanica Harbor, Puerto Rico).

Alpheus amblyonyx Chace, 1972 : 59, fig. 16 (Holotype : ovig. ♀, USNM 135356; type locality : Near center of Arrecife Nicchehabin, Bahía de la Ascensión, Territorio de Quintana Roo, Mexico, on or under coral in 0.30-1.5 m; other localities : Dominica and Bahía de la Ascensión, grass and *Porites* flats). — Ray, 1974 : 71, fig. 49, 50 (West Flower Garden reef, Texas, 22.8 and 67 m, dead coral head; Isla de Lobos reef, Veracruz, 9.8 and 13.7 m).

Material. — Mexico, quintana roo : Bahia de la Ascensión, near center of Arrecife Nicchehabin, 0.30-1.5 m, on or under coral, 1 ovig. ♀, Holotype (USNM 135356), Smithsonian-Bredin St. 52-60, 10.4.60. — Brazil, atol das rocas : 3°50′ S, 33°54′ W, 47-54 m, rocks, calcareous algae and other algae, 5 spec. (3 ovig. ♀), *Calypso* St. 7, 7.11.61. — Paraíba : 7°29′ S, 34°30′ W, 45 m, rocks, shells, broken shells, calcareous algae and other algae, 1 ♂, *Calypso* St. 1, 16.11.61. — Bahia : 18°00′ S, 38°18′ W, 48 m, bryozoans, calcareous algae and sponges, 1 ♂, 1 ovig. ♀, *Calypso* St. 77, 28.11.61. — Espírito Santo : 18°51′ S, 39°08′ W, 49 m, mud, 1 ♂, *Calypso* St. 90, 29.11.61.

Size. — Largest ovigerous female, 7.5+14 mm; major chela, 7:25:1.5 mm; minor chela, 5:1 mm. Largest male, 7+13 mm; both chelae missing. Largest major chela, 9.5:4:2 mm. Largest minor chela of male, 6.5:1.5 mm. Smallest ovigerous female, 4.5+8 mm; both chelae missing.

Color. — In the male from *Calypso* St. 1, preserved in alcohol, small and numerous red chromatophores were still evident on the first pair of chelipeds, abdomen, telson and uropods.

Remarks. — Chace (1972 : 61) describes the movable finger of the minor chela as « ... obscurely carinate on mesial extensor margin... ». This applies well to the females in the new material, but in the males the movable finger of the minor chela is distinctly expanded into a dorsal crest (fig. 1 *j, k*). The difference may be due to the larger size of my specimens. This character and the following variations increase the similarities of *A. amblyonyx* Chace with East Atlantic *A. macrocheles* (Hailstone) : rostrum reaching from about two-thirds to distal end of basal antennular segment (fig. 1 *a, l*); distal elevation on mesiodorsal surface of palm of major chela with superior margin sinuous (fig. 1 *c, d*) or convex (fig. 1 *m*); conspicuous constriction present on ventral margin of minor chela of male (fig. 1 *j, k*), but vestigial or absent in female (fig. 1 *e*); first pair of perciopods with 4-8 movable spinules on merus, 1-4 on ischium (fig. 1 *c, f*). Thus, of those differences indicated for *A. amblyonyx* in relation to British specimens of *A. macrocheles* (Chace, 1972 : 62), the only ones which may still be valid are : movable finger of major chela more strikingly bulbous distally; transverse notch on mesiodorsal surface of palm of major chela broader and less sharply defined.

The minor chela associated with the larger of two ovigerous females from Saint Helena Island, identified as *A. macrocheles* (Chace, 1966 : 627, fig. 2) is similar to that of my male specimens of *A. amblyonyx*, whereas it is longer than in British specimens *(loc. cit.)* or in figured West African material of *A. macrocheles* (Monod, 1933 : 4, fig. 1 *e;* Crosnier and Forest, 1966 : 219, fig. 2 *c;* Lagardère, 1971 : 80, fig. 153).

Habitat. — From 0.30-1.5 to 67 m deep. Mud; grass flats with clumps of the coral *Porites;* hard substrates containing rocks, calcareous algae, shells, broken shells, bryozoans and sponges; corals.

Geographical distribution. — Texas and Veracruz, Gulf of Mexico; Quintana Roo, Yucatan Peninsula; Puerto Rico; Saint-Thomas; Dominica; Atol das Rocas and Paraiba to Espírito Santo.

The previous indication of *A. macrocheles* (Hailstone) for Maranhão and Pernambuco, from calcareous algae between 33 and 38 m deep (Coelho and Ramos, 1972 : 149) probably refers to *A. amblyonyx*.

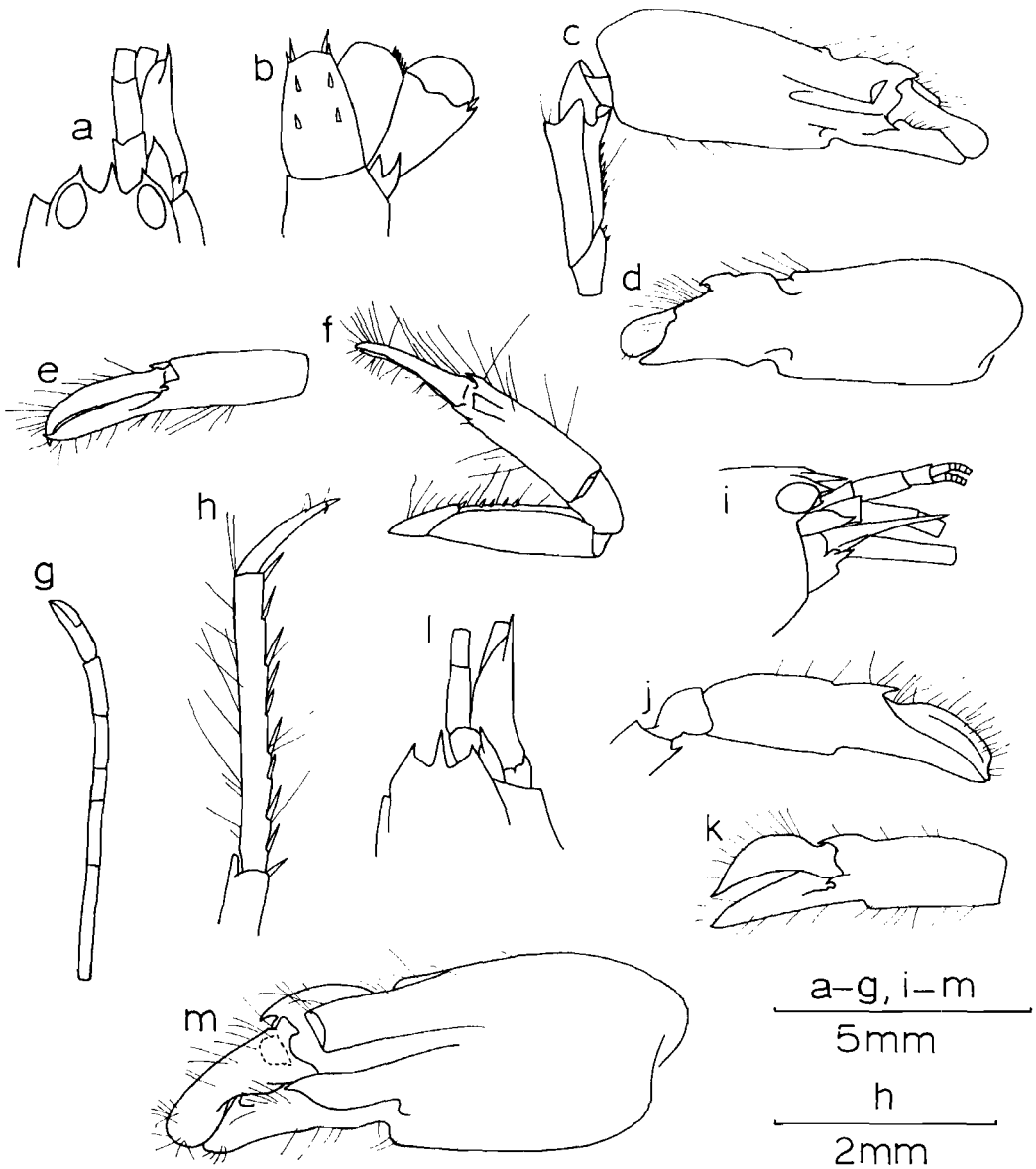

FIG. 1. — Alpheus amblyonyx *Chace, ovigerous female from Calypso St. 77 :* a, *anterior region, dorsal view;* b, *telson and uropod, dorsal view;* c, *major cheliped, lateral surface;* d, *chela of same, mesial surface;* e, *minor chela, lateral surface;* f, *minor cheliped, dorsal surface;* g, *chela and carpus of second pereiopod;* h, *dactyl and propodus of third pereiopod. Male from* Calypso *St. 77 :* i, *anterior region, lateral view;* j, *distal portion of minor cheliped, mesial surface;* k, *minor chela, lateral surface. Male from* Calypso *St. 77 :* l, *anterior region, dorsal view;* m, *major chela, lateral surface.*

Alpheus bouvieri

A. Milne Edwards, 1878

(fig. 2-5)

Alpheus Edwardsii, DANA, 1852 (not *Athanas Edwardsii* Audouin, 1826) [text] : 542 (São Tiago, Cape Verde Islands); 1855 [atlas] : 11, pl. 34, fig. 2 *a-f.* — p.p. POCOCK, 1890 : 518 (Fernando de Noronha).

Alpheus Bouvieri A. Milne Edwards, 1878 : 231 (Type Locality : Cape Verde Islands). — p.p. COUTIÈRE, 1898 *a* : 131, fig. 1 (Congo; Pacific coast of Panama); 1899 : 15, fig. 291; p.p. 1905 : 907, pl. 85, fig. 44 (only note and figure of syntype).

Alpheus heterochaelis, p.p. KINGSLEY, 1878 *a* (not Say, 1818) : 194 (Bermuda). — p.p. RATHBUN, 1900 *b* : 152 (Mamanguape stone reef, Paraíba; Ilha de Nogueira and Praia da Boa Viagem, Pernambuco). — p.p. LUEDERWALDT, 1919 : 429 (Iguape and Itanhaém, São Paulo).

Alpheus edwardsii, Bate, 1888 : 542, pl. 97, fig. 1 (off São Vicente, Cape Verde Islands).
Alpheus Edwardsi, p.p. de Man, 1899 : 311.
Alpheus bouvieri, p.p. Rathbun, 1900 *a* : 312. — Soubie, 1954 : 253 (Senegal). — Forest and Guinot, 1958 : 9. — Ribeiro, 1964 : 5. — Crosnier and Forest, 1965 *b* : 606; 1966 : 273, fig. 22 *a-j* (Ghana; São Tomé; São Tiago; Boavista; São Vicente; intertidal zone, among rocks, stones and sand). — Uschakov, 1970 : 444 (Guinea, intertidal zone). — Fausto-Filho and Furtado, 1970 : 286 (Praia de Iracema, Ceará, intertidal region, in sabellariid worm reefs). — Chace, 1972 : 63 (Antigua Island; Guadeloupe; Tobago Cays; Grenada; Tobago; in and among rocks and dead coral near or above low-tide level). — Fausto-Filho, 1974 : 5 (Fernando de Noronha, stone reef); 1975 : 79 (Praia da Caieira, Fernando de Noronha). — Gore, Scotto and Becker, 1978 : 225 (Indian River region, Florida, in *Phragmatopoma*).
Alpheus bouvieri var. *chilensis*, Schmitt, 1924 *b* (not Coutière, 1902) : 162 (Galápagos, tide pool).
Crangon [*Alpheus*] *Bouvieri*, Monod, 1933 : 462, fig. 1 *A-C* (Los Islands, Guinea).
Alpheus nuttingi var. ?, p.p. Schmitt, 1936 (not *Crangon nuttingi* Schmitt, 1924) : 368 (Punta Braboe, Aruba, between corals).
Alpheus sp., Santos, 1974 : 7, fig. 1-16, 18 *G* (larvae; São Sebastião, São Paulo).

Material. — Bermudas : 1 spec. (USNM), **G.B.G.** coll. 1876; 1 ♂, 1 minor male chela (YPM 6614), **G.B.G.** coll.; 2 spec. (part of YPM 3072), **V.M.J.** coll.; 2 spec .(1 ovig. ♀) (YPM 6114), **A.E.V.** and group coll. 1901. — Cuba : Havana, between stones, 1 ovig. ♀ (MCZ 9370), **L.H.** coll. — Pacific coast of Panama : 2 ♀, 2 ♂ (MCZ 5511), Hassler Expedition; 1 ♂, 2 ♀ (1 ovig.) (MCZ 1633), **A.A.** coll. — Pacific coast of Colombia : Cupica Bay, Cova Limón, 19 spec. (AMNH 14304), Askoy Expedition St. 102, **J.C.A.** coll. 17.5.41. — Aruba : Punta Braboe, Oranjestad, between corals of a « Schorrenflache », 2 ♂, 1 major chela (part of USNM 67401), **W.L.S.** coll. 18.6.30. — Barbados : Bridgetown, 7 spec. (AMNH 4284), **P.B.W.** coll. 27.3.10. — Trinidad : Toca, under stones, 1 ovig. ♀ (MCZ), **E.D.** coll. 5-6.8.37. — Brazil, Rio Grande do Norte : Natal, Praia do Forte, 3 spec. (MNRJ 64-64), **A.L.C.** coll. 25.1.64. — Paraíba : Mataraca, Barra de Camaratuba, 4 spec. (MNRJ 69-64), **A.L.C.** coll. 31.1.64; Mamanguape stone reef, 7 spec. (4 ovig. ♀) (part of USNM 25800), Branner-Agassiz Expedition, **A.W.G.** coll. 20-22.6.1899. — Pernambuco : Recife, Baia de Suape, 10 spec. (MNRJ 72-64), **A.L.C.** coll. 5.2.64; stone reef at Praia da Boa Viagem, 1 spec. (USNM 25804), Branner-Agassiz Expedition, **A.W.G.** coll. 6.7.1899; stone reef at Ilha de Nogueira, 1 spec. (USNM 25803), Branner-Agassiz Expedition, **A.W.G.** coll. 10.7.1899. — Bahia : Abrolhos, Ilha de Santa Bárbara, 2 spec. (MNRJ), 28.9.69; *ibid.*, south coast of Santa Bárbara, 0.8 m, in a sponge, 1 spec., *Calypso* St. 84, 28.11.61. — Espírito Santo : Manguinhos, Praia de Manguinhos, intertidal zone, between stones and *Phragmatopoma*, 4 spec. (2 ovig. ♀), **M.L.C.** coll. 12.3.79; Guarapari, Praia de Peracanga, intertidal zone, between stones, 2 spec. (1 ovig. ♀), **M.L.C.** coll. 10.1.78; Anchieta, Praia de Parati, intertidal zone, in *Phragmatopoma*, 5 spec. (4 ovig. ♀), **M.L.C.** coll. 9.1.78; *ibid.*, Praia dos Castelhanos, intertidal zone, among stones and calcareous algae of stone reef, 5 spec. (2 ovig. ♀), **M.L.C.** coll. 7.1.78; *ibid.*, 1 ovig. ♀, **M.L.C.** coll. 8.1.78; Marataízes, intertidal zone, in *Phragmatopoma*, 2 spec., **M.L.C.** coll. 13.3.79; *ibid.*, Praia das Arraias, intertidal zone, between stones and in *Phragmatopoma*, 2 spec. (1 ovig. ♀), **M.L.C.** coll. 6.1.78. — Rio de Janeiro : Rio das Ostras, Praia do Cemitério, intertidal zone, in *Phragmatopoma*, 3 spec. (2 ovig. ♀), **M.L.C.** coll. 5.1.78; Cabo Frio, Armação dos Búzios, Praia de Manguinhos, 1 ovig. ♀ (MNRJ), **J. Bec.** coll. 5.9.52; *ibid.*, Praia dos Búzios, intertidal zone, between stones, 2 spec. (1 ovig. ♀), Praia dos Ossos, intertidal zone, between stones, 1 spec., and Praia de João Fernandes, intertidal zone, between stones, 8 spec. (4 ovig. ♀), **M.L.C.** coll. 19.1.78; *ibid.*, Praia do Forno, intertidal zone, between stones and in *Phragmatopoma*, 23 spec. (7 ovig. ♀), **M.L.C.** coll. 21.1.78; *ibid.*, Praia da Ferradura, intertidal zone, between stones, several spec., **M.L.C.** coll. 20.1.78; *ibid.*, 1 ovig. ♀, and Praia do Geribá, intertidal zone, between stones, several spec., **M.L.C.** coll. 22.1.78; Cabo Frio, Praia do Peró, 3 spec. (MNRJ 38-65), **A.L.C.** coll. 28.7.65; Cabo Frio, Arraial do Cabo, Prainha, intertidal zone, between stones, 5 spec. (3 ovig. ♀), **M.L.C.** coll. 23.1.78; *ibid.*, Praia dos Anjos, intertidal zone, between stones, 1 ovig. ♀, **M.L.C.** coll. 14.1.77; *ibid.*, 7 spec. (4 ovig. ♀), **M.L.C.** coll. 23.1.78; Niterói, Praia de Itaipu, 4 spec. (1 ovig. ♀) (MNRJ 22-59), **A.C.**, **J. Bec.**, **A.R.** and **H.S.** coll. 6.6.59; *ibid.*, intertidal zone, between stones, 16 spec. (6 ovig. ♀), **M.L.C.** coll. 26.1.78; Ilha Grande, 1 spec. (part of USNM 48919), **E.G.** coll.; *ibid.*, 3 ♂, 4 ovig. ♀ (part of MZUSP 570), **E.G.** coll. 1905; Angra dos Reis, Monsuaba, Praia do Jordão, intertidal zone, between stones, 2 spec. (1 ovig. ♀), **M.L.C.** coll. 14.1.78; Angra dos Reis, Praia de Garatucaia, intertidal zone, between stones, 9 spec. (4 ovig. ♀), **M.L.C.** coll. 9.2.78; Parati, Praia dos Coqueiros, intertidal zone, between stones, 1 ovig. ♀, **M.L.C.** coll. 10.2.78; *ibid.*, Praia do Cão Morto, intertidal zone, between stones, 2 ♂, 2 ovig. ♀, **M.L.C.** coll. 5.2.78; *ibid.*, Praia de Parati-Mirim, intertidal zone, between stones, 12 spec. (10 ovig. ♀), **M.L.C.**

coll. 4.2.78. — São Paulo : Ubatuba, Praia de Picinguaba, intertidal zone, between stones, 2 samples (several spec.), **M.L.C.** coll. 6.1.77; *ibid.*, between Praia de Picinguaba and Praia da Fazenda, intertidal zone, between stones, several spec., Praia da Fazenda, intertidal zone, in *Phragmatopoma*, 2 spec., and between stones, 2 spec., **M.L.C.** coll. 7.1.77; *ibid.*, Praia Vermelha do Norte, intertidal zone, in *Phragmatopoma*, 5 spec., Praia do Perequê-Açu, intertidal zone, between stones, 2 spec., **M.L.C.** coll. 3.1.77; *ibid.*, Praia Vermelha do Sul, intertidal zone, in block of fossil vermetid molluscs, 1 spec., **M.L.C.** coll. 5.1.77; *ibid.*, Praia do Tenório, intertidal zone, between stones, 4 spec., **M.L.C.** coll. 4.1.77; *ibid.*, Praia do Lamberto, intertidal zone, between stones, 1 spec., **M.L.C.** coll. 11.7.76; *ibid.*, Praia do Lázaro, intertidal zone, between stones, 4 spec., **M.L.C.** coll. 13.7.76; *ibid.*, Praia da Fortaleza, intertidal zone, between stones, 7 spec., **M.L.C.** coll. 14-17.4.76; *ibid.*, 6 spec., **M.L.C.** coll. 30.5.76; *ibid.*, several spec., **M.L.C.** coll. 14.7.76; Ilha de São Sebastião, between Praia da Armação and Praia do Pinto, intertidal zone, in *Phragmatopoma*, several spec., **M.L.C.** coll. 18.1.77; *ibid.*, Praia da Siriúba, intertidal zone, between stones, 1 spec., **M.L.C.** coll. 17.1.77; *ibid.*, 4 spec., **M.L.C.** coll. 19.1.77; *ibid.*, Praia do Barreiro, intertidal zone, between stones, 7 spec., **M.L.C.** coll. 17.1.77; *ibid.*, Praia do Porto São Paulo, intertidal zone, between pebbles and in *Phragmatopoma*, 10 spec., **M.L.C.** coll. 20.1.77; *ibid.*, Praia do Portinho, intertidal zone, between stones, several spec., **M.L.C.** coll. 19.1.77; *ibid.*, Praia do Curral, intertidal zone, between pebbles, 3 spec., and Praia do Veloso, intertidal zone, between stones, 8 spec., **M.L.C.** coll. 21.1.77; São Sebastião, 3 spec. (MNRJ 82-61), 1 spec. (MNRJ), 1 spec. (MNRJ 59-63), **M.T.L.** coll. 22.8.60; *ibid.*, Praia de São Francisco, intertidal zone, between stones, 2 spec., **M.L.C.** coll. 22.1.77; *ibid.*, Praia do Araçá, intertidal zone, between stones, several spec., **M.L.C.** coll. 10.8.76; *ibid.*, Praia das Pitangueiras, 1 spec., **N.J.H.** coll. 9.9.76; *ibid.*, Praia Grande, intertidal zone, between stones, 1 spec., **M.L.C.** coll. 21.2.77; *ibid.*, Praia do Segredo, intertidal zone, between stones, 2 spec., **M.L.C.** coll. 24.4.76; *ibid.*, Praia de Baraqueçaba, 1 spec. (MNRJ), 23.10.60; *ibid.*, intertidal zone, between stones, 2 spec., and Praia de Guaecá, intertidal zone, between stones, several spec., **M.L.C.** coll. 20.2.77; *ibid.*, Praia do Toque-Toque Grande, intertidal zone, between stones, 3 spec., and Praia do Toque-Toque Pequeno, intertidal zone, between stones, 3 spec., **M.L.C.** coll. 19.2.77; *ibid.*, Praia de Boissucanga, intertidal zone, between stones, 7 spec., and Praia do Camburi, intertidal zone, between stones, 2 spec., **M.L.C.** coll. 17.2.77; Santos, Praia de Boracéia, intertidal zone, in *Phragmatopoma* and between stones, 2 samples (3 spec.), **M.L.C.** coll. 15.2.77; Ilha de Santo Amaro, Praia do PG, intertidal zone, between stones, **M.L.C.** coll. 10.9.76; *ibid.*, Praia do Tombo, intertidal zone, in *Phragmatopoma*, 1 spec., **M.L.C.** coll. 4.12.76; *ibid.*, Praia de Guaiúba, intertidal zone, in *Phragmatopoma*, 9 spec., **M.L.C.** coll. 11.9.76; *ibid.*, 4 spec., **M.L.C.** coll. 4.12.76; São Vicente, Ilha Porchat, intertidal zone, in *Phragmatopoma*, 2 spec., **M.L.C.** coll. 14.2.77; Itanhaém, 1 ovig. ♀ (MZUSP 741), **H.L.** coll. april 1914; *ibid.*, Ilha das Cabras, intertidal zone, between stones, 7 spec., **M.L.C.** coll. 31.7.77; Itanhaém, Praia do Cibratel, intertidal zone, between stones, 1 spec., **M.L.C.** coll. 23.8.76; Peruibe, between Praia do Canto and Prainha do Guarau, intertidal zone, between stones, **M.L.C.** coll. 29.7.77; Iguape, 2 ovig. ♀ (part of MZUSP 195), **R.K.** coll. 1902. — Paraná : Caiobá, Ilha de Caiobá, close to Praia Mansa, intertidal zone, between stones and in *Phragmatopoma*, several spec., **M.L.C.** coll. 24.2.78; Guaratuba, Ponta da Caieira, intertidal zone, between stones, 10 spec., **M.L.C.** coll. 23.2.78. — Santa Catarina : São Francisco do Sul, Ponta de Ubatuba, intertidal zone, in *Phragmatopoma*, 2 ♂, 2 ovig. ♀, **M.L.C.** coll. 23.2.78; Barra Velha, Praia de Barra Velha, intertidal zone, between stones, 11 spec., **M.L.C.** coll. 20.2.78; Penha, Prainha, intertidal zone, in *Phragmatopoma* and between stones, 1 ♂, 2 ovig. ♀, **M.L.C.** coll. 21.2.78; Porto Belo, Praia do Pereque, intertidal zone, between stones, several spec., **M.L.C.** coll. 15.12.77; *ibid.*, Praia de Porto Belo, intertidal zone, between stones, 1 minor male cheliped, **M.L.C.** coll. 14.12.77; *ibid.*, Praia das Bombas, intertidal zone, between stones, 1 ovig. ♀, **E.J.P.** coll. 3.11.78; *ibid.*, Praia das Bombinhas, intertidal zone, between stones, 1 ♂, **M.L.C.** coll. 14.12.77; Ilha de Santa Catarina, Caieiras da Barra do Sul, intertidal zone, between stones, 1 ♂, **M.L.C.** coll. 11.12.77; Garopaba, Praia do Silveira, intertidal zone, between stones, 2♀ (1 ovig.), **M.L.C.** coll. 8.12.77; *ibid.*, Praia de Garopaba, intertidal zone, between stones, several spec., **M.L.C.** coll. 7.12.77. — Rio Grande do Sul : Torres, 1 ♂ (part of MZUSP 56), **J. Ber.** coll. 5.11.64.

Size. — Largest ovigerous female, 10+30 mm; major chela, 14:7:3 mm; minor chela, 10:3:2 mm.

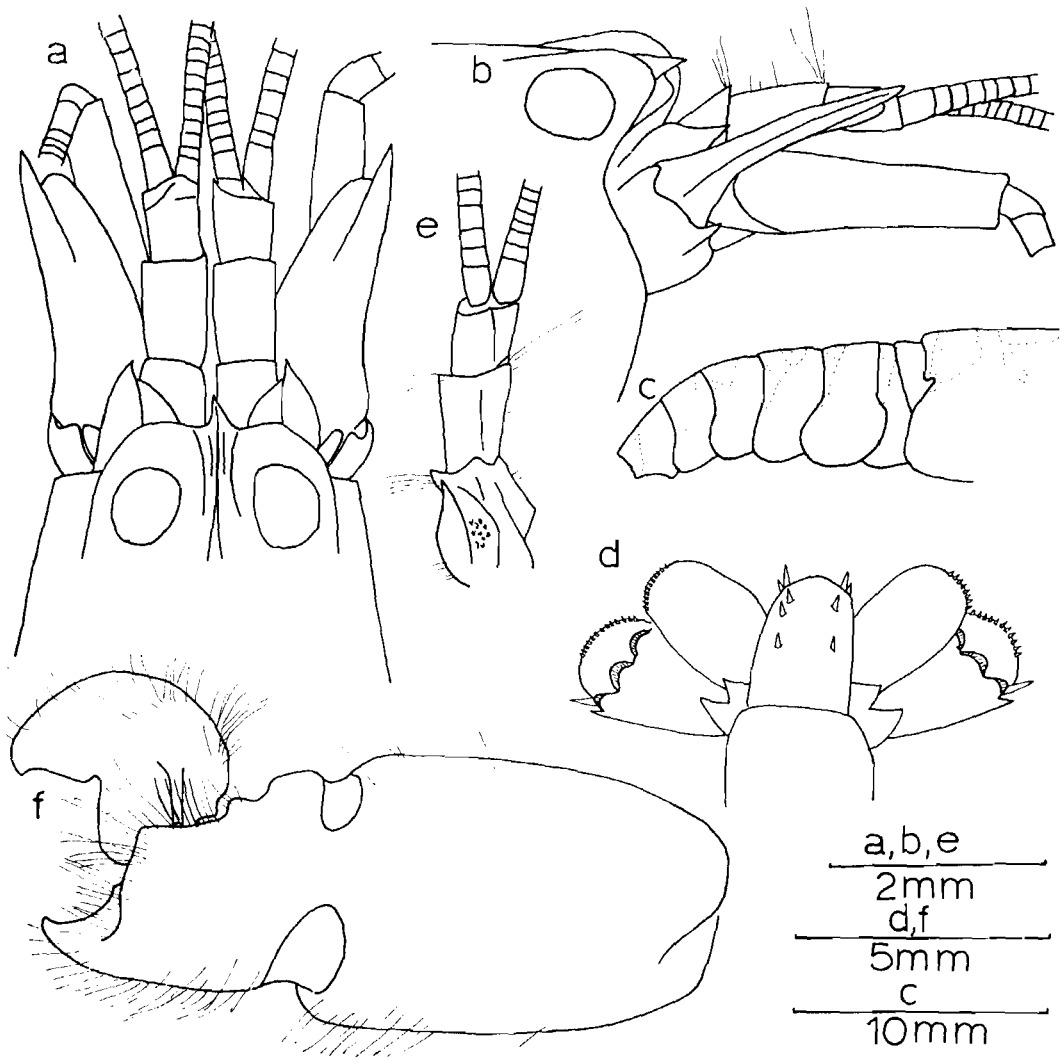

FIG. 2. — Alpheus bouvieri *A. Milne Edwards, male from Praia da Fazenda, São Paulo :* a, *anterior region, dorsal view;* b, *same, lateral view;* c, *abdomen, lateral view, showing color markings;* d, *telson and uropods, dorsal view (supranumerary spine present on dorsal surface of telson);* e, *antennule, lateral view;* f, *major chela, mesial surface.*

Largest male, 9+27 mm; major chela, 13:6:3 mm; minor chela, 8:3:1.5 mm. Smallest ovigerous female, 6+18 mm; major chela, 8:3:2 mm; minor chela, 5:1.5:1 mm.

COLOR. — Agrees with CROSNIER and FOREST (1966 : 276). Eggs are reddish-brown. Color markings on lateral surface of body are illustrated for 2 specimens (fig. 2 *c*, 5 *f*); in dorsal view the pigmented areas appear as brown or greenish-brown transversal bands, very conspicuous in live animals; these are not mentioned by FAUSTO-FILHO (1974 : 5).

REMARKS. — This species appeared in several samples which were previously identified as *Alpheus heterochaelis* Say (KINGSLEY, 1878 *a*; RATHBUN, 1900 *b*; LUEDERWALDT, 1919). To distinguish damaged specimens of *A. bouvieri* A. Milne Edwards from related species (e.g. *Alpheus nuttingi* [Schmitt] and *A. armillatus* H. Milne Edwards), the following characters of the tail fan are useful (fig. 2 *d*) : Presence of movable spinules on posterior margins of both branches of uropod and their absence from posterior margin of telson; presence of conspicuous rounded lobes over transversal suture of outer uropodal branch.

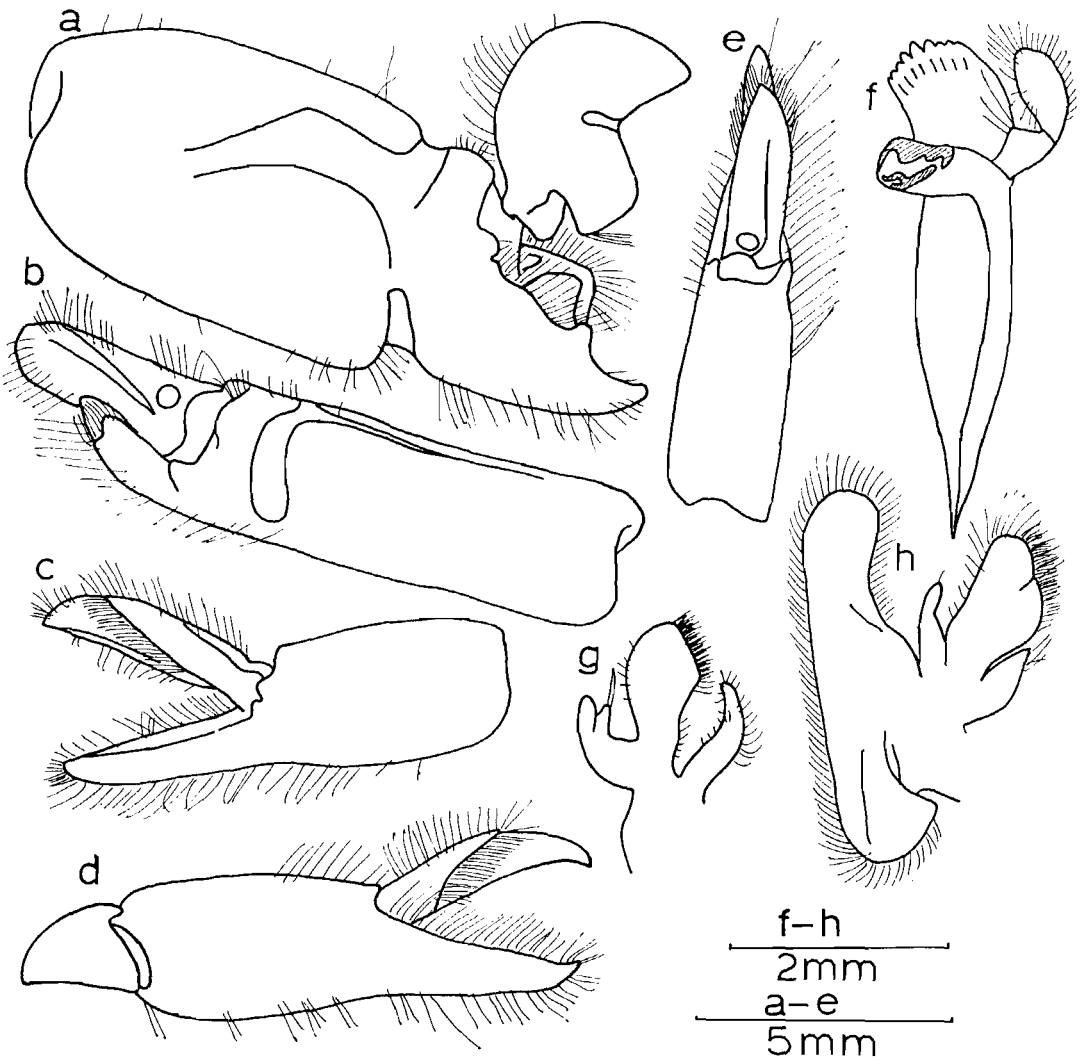

FIG. 3. — Alpheus bouvieri *A. Milne Edwards, male from P aia da Fazenda, São Paulo :* a, *major chela, lateral surface;* b, *same, dorsal surface;* c, *minor chela, lateral surface;* d, *same, mesial surface;* e, *same, dorsal surface;* f, *mandible;* g *first maxilla;* h, *second maxilla.*

BANNER and BANNER (1964 : 92) suggested synonymizing *A. bouvieri* with the Pacific species *A. leviusculus* Dana. As the evidence for this seems still fragmentary (CHACE, 1972 : 64), the specimens from Clipperton Island, tentatively identified with *A. bouvieri* (CHACE, 1962 : 610), should also be considered distinct at present (CHACE, 1972 : 64). The African material referred to this species by MONOD (1927 : 594) belongs to *A. pontederiae* Rochebrune (MONOD, 1928, *apud* HOLTHUIS, 1951 : 85). CROSNIER and FOREST (1966 : 276) suggest that the material from Minikoi (COUTIÈRE, 1905 : 907) is close to *A. bastardi* Coutière, whereas the African specimens of BALSS (1916 : 21) and HOLTHUIS (1951 : 81, fig. 16; 1952 : 43) may be synonyms of *A. holthuisi* Ribeiro.

HABITAT. — Known with certainty only from the intertidal zone. Most specimens were taken between stones; frequently found in less active or non-living sections of *Phragmatopoma* worm reefs; in a sponge; in fossil block of vermetid molluscs.

GEOGRAPHICAL DISTRIBUTION. — Bermudas; East Florida; Cuba; Antigua to Tobago; Aruba; Fernando de Noronha and Ceará to the north of Rio Grande

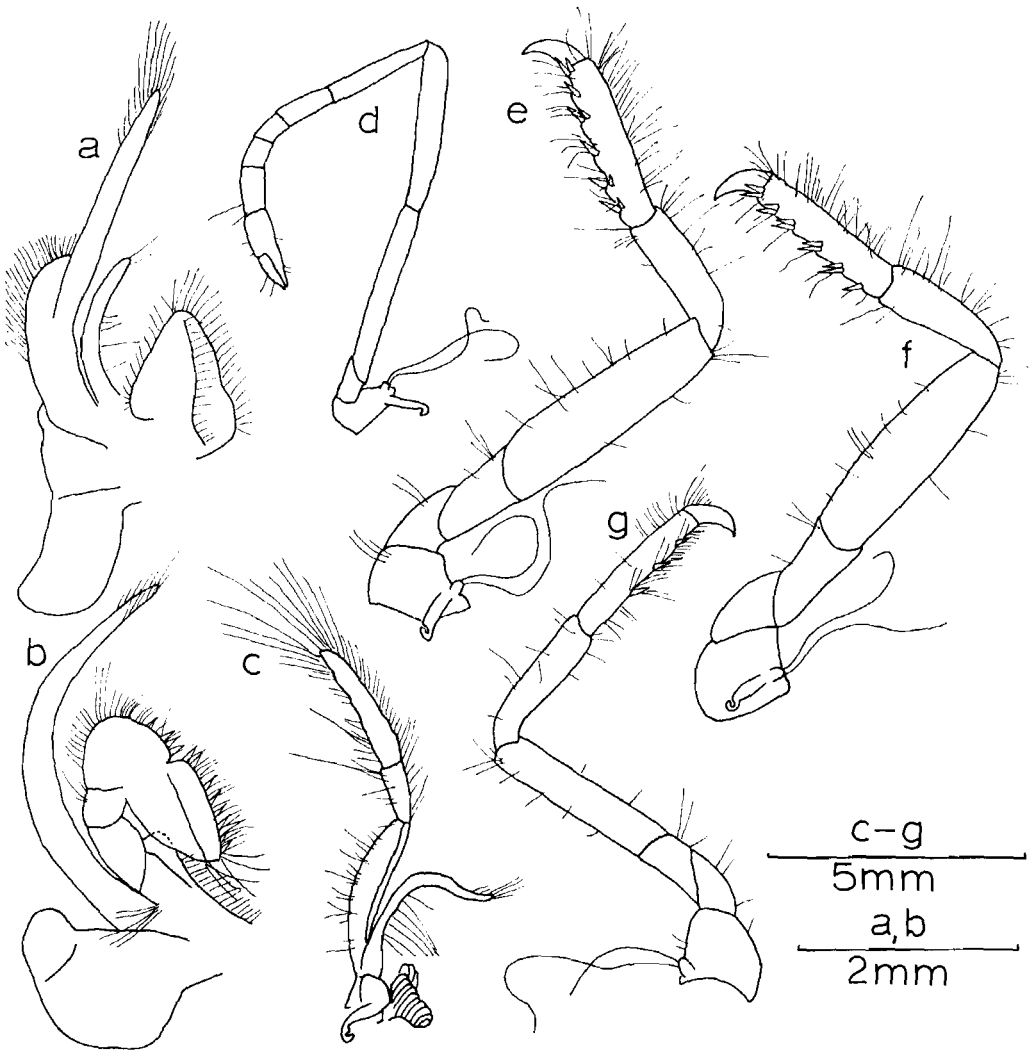

FIG. 4. — Alpheus bouvieri *A. Milne Edwards, male from Praia da Fazenda, São Paulo :* a, *first maxilliped;* b, *second maxilliped;* c, *third maxilliped;* d, *second pereiopod;* e, *third pereiopod;* f, *fourth pereiopod;* g, *fifth pereiopod.*

do Sul. East Pacific from Panama, Colombia and Galápagos Islands. East Atlantic from the Cape Verde Islands and Senegal to Ilha de São Tomé and Congo.

Alpheus cristulifrons Rathbun, 1900

Alpheus obeso-manus, POCOCK, 1890 (not *A. obesomanus* Dana, 1852) : 520 (Fernando de Noronha).

Alpheus cristulifrons Rathbun, 1900 *b* : 152 (*nom. nov. pro A. obesomanus*, Pocock; Type Locality : Fernando de Noronha; New Locality : Maceió coral reef); 1902 : 106 (Playa de Ponce, Arroyo and Ensenada Honda, Puerto Rico). — COUTIÈRE, 1910 : 485 (Dry Tortugas, Florida). — CHACE, 1956 : 146 (south of Gran Roque, Los Roques Islands, 11-16 m, in *Callyspongia*, 25.8 °C); 1972 : 64 (Guana Island; Virgin Gorda; Barbuda; Saint Christopher; Antigua Island; Guadeloupe; Dominica; Carriacou Island; Tobago; Isla Mujeres; Bahía de la Ascensión; Bahía del Espiritu Santo; most frequently at reef edges near tide level and associated with rocks and coral, including *Pocillopora* and *Porites*). — CROSNIER and FOREST, 1965 *b* : 606; 1966 : 260, fig. 17, 18 *a-j* (Ilha do Principe and Ilha de São Tomé, 0-6 to 35-40 m, corals and calcareous algae). — FAUSTO-FILHO, 1970 : 56 (Praia do Tambaú, Rio Grande do Norte, between stones covered by calcareous algae in the intertidal zone); 1974 : 5 (Praia de Atalaia, Fernando de Noronha). — COELHO and RAMOS, 1972 : 149. — RAY, 1974 : 90, fig. 70, 71 (West Flower Garden reef, Texas; Isla de Lobos reef, Veracruz, 7.6 and 13.7 m).

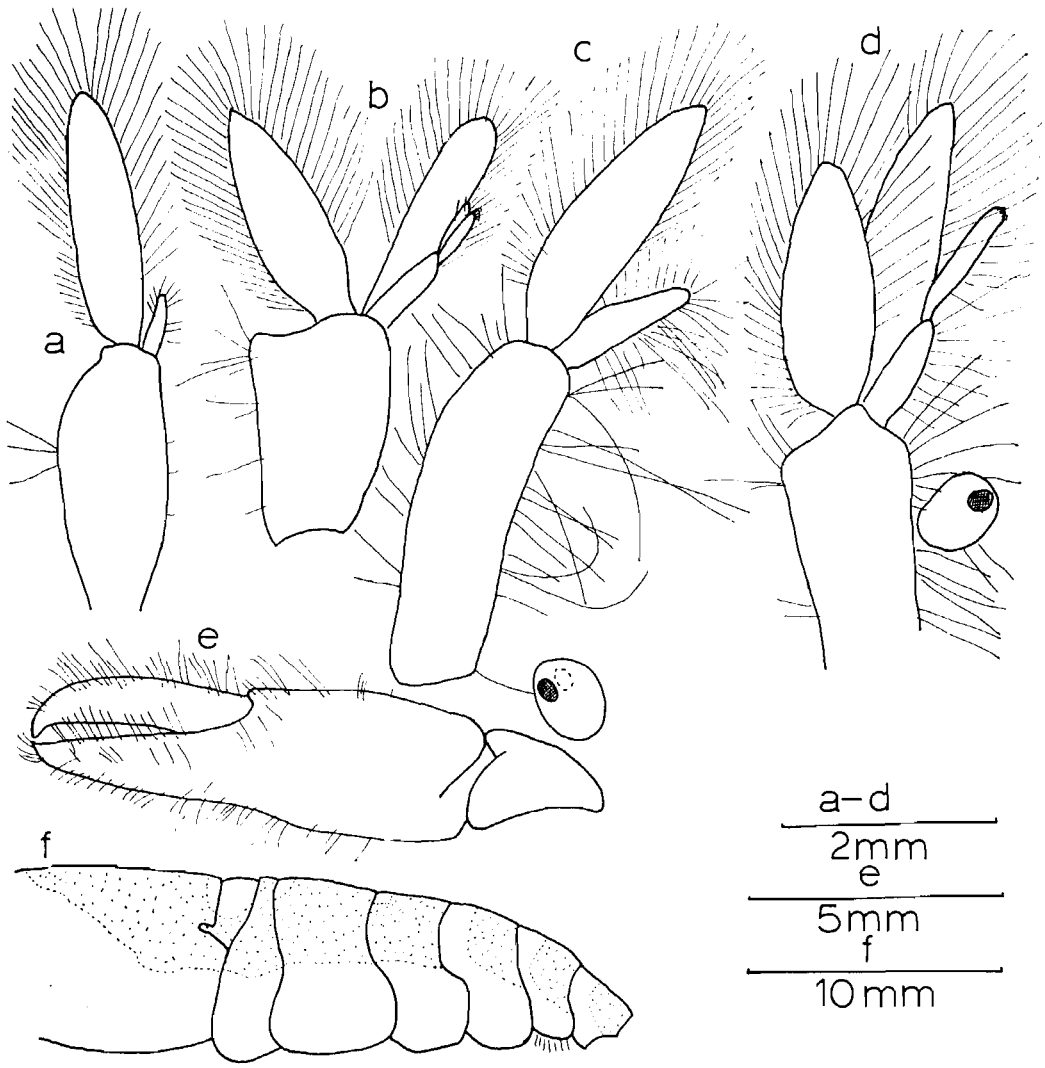

FIG. 5. — Alpheus bouvieri *A. Milne Edwards, male from Praia da Fazenda, São Paulo :* a, *first pleopod;* b, *second pleopod. Female from Praia da Fazenda :* c, *first pleopod;* d, *fifth pleopod;* e, *minor chela and carpus, mesial surface;* f, *abdomen, lateral view, showing color markings.*

Crangon cristulifrons, SCHMITT, 1924 *a* : 65 (Curaçao) ; 1924 *c* : 73 (Barbados) ; 1935 : 143 (Condado Bay, Puerto Rico) ; 1936 : 368 (Punta Braboe, Aruba, between corals; Boca Porto Marie, Curaçao, between corals; Kralendijk, Bonaire, in mouldered coral rock at water line, in colonies of *Zoanthus sociatus* and under sandy coral debris; Klein Bonaire, sandy coral debris) ; 1939 : 28 (Old Providence Island).

MATERIAL. — BRAZIL, ALAGOAS : Maceió, coral reef, 1 ♂, 1 ovig. ♀ (USNM 25809), Branner-Agassiz Expedition, **A.W.G.** coll. 3-4.8.1899; *ibid.*, outer side of jetty, 5 m, stones and calcareous algae, 6 spec. (3 ovig. ♀), *Calypso* St. 34, 22.11.61. — ESPÍRITO SANTO : Guarapari, Praia de Peracanga, 0-2 m, in coral heads, 6 spec. (3 ovig. ♀), **M.L.C.** coll. 10.1.78; *ibid.*, 6 spec. (3 ovig. ♀), **M.L.C.** coll. 11.1.78. — RIO DE JANEIRO : Cabo Frio, Praia das Conchas, intertidal zone, between stones, 1 ♂, **M.L.C.** and **A.I.K.** coll. 24.1.78; Ilha de Cabo Frio, Praia do Farol, 1-2 m, in *Pocillopora* head, 1 ♂, 1 ovig. ♀, and in *Schizoporella* block, 1 ovig. ♀, **M.L.C.** coll. 14.1.77.

SIZE. — Largest ovigerous female, 7.5+15 mm; major chela, 5.5:2:1.5 mm; minor chela, 3:1 mm. Largest male, 6+11 mm; major chela, 9:4:3 mm; minor chela, 6:2:1.5 mm. Smallest ovigerous female, 6+11 mm; major chela, 5.5:2:1.5 mm; minor chela 3:1 mm.

COLOR. — Dorsal region of body inconspicuously striped by brown transversal bands and speckled with small white spots. Quelae brownish-green, conspicuously speckled with white dots. Walking legs, telson and uropods slightly orange-colored. Eggs grayish-brown. FAUSTO-FILHO (1974 : 5) indicates the color of his specimen as being light yellow.

REMARKS. — The presence of a dorsal spine at the distal end of the propodus of the third pereiopod confirms the identity of the new material with West African specimens of *A. cristulifrons* (CROSNIER and FOREST, 1966 : 262). Furthermore, the occasional absence of this spine in the fourth pereiopod, and its absence from both pereiopods in Brazilian specimens examined by previous authors, indicates the inconsistency of this character as a basis for the separation of East and West Atlantic forms into distinct species.

Other variable characters observed in the new material include the relative length of the antennal scale, which may be just as long as, or slightly longer than, the antennal peduncle, and the occasional reduction in size or even the complete absence ot the distal spine of the merus of the first pereiopod.

The new material differs from that of CROSNIER and FOREST (1966 : 260) in the length of the rostral carina, which ends just behind the eyes, rather than extending posteriorly to almost three-fourths of the length of the carapace, and in the length of the second antennular segment, which is about half as long again as the visible portion of the basal segment, instead of about twice the length of this segment. As well as the sexual dimorphysm in the shape of the movable finger of the minor chela, a conspicuous reduction in size occurs in both chelae of the female, which are also lower and less swollen than in the males (*see* measurements of chelae, above).

CROSNIER and FOREST (1966 : 262) discuss the value of distinctive characters for closely related Indo-Pacific species.

HABITAT. — Intertidal zone to 35-40 m deep. Sandy coral debris; in *Callyspongia;* in colonies of *Zoanthus sociatus;* mouldered coral rock; in branching colony of the bryozoan *Schizoporella;* in *Phragmatopoma* worm reefs (Jacques VAN MONTFRANS, personal communication); rocks and calcareous algae; corals, including *Porites* and *Pocillopora;* between stones. Measured water temperature, 25.8 °C.

GEOGRAPHICAL DISTRIBUTION. — East Florida (Jacques VAN MONTFRANS, personal communication); Dry Tortugas; Texas and Veracruz, Gulf of Mexico; Quintana Roo, Yucatan Peninsula; Cld Providence Island; Puerto Rico and Virgin Islands; Barbuda to Tobago and westward to Curaçao; Fernando de Noronha and Rio Grande do Norte to the State of Rio de Janeiro. East Atlantic from Ilha do Principe and Ilha de São Tomé.

Alpheus cylindricus Kingsley, 1878

Alpheus cylindricus Kingsley, 1878 *a* : 196 (Holotype : YPM 746; Type Locality : Perlas Archipelago, Gulf of Panama); 1878 *c* : 58; 1883 : 120. — LOCKINGTON, 1878 : 478. — COUTIÈRE, 1899 : 29, fig. 44, 278. — ZIMMER, 1916 : 394 (Barbados). — CROSNIER and FOREST, 1965 *b* : 606; 1966 : 257, fig. 16 *a-h* (24°43' N, 83°25' W, Florida, 65 m; Príncipe, São Tomé and Anobom Islands, intertidal zone to 73 m, rocks, calcareous algae and corals). — HENDRIX, 1971 : 157 (South Florida). — COELHO and RAMOS, 1972 : 149 (Maranhão, 52 m, calcareous algae). — CHACE, 1972 : 65 (Mustique; Tobago Cays; down to 1 m, in loggerhead sponges). — RAY, 1974 : 92, fig. 72-78 (Santo Domingo, Dominican Republic; West Flower Garden reef, Texas, 22.8 m, dead coral head).

Crangon cylindricus, SCHMITT, 1924 *c* : 74 (Barbados); 1939 : 24 (Sulivan Bay, James Island, Galápagos, intertidal zone). — CHACE, 1937 *a* : 121 (Arena Bank, Gulf of California, 64.0 and 82.3 m, mud and in sponge). — PEARSE, 1950 : 150 (Bimini, in *Spheciospongia vesparia*).

Alpheus vanderbilti Boone, 1930 *b* : 163, pl. 58, textfig. 5 A-C (Holotype : Ovig. ♀; Type Locality : South of Sand Key, Key West, Florida, 37 m).

MATERIAL. — PACIFIC COAST OF PANAMA : Panama Bay, Perlas Archipelago, 1 spec., Holotype (YPM 746), **F.H.B.** coll. — BRAZIL, PARAÍBA : 7°29' S, 34°30' W, 45 m, rocks, shells, broken shells, calcareous algae and other algae, 1 ♂, *Calypso* St. 1, 16.11.61. — BAHIA : 15°37' S, 38°44' W, 39 m, coral, calcareous algae and other algae, 1 ♂, 1 ovig. ♀, *Calypso* St. 69, 27.11.61.

SIZE. — Largest male, 6.5+10.5 mm; major chela, 9.5:3.5 mm; minor chela, 7:2 mm. Only ovigerous female, 6+11.5 mm; major chela missing; minor chela, 5:1 mm.

COLOR. — According to CROSNIER and FOREST (1966 : 258), some specimens preserved in alcohol have pink and purple pigment still evident on the distal portions of the first pair of chelae, but in a manuscript note by GRAVIER *(loc. cit.)*, an unpigmented body and a dark brown major chela is indicated.

REMARKS. — My specimens agree with CROSNIER and FOREST's illustrations (1966 : 256, fig. 16), but 5-11 movable spines are present on the posterolateral margin of the inner branch of the uropod; these are also evident in RAY's scanning photograph (1974 : 94, fig. 74). In lateral view, very shallow depressions are noticed separating the rostrum from the ocular lobes. The branchial formula is characteristic for the genus, a rudimentary pleurobranch being absent from the base of the third maxilliped. The appendix masculina overreaches the appendix interna in the male second pleopod. The rounded subterminal tooth of the movable finger of the large chela mentioned in CHACE (1937 *a* : 121) is present in all three South American specimens examined. Small intraspecific variations were observed in the anterior region of the body : In the male from *Calypso* St. 1 the rostrum is almost as conspicuous as indicated by COUTIÈRE (1899 : 81, fig. 44), whereas in the two specimens from *Calypso* St. 69 it is less prominent, similar to CROSNIER and FOREST's illustration (1966 : 259, fig. 16 *a*); in the ovigerous female from *Calypso* St. 69 the antennal scale reaches almost to the end of the antennular peduncle, as in the male in CROSNIER and FOREST (1966 : 259, fig. 16 *a*), but in both males from South America here examined, the antennal scale reaches about to the end of the second antennular segment, as in the holotype (KINGSLEY, 1878 *a* : 196).

HABITAT. — Intertidal zone to 82.3 m deep. Mud; in sponges, including *Spheciospongia vesparia;* hard substrates containing broken shells, calcareous algae, corals and rocks; calcareous algae; in dead coral head.

GEOGRAPHICAL DISTRIBUTION. — Bimini, Bahamas; Southern Florida; Texas; Dominican Republic; Barbados; Mustique; Tobago Cays; Maranhão; Paraíba; Bahia. East Pacific from Gulf of California, Gulf of Panama and Galápagos Islands. East Atlantic from Principe, São Tomé and Anobom Islands.

Alpheus floridanus Kingsley, 1878

(fig. 6-8)

Alpheus floridanus Kingsley, 1878 *a* : 193 (Syntypes : 1 ♂, 1 ♀, MCZ 4987; Type Locality : Fort Jefferson, Dry Tortugas, Florida, 16.5 m); 1878 *c* : 58; 1883 : 123, pl. 2, fig. 8; 1899 : 717, fig. 42. — LOCKINGTON, 1878 : 476. — COUTIÈRE, 1899 : 29. — RATHBUN, 1902 : 107 (Mayaguez Harbor, 12.8-32.9 m, Puerto Real, off Puerto Real, 15.5 m, off Humaçao, 17.4 m, and Fajardo, Puerto Rico). — ZIMMER, 1916 : 398, fig. C¹-J¹ (Dry Tortugas, 22.9 m). — FORNERIS, 1969 : 86 (Baía do Flamengo, São Paulo, down to 28 m, soft sediment, 15.2.27 °C, 22.27-37.00 ‰). — HENDRIX, 1971 : 75 (South Florida, from burrows in mud). — CHACE, 1972 : 65, fig. 17-20 (Antigua Island; Guadeloupe; Bahía de la Ascensión; less than 0.6 m, mud or sandy mud). — RAY, 1974 : 98, fig. 79-84 (Isla de Lobos reef, Veracruz, 10.6 m).

Alpheus floridanus var. *africana* Balss, 1916 : 21, fig. 5 (Wappu, Ivory Coast, 40 m).

Crangon floridanus, SCHMITT, 1924 *a* : 65 (Curaçao); 1935 : 144 (Guanica Harbor, Puerto Rico); 1936 : 368 (Lac, Bonaire, about 1 m, in sand with *Halimeda*). — PEARSE, 1950 : 150 (Bimini, in *Ircinia strobilina*).

Alpheus platycheirus Boone, 1927 : 131, fig. 29, 30 (Type Locality : Singuanea Bay, Isle of Pines, Cuba, 22.9 m); 1930 *a* : 49, fig. 9, 9 *a* (Gonave Bay, Haiti).

Alpheus floridanus africanus, HOLTHUIS, 1951 : 79, fig. 15 *a-e* (Marshall, Liberia; 4°52' N, 1°42' W, 24 m, mud, sand with shells, and 4°43' N, 1°41' W, 46 m, muddy sand, Ghana). — BUCHANAN, 1958 : 24 (Accra, Ghana). — LONGHURST, 1958 : 31 (Sierra Leone). — ROSSIGNOL, 1962 : 131 (Pointe-Noire, Congo). — CROSNIER and FOREST, 1965 *a* : 358 (Pointe-Noire, Congo); 1965 *b* : 606; 1966 : 269, fig. 20 *b*, 21 *a-e* (Guinea, 7-8 to 18-30 m, mud; Gabon, 10 m, mud; Ilha do Príncipe, 12 m, sand and mud; Congo; between Recife and Bahia, Brazil). — COELHO and RAMOS, 1972 : 150.

Alpheus floridanus floridanus, HOLTHUIS, 1951 : 80, fig. 15 *f-g* (Curaçao). — CROSNIER and FOREST, 1965 *b* : 606; 1966 : 267, fig. 20 *a*, 21 *f-i* (Guinea, 15 m, sand, mud, hydrozoans and bryozoans; Gabon, 10 m, mud; Congo; Atol das Rocas, Brazil, in the lagoon). — COELHO and RAMOS, 1972 : 150.

MATERIAL. — USA, FLORIDA : Dry Tortugas, Fort Jefferson, north channel, 16.5 m, 1 ♂, 1 ♀, Syntypes (MCZ 4987), **W.H.J.** coll. — CUBA : Isle of Pines, Singuanea Bay, 1 ♂, probably Holotype of *Alpheus platycheirus* Boone (YPM 6628), *Pawnee I.* — BRAZIL, ATOL DAS ROCAS : In the lagoon, 2 m, calcareous algae and sand, 4 spec., *Calypso* St. 5, 17.11.61. — BAHIA : 11°30' S, 37°14' W, 36-39 m, sand, mud, shells and broken shells, 1 ♀, *Calypso* St. 47, 23.11.61; 12°49.7' S, 38°31.4' W, 20-30 m, mud, 5 spec., *Calypso* St. 62, 26.11.61; 12°56.5' S, 38°31.5' W, 20 m, mud, 2 spec. (1 ovig. ♀), *Calypso* St. 59, 24.11.61; 13°26' S, 38°50' W, 35 m, muddy sand, 2 spec., *Calypso* St. 65, 26.11.61. — RIO DE

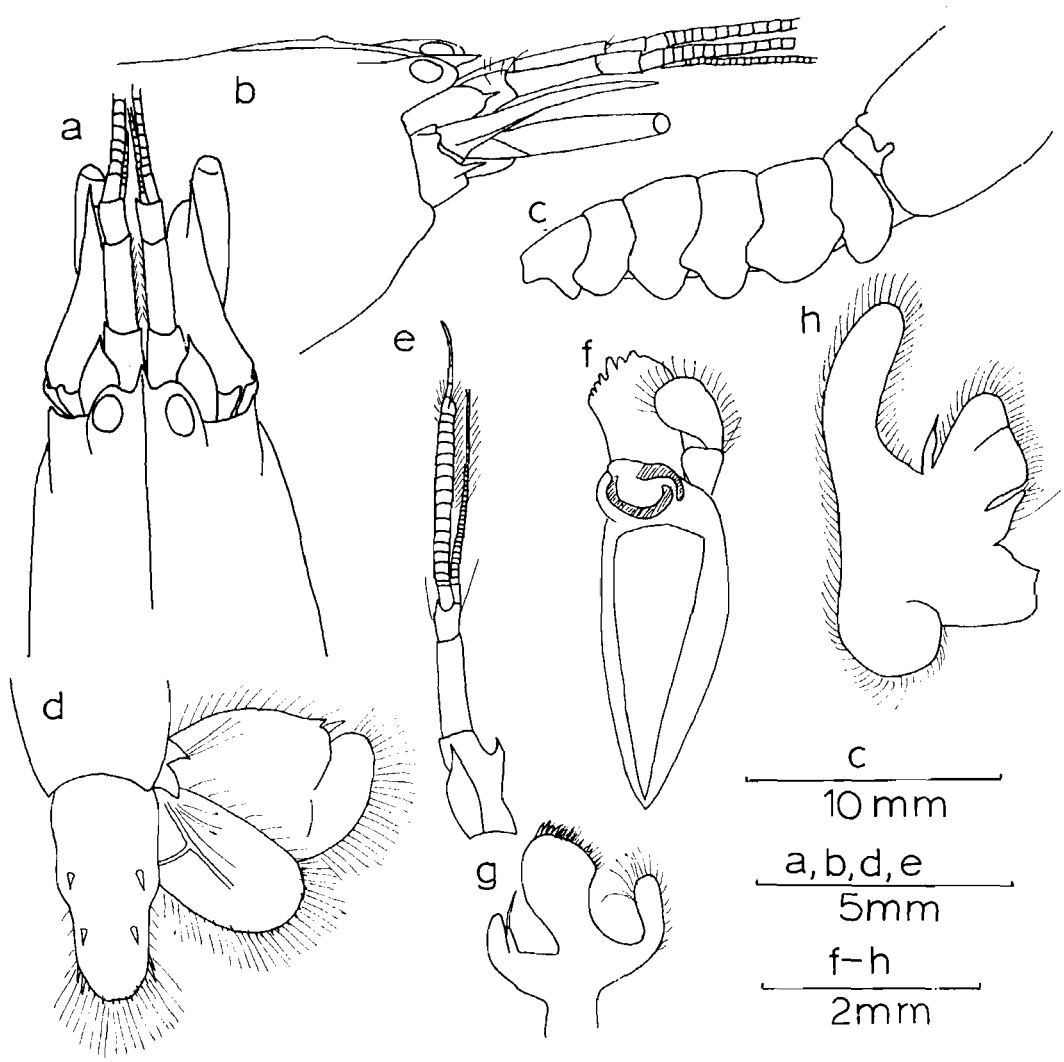

FIG. 6. — Alpheus floridanus *Kingsley, male, MZUSP 25 :* a, *anterior region, dorsal view;* b, *same, lateral view;* c, *abdomen, lateral view;* d, *telson and uropods, dorsal view;* e, *antennule, lateral view;* f, *mandible;* g, *first maxilla;* h, *second maxilla.*

JANEIRO : Ilha Grande-Sepetiba, 1 ♂ (USNM 144013), 4.2.71; Ilha Grande, off Baia Abraão, 16-19 m, mud, 4 spec. (1 ovig. ♀), *Calypso* St. 111, 8.12.61; Baia Abraão, 0-5 m, mud and sand, 40 spec., *Calypso* St. 110, 8.12.61; 23°04′ S, 44°14′ W, 45 m, mud, 6 spec., *Calypso* St. 114, 8.12.61; 23°05′ S, 44°08′ W, 17 m, mud, 1 spec., *Calypso* St. 112, 8.12.61; Angra dos Reis, 1 ♀ (MZUSP 48), *Emília* St. 360, March 1969; *ibid.*, 1 ♂ (MZUSP 25), *Emília* St. 348, March 1969. — SÃO PAULO : Ilha de São Sebastião, intertidal zone, in U-shaped burrows in mud, 2 ♂, 2 ♀, **A.S.F.D.** coll. 17.9.78; Canal de São Sebastião, 15 m, 2 spec., 12.2.63; *ibid.*, 15-20 m, 9 spec., 15.2.66. — PARANÁ : 25°35′ S, 48°13.0′ W, 23 m, sand and broken shells, 2 ovig. ♀ (IOUSP-CO379), *Besnard* St. 1587, 11.12.71. — SANTA CATARINA : 27°13′ S, 48°20′ W, 36 m, clay, 20.86C, 1 spec. (IOUSP-CO317), *Besnard* St. 1294, 9.12.70; 27°19′ S, 48°03′ W, 68-70 m, clay, 20.95 °C, 1 spec. (IOUSP-CO316), *Besnard* St. 1293, 9.12.70; 27°32′ S, 48°05′ W, 78-81 m, mud, 15-81 °C, 2 samples (2 spec.) (IOUSP), *Besnard* St. 1052, 2.6.70. — RIO GRANDE DO SUL : 29°24.0′ S, 49°10.0′ W, 55 m, mud and shells, 18.81 °C, 35.39 ‰, 1 spec. (IOUSP-CO524), *Besnard* St. 1843, 2.8.72; 29°51.8′ S, 49°37.6′ W, 45 m, sand and shells, 16.00 °C, 32.49 ‰, 4 spec. (IOUSP-CO528), *Besnard* St. 1851, 4.8.72.

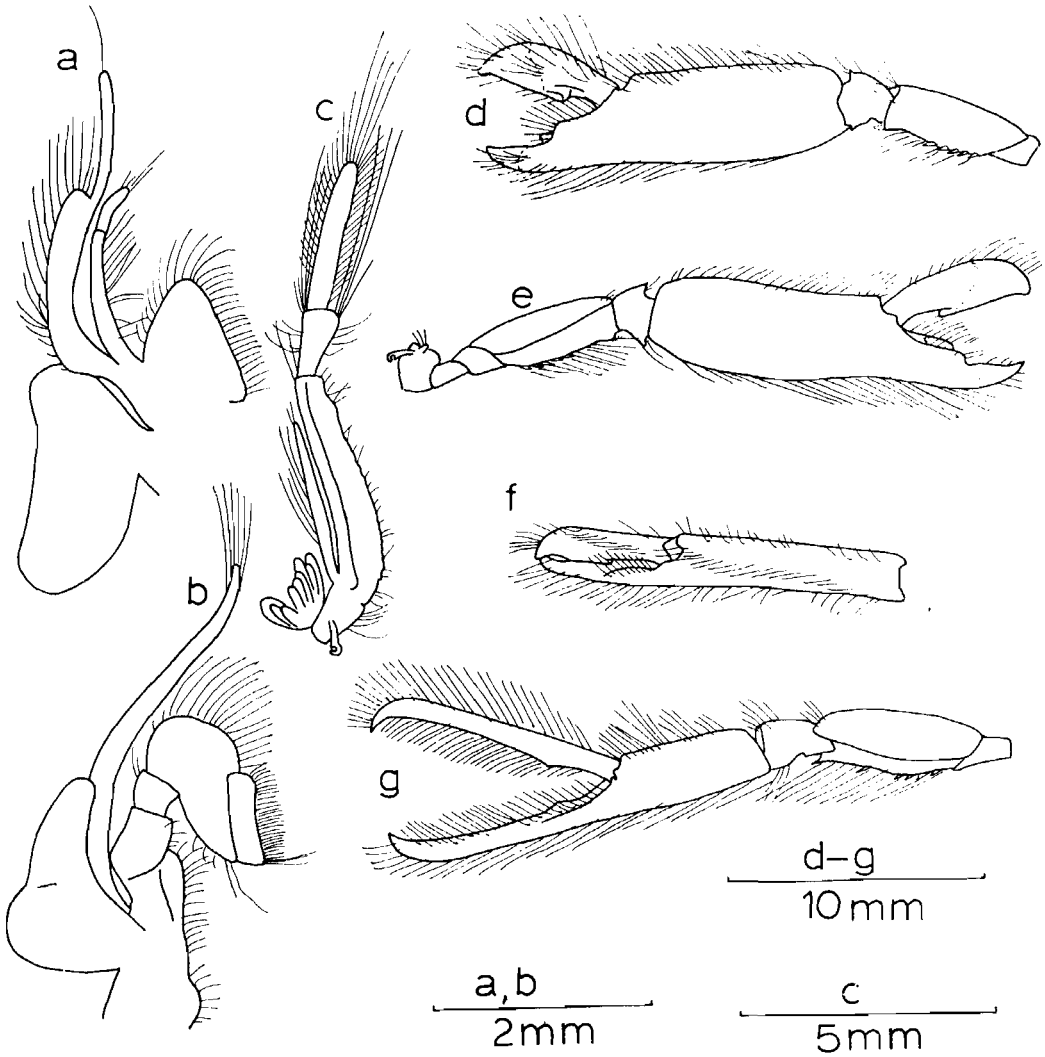

FIG. 7. — Alpheus floridanus *Kingsley, male, MZUSP 25 :* a, *first maxilliped;* b, *second maxilliped;* c, *third maxilliped;* d, *major cheliped, mesial surface;* e, *same, lateral surface;* f, *major chela, dorsal surface;* g, *minor cheliped, lateral surface.*

SIZE. — Largest female, 18.5+30 mm; major chela, 17:5.5:2.5 mm; minor chela, 16.5:3.5:2 mm. Largest male, 15+24 mm; major chela, 21:7:3.5 mm; minor chela, 18:4.5:3 mm. Smallest ovigerous female, 5+8 mm; major chela, 4.5:1.5:0.75 mm; minor chela, 3.5:1 mm.

COLOR. — Body speckled by green and brown chromatophores; traces of blue or black pigment sometimes present along margins of abdominal pleura, uropods and telson. Chelae with irregular greenish-brown stains, spaces between these sometimes speckled by blue chromatophores; major chela with finger tips between brown and pink. This color pattern is similar to that described by HENDRIX (*apud* RAY, 1974 : 99).

REMARKS. — The morphology of two specimens is illustrated (fig. 6-8). A rudimentary pleurobranch is absent from the base of the third maxilliped.

The considerable variability discussed by CHACE (1972 : 65) for this species was also encountered in the new South American material examined, without any distinct limits being apparent between the previously recognized forms « *floridanus* » and « *africanus* ».

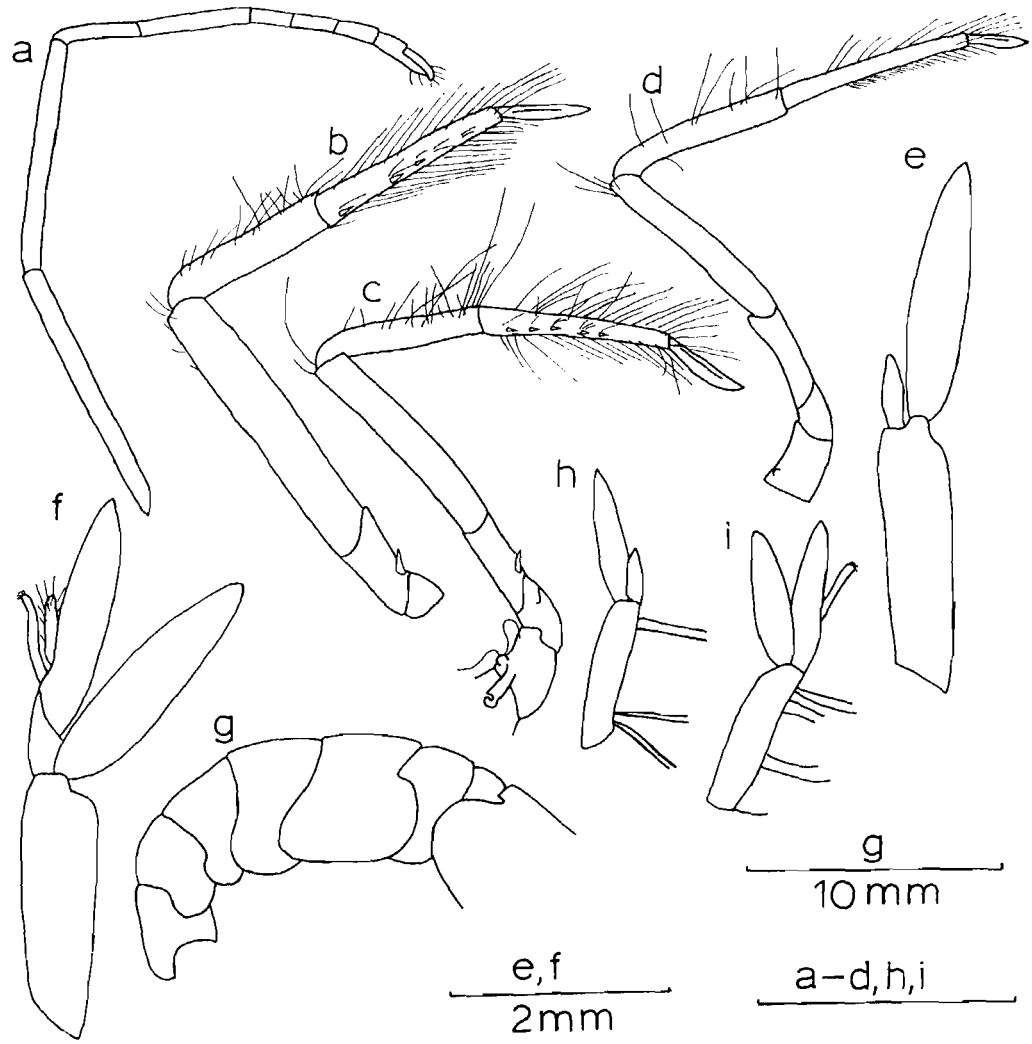

FIG. 8. — Alpheus floridanus *Kingsley, male, MZUSP 25 :* a, *second pereiopod;* b, *third pereiopod,* c, *fourth pereiopod;* d, *fifth pereiopod;* e, *first pleopod;* f, *second pleopod. Female, MZUSP 48 :* g, *abdomen, lateral view;* h, *first pleopod;* i, *second pleopod.*

HABITAT. — Intertidal zone to 78-81 m deep. Inside U-shaped burrows in mud flat uncovered by exceptionally low tide; mud; clay; sand with the green calcareous algae *Halimeda;* inside lagoon, sand and calcareous algae substrates; mixed sediments containing mud, sand, shells, broken shells, hydrozoans and bryozoans. Measured water temperatures, 15.2 to 27 °C; salinities, 22.27 to 37.00 ‰.

GEOGRAPHICAL DISTRIBUTION. — Bimini, Bahamas; Southern Florida; Veracruz, Gulf of Mexico; Quintana Roo, Yucatan Peninsula; Isle of Pines, Cuba; Haiti; Puerto Rico; Antigua; Guadeloupe; Bonaire; Curaçao; Atol das Rocas and north of Bahia to north of Rio Grande do Sul. East Atlantic from Guinea to Congo and Ilha do Príncipe.

Alpheus formosus Gibbes, 1850

Alpheus formosus Gibbes, 1850 : 196 (Type Locality : Key West, Florida). — KINGSLEY, 1878 *a* : 190. — HEILPRIN, 1888 : 322 (Bermudas); 1889 : 151. — COUTIÈRE, 1899 : 13; 1910 : 485 (Dry Tortugas, Florida). — VERRILL, 1900 : 579 (Bermudas, in cavities of dead coral). — RATHBUN, 1900 *b* : 152 (Natal, Rio Grande do Norte; stone reef at Ilha de Nogueira, Pernambuco; Maceió, coral reef); 1902 : 106 (Puerto Rico : Mayaguez, 7.3-11.0 m; Playa de Ponce, off Humaçao.

17.3 m; Ensenada Honda, Culebra; Fajardo). — Balss, 1924 : 177 (Bird Key Reef, Tortugas). — Boone, 1930 *b* : 166, pl. 59 (Pigeon Key, Florida). — Chace, 1956 : 146 (SW of Gran Roque, in *Callyspongia*, 5.5 m, 26.1 °C); 1972 : 67 (Tortola; Guana Island; Virgin Gorda; Anguilla; Barbuda; Saint Christopher; Antigua Island; Guadeloupe; Dominica; Saint Lucia Island; Tobago Cays; Carriacou Island; Tobago; Bahía de la Ascención; sand and mud flats with and without *Pocillopora* and *Porites*, rock-studded beaches, seawalls, wrecks, and exposed and submerged reefs from above low-tide line to 2 m deep). — Bullis and Thompson, 1965 : 8. — Williams, 1965 : 64, fig. 52 (near Beaufort, North Carolina; Santos, São Paulo; surface to 42.0 m). — Fausto-Filho, 1970 : 56 (Praia de Mucuripe, Ceará, mud). — Hendrix, 1971 : 83 (South Florida). — Corrêa, 1972 : 3 (Ilha de Santa Bárbara, Abrolhos, Bahia). — Coelho and Ramos, 1972 : 148. — Ray, 1974, fig. 85-88 (Isla de Lobos reef, Veracruz, 7.6-15.2 m, coral heads; Porto Yabucoa, Puerto Rico, coral heads). — Camp, Whiting and Martin, 1977 : 25 (Hutchinson Island, Florida, in *Phragmatopoma* and at 11.2 m, 25.5 °C, 35.3 ‰). — Gore, Scotto and Becker, 1978 : 225 (Saint Lucie and Fort Pierce, Florida, intertidal zone, in *Phragmatopoma*).

Alpheus poeyi Guérin Méneville, 1857 : 19, pl. 2, fig. 10 (Holotype : ANSP 235; Type Locality : Cuba). — Kingsley, 1883 : 116. — Sharp, 1893 : 114.

Alpheus panamensis Kingsley, 1878 *a* : 192 (Syntypes : 3 spec., from Acajutla and Panama, Pacific coast of Central America); 1878 *c* : 58; 1883 : 113. — Pocock, 1890 : 519 (Fernando de Noronha). — Zimmer, 1916 : 391, fig. N-V (Kingston, Jamaica; Saint John; Barbados; Bird Key Reef, Tortugas). — Holthuis, 1954 : 160. — Fausto-Filho, 1974 : 5.

Alpheus Poeyi, Coutière, 1899 : 13.

Alpheus Panamensis, Coutière, 1899 : 29, fig. 50.

Crangon formosus, Hay and Shore, 1918 : 384, pl. 26, fig. 5 (Beaufort, North Carolina, 27.4 m. — Schmitt, 1924 *a* : 65 (Curaçao); 1924 *c* : 73 (Pelican Island, tide pool; Barbados, coral heads; English Harbor); 1935 : 144 (Ballena Point, Puerto Rico, coral reefs); 1936 : 368 (Punta Braboc, Aruba, between corals; Boca Porto Marie, Curaçao, between corals. Bonaire : Kralendijk, in coral stone, and Lac, sand debris); 1939 : 28 (Old Providence Island). — Pearse, 1932 : 107 (Dry Tortugas, Florida); 1950 : 150 (Bimini, in *Ircinia strobilina*). — Manter, 1934 (metacercariae of *Helicometra nimia* encysted in the muscles; Tortugas). — Pearse and Williams, 1951 : 143 (reefs off the Carolinas).

Alpheus or *Crangon formosus*, Verrill, 1922 : 84, text. fig. 5 *d*, pl. 19, fig. 1, 2, pl. 20, fig. 3, pl. 23, fig. 5 *a*, *b*, pl. 29, fig. 4 *a-u*, pl. 25, fig. 6-6 *a* (Bermuda, in cavities of calcareous rock and in dead reef corals).

Material. — Bermudas : 3 spec. (USNM 3068), Yale Expedition, **A.E.V.** coll. 1898; (YPM 6102), **A.E.V.** and group coll. 1901. — USA, North Carolina : Carteret County, Morehead City, Bogue Sound, intertidal zone, between stones of jetty, 1 spec. (IMS 1605), **D.W.** and **R.Re.** coll. 25.11.62. — Florida : [Probably Pigeon Key] littoral, several spec. (YPM 6105), 16.3.26; Biscayne Bay, Miami Beach, 1 ♂ (IMS 2016), **C.E.J.** and class coll. 6.4.66; Marathon Keys, Walkers Island, 1 ♂, 1 ovig. ♀ (IMS 2003), **D.M.D.** coll. 7.4.65. — West coast of Panama : Panama Bay, 4 spec. (2 ovig. ♀) (AMNH 15182), *Albatross*, **F.H.B.** coll.; *ibid.*, Pearl Island, 1 ♂, Syntype of *Alpheus panamensis* Kingsley (MCZ 4988), **F.H.B.** coll.; Pearl Island, Pachira, 1 spec., Syntype of *A. panamensis* Kingsley (part of YPM 741), **F.H.B.** coll. 1866-67. — Brazil, Rio Grande do Norte : Natal, 1 spec. (USNM 25806), Branner-Agassiz Expedition, **A.W.G.** coll. 29.6.1899. — Pernambuco : Ilha de Nogueira, stone reef, 2 pereiopods (USNM 25807), Branner-Agassiz Expedition, **A.W.G.** coll. 10.6.1899; Recife, Baia de Suape, 1 spec. (MNRJ 72-64), **A.L.C.** coll. 5.2.64. — Alagoas : Maceió, coral reef, 5 spec. (USNM 25808), Branner-Agassiz Expedition, **A.W.G.** coll. 3-4.8.1899; *ibid.*, outer side of jetty, 5 m, rocks and calcareous algae, 1 ♂, *Calypso* St. 34, 22.11.61. — Bahia : Abrolhos, Ilha de Santa Bárbara, 1 ovig. ♀ (MNRJ), **A.L.C.** coll. 28.9.69. — Espírito Santo : Guarapari, Praia de Peracanga, 0-1 m, in coral heads, 4 spec. (1 ovig. ♀), **M.L.C.** coll. 11.1.78. — Rio de Janeiro : Cabo Frio, Armação dos Búzios, Enseada de Manguinhos, 1 spec. (MNRJ), **L.N.T.**, **P.J.** and **A.C.** coll. August 1968; Cabo Frio, Praia das Conchas, intertidal zone, between stones, several spec., **A.I.K.** coll. 24.1.78; *ibid.*, Praia do Forte, intertidal zone, between stones, 1 spec., **M.L.C.** coll. 24.1.78; Cabo Frio, Arraial do Cabo, Praia do Forno, 3 spec. (1 ovig. ♀) (MNRJ), **N.S.** and class coll. 15.8.58; *ibid.*, Praia dos Anjos, intertidal zone, between stones, 8 spec. (3 ovig. ♀), **M.L.C.** coll. 23.1.78; Niterói, Praia da Boa Viagem, 1 spec. (MNRJ), **Ab.** coll. 12.7.71; Mangaratiba, island in front of Praia do Sai, intertidal zone, between stones, 1 spec., **M.L.C.** coll. 8.2.78. — São Paulo : Ubatuba, Praia de Picinguaba, intertidal zone, between stones, 2 spec., **M.L.C.** coll. 6.1.77; *ibid.*, 4 spec., **M.L.C.** coll. 7.1.77; *ibid.*, Praia do Lamberto, about 1 m, in *Schizoporella*, 2 spec., **M.L.C.** coll. 11.10.76; *ibid.*, Praia da Fortaleza, intertidal zone, between stones, 9 spec., **M.L.C.** coll. 29.5.76; Ilha de São Sebastião, Praia da Siriúba, intertidal zone, between stones, 4 spec., **M.L.C.** coll. 19.1.77; *ibid.*, Barra Velha, intertidal zone, between stones, 4 spec., **M.L.C.** coll. 20-21.1.77; São Sebastião, 1 spec. (MNRJ 78-61), **M.T.L.** coll. 22.8.60; *ibid.*, Praia do Segredo, 2 spec. (1 with *Bopyrella alphei* [Rich.] in branchial chamber) (MNRJ 60-63), **M.T.L.** coll. 5.9.60; *ibid.*, Praia de Baraqueçaba, intertidal zone, between stones, 6 spec., **M.L.C.** coll. 20.2.77; *ibid.*, Praia do Toque-Toque Pequeno, intertidal zone, between stones, 4 spec. (1 ovig. ♀), **M.L.C.** coll. 31.12.78; *ibid.*, Praia de Boissucanga, intertidal zone, between stones, 2 samples (14 spec.), **M.L.C.** coll. 17.2.77; *ibid.*, Praia do Camburi, intertidal zone,

between stones, 2 spec., **M.L.C.** coll. 16.2.77; Santos, Praia de Boracéia, tide pool, 3 spec., **M.L.C.** coll. 15.2.77; Baia de Santos, 1 ovig. ♀ (USNM 92850), **Ca.** coll. 2.6.50; Ilha de Santo Amaro, Praia de Pernambuco, intertidal zone, between stones, 4 spec., **M.L.C.** coll. 25.8.76; Itanhaém, Ilha das Cabras, intertidal zone, between stones, 2 spec., and Praia do Cibratel, intertidal zone, between stones, 7 spec., **M.L.C.** coll. 31.7.77.

SIZE. — Largest ovigerous female, 14+27 mm; major chela, 17:6:4 mm; minor chela, 14.5:3.5:2 mm. Largest male, 13.5+26 mm; major chela, 17:6.5:3.5 mm; minor chela, 14:3:2.5 mm. Smallest ovigerous female, 7+12.5 mm; major chela, 8:3:2 mm; minor chela missing.

COLOR. — The characteristic color pattern of this species has been mentioned by HAY and SHORE (1918 : 385), VERRILL (1922 : 85), BOONE (1930 *b* : 166), WILLIAMS (1965 : 64) and RAY (1974 : 105). The eggs in life are yellow, orange-colored or brown.

REMARKS. — Examination of the type material of *Alpheus websteri* Kingsley (USNM 84329), from Key West (KINGSLEY, 1880 : 416), showed the previous synonimization of this species with *Alpheus formosus* Gibbes (VERRILL, 1922 : 84) to be incorrect. Due to shape of rostrum and to presence of shallow transverse notches on dorsal and ventral margins of major chela, *A. websteri* Kingsley seems to be related to *A. rugimanus* A. Milne Edwards (*see* also COUTIÈRE, 1899 : 30).

HABITAT. — Intertidal zone to 42.0 m deep. Sand and mud flats with or without corals *Pocillopora* and *Porites;* seawalls; wrecks; in sponges *Ircinia strobilina* and *Callyspongia;* in branching colony of the bryozoan *Schizoporella;* in *Phragmatopoma* worm reefs; rock and calcareous algae; between reef corals or in isolated coral heads; in cavities of calcareous rock; between stones. Measured water temperatures, 25.5 and 26.10 °C; salinity, 35.3 ‰.

GEOGRAPHICAL DISTRIBUTION. — Bermudas; North Carolina; East Florida to Dry Tortugas; Bimini, Bahamas; Veracruz, Gulf of Mexico; Quintana Roo, Yucatan Peninsula; Cuba; Jamaica; Old Providence Island; Puerto Rico and Virgin Islands through Lesser Antilles to Tobago and westward to Aruba; Fernando de Noronha and Ceará to São Paulo. East Pacific from El Salvador and Panama.

Alpheus intrinsecus Bate, 1888
(fig. 9, 10)

Alpheus intrinsecus Bate, 1888 : 557, pl. 100, fig. 1 (Holotype : 1 ovig. ♀; Type Locality : Off Salvador, Estado da Bahia, Brazil, 13-36 m). — OSÓRIO, 1892 : 201 (Iogo-Iogo, Ilha de São Tomé); 1898 : 194. — COUTIÈRE, 1899 : 44, fig. 64. — RATHBUN, 1900 *a* : 313. — MOREIRA, 1901 : 10; 1905 : 131 (Ilha de São Sebastião, São Paulo, 24 m). — BALSS, 1916 : 20 (West coast of Africa); 1925 : 292, text. fig. 75 (Victoria, Cameroon). — LUEDERWALDT, 1919 : 430 (Ilha de São Sebastião, São Paulo). — MONOD, 1927 : 594. — HOLTHUIS, 1951 : 87 (9°57′ N, 15°22′ W, off Guinea, 25 m, shells and hydroids); 1952 : 44 (Angra de Cintra, Rio de Oro, 16-20 m, 18 °C; 9°51′ N, 15°30′ W, Guinea, 26-28 m, coarse sand and broken shells); 1959 : 103 (off Surinam, 7 and 26 m, mud and shells). — SOURIE, 1954 : 253 (Senegal). — BUCHANAN, 1958 : 19 (Accra, Ghana). — LONGHURST, 1958 : 91 (Sierra Leone). — CROSNIER and FOREST, 1965 *a* : 358 (Congo, intertidal zone); 1965 *b* : 607; 1966 : 286, fig. 26 a-e (Guinea, 10 m, sand; Ilha do Principe, 12 m, calcareous algae; Togo, 14-17 m, sand and gorgonians; Benin, 12-14 m, sand and mud; Congo). FAUSTO-FILHO, 1970 : 56 (Praia do Mucuripe, Ceará, 1-5 m, mud). — COELHO and RAMOS, 1972 : 148 (Pernambuco, on *Halodule* grass flats). — CHACE, 1972 : 68 (Tobago, on or in the interstices of coral rock covered with algae).

Crangon intrinsecus, SCHMITT, 1926 : 23 (Ponta da Banana, Zaire, in an empty carapace of *Balanus,* attached to a coral fragment washed up into shallow water).

Alpheus intrinseccus, LUEDERWALDT, 1929 : 52.

MATERIAL. — SURINAM : Between 6°19′ S, 55°15′ W and 6°20′ S, 55°14′ W, 25.6 m, mud and shells, 1 ovig. ♀ (USNM 103053), *Coquette,* 22.7.57. — BRAZIL, CEARÁ : Fortaleza, Praia do Mucuripe, 1 ovig. ♀ (MNRJ), 19.8.62. — ESPIRITO SANTO : Beach 3.2 km SW of Anchieta, 0-6 m, sand, 1 ovig. ♀, *Calypso* St. 93, 30.11.61. — RIO DE JANEIRO : 23°08′ S, 43°46′ W, 40 m, coarse sand, 15.72 °C, 2 ♀ (IOUSP-CO366), *Besnard* St. 1475, 8.3.71; Restinga da Marambaia, 1 ♂ (MNRJ), **N.S.** and **E.J.M.** coll. 1942. — SÃO PAULO : Ilha de São Sebastião, Enseada dos Castelhanos, 24 m, 1 ♀ (MNRJ), *Annie,* 14.2.03; [Ilha de] São Sebastião, 2 ovig. ♀ (MZUSP 572), **F.G.** coll. 1907; São Sebastião, Praia do Segredo, in box for cultivation of *Perna,* 1 ♂, **S.A.R.** coll. end of 1963. — SANTA CATARINA : 27°15′ S, 48°29′ W, 18 m, sand, 1 ♂, 3 ovig. ♀, *Calypso* St. 149, 16.12.61; 28°10′ S, 48°35′ W, 32 m, clay, 20.26 °C, 1 ovig. ♀ (IOUSP-CO318), *Besnard* St. 1295, 9.12.70.

SIZE. — Largest ovigerous female, 15+27 mm; major chela, 19:8:3.5 mm; minor chela missing. Largest male, 11.5+20 mm; major chela, 18:6.5:3.5 mm; minor chela, 16:3 mm. Smallest ovigerous female, 10+21 mm; both chelae missing.

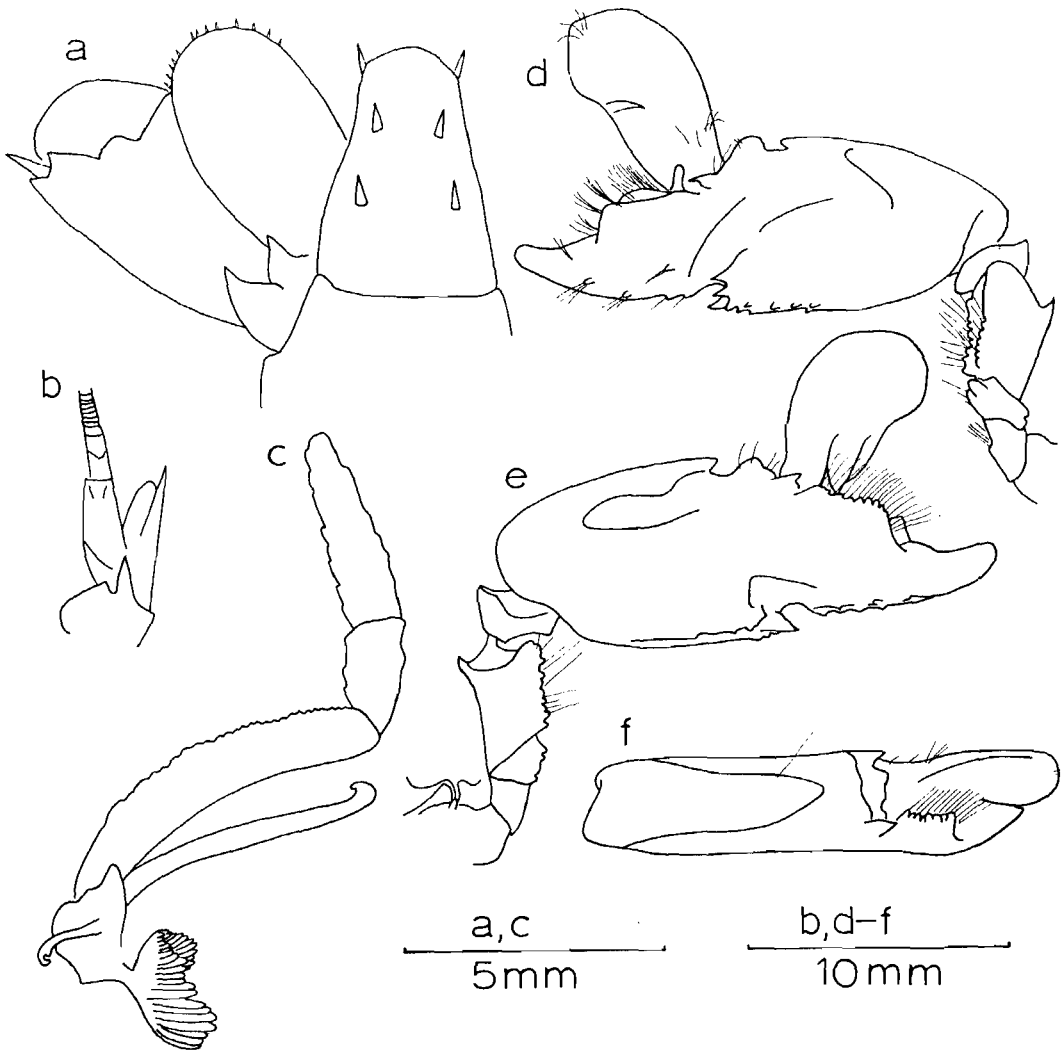

FIG. 9. — Alpheus intrinsecus *Bate, ovigerous female, MZUSP 572 :*
a, *telson and uropod, dorsal view;* b, *antenna, ventral view;* c, *third maxilliped;*
d, *major cheliped, lateral surface;* e, *same, mesial surface;* f, *major chela, dorsal surface.*

COLOR. — Not recorded.

REMARKS. — In the single male which has not lost its minor chela (*Calypso* St. 149), the movable finger is « balaeniceps-shaped », as noted by HOLTHUIS (1959 : 103), rather than « not balaeniceps-shaped », as indicated in the key to the Western Atlantic species of *Alpheus* (CHACE, 1972 : 57).

Some morphological characters may be stressed : basal segment of antenna with small triangular tooth on ventral surface, as well as developed ventrolateral spine (fig. 9 *b*); rudimentary pleurobranch absent from base of third maxilliped; variations occur in shape of major chela (*cf.* fig. 9 *d*, 10 *g*); inner branch of uropod with series of irregularly distributed spines along posterior margin (fig. 9 *a*).

HABITAT. — Intertidal zone to 40 m deep. Mud; clay; sand; sand and gorgonians; on *Halodule* grass flats; coarse sand and broken shells; shells and hydroids; calcareous algae; in box for cultivation of mussel *Perna;* in carapace of the barnacle *Balanus,* attached to coral fragment washed into shallow water; interstices of coral rock. Measured water temperatures, 15.72 to 20.26 °C.

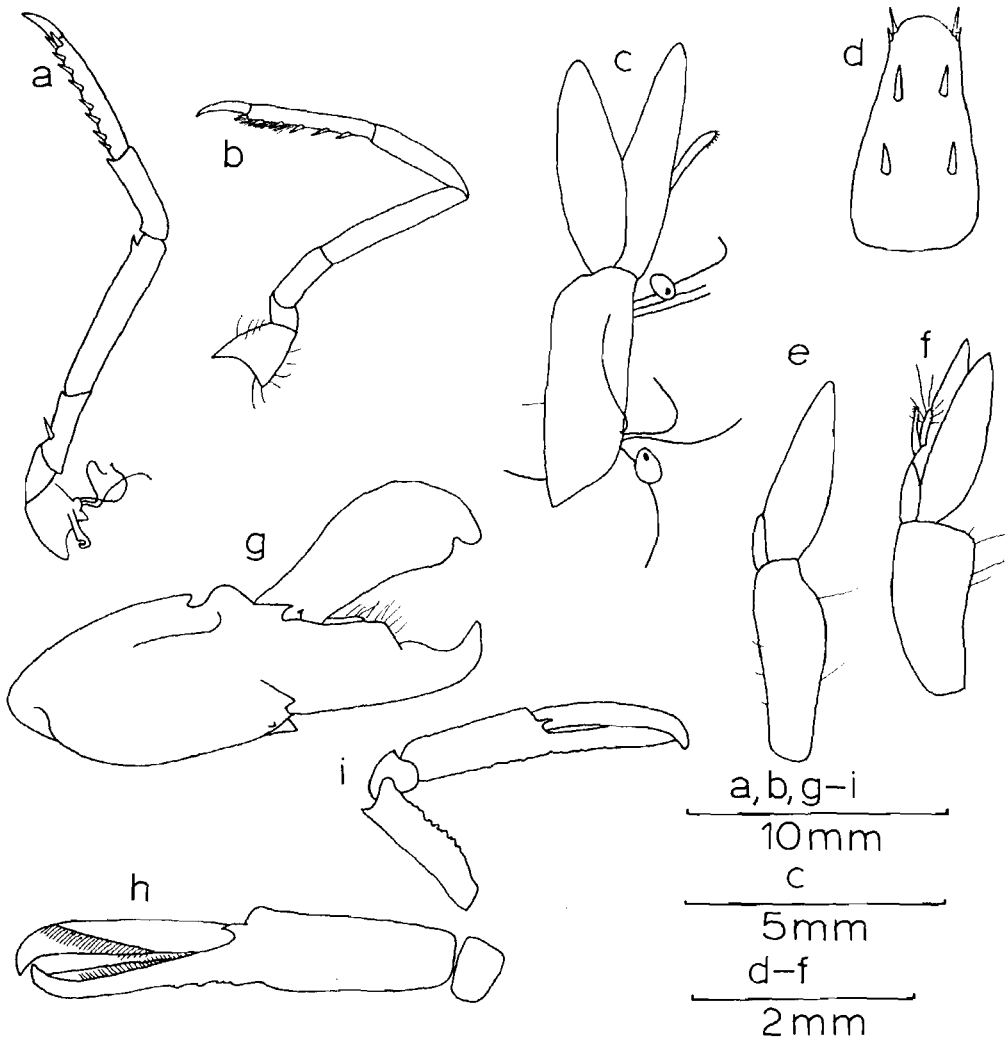

FIG. 10. — Alpheus intrinsecus *Bate, ovigerous female, MZUSP 572 :* a, *fourth pereiopod;* b, *fifth pereiopod;* c, *second pleopod. Male from Praia do Segredo, São Paulo :* d, *telson, dorsal view;* e, *first pleopod;* f, *second pleopod. Male from* Calypso *St. 149 :* g, *major chela, lateral surface;* h, *minor chela and carpus, lateral surface. Female from* Calypso *St. 149 :* i, *minor cheliped, lateral surface.*

GEOGRAPHICAL DISTRIBUTION. — Tobago; Ceará to Santa Catarina. East Atlantic from Western Sahara to Zaire.

Additional records are mentioned for Puerto Rico (CHACE, 1972 : 68) and for Gabon (CROSNIER and FOREST, 1966 : 287).

Alpheus maxilliplanus sp. n.
(fig. 11-13)

HOLOTYPE. — Ovigerous ♀, MZUSP 4545; Balneário de Atalaia, Sergipe, **M.A.S.** coll. 12.7.72.

PARATYPES. — BRAZIL, PARAÍBA : Mataraca, Barra de Camaratuba, 2 ♂ (part of MNRJ 69-64), **A.L.C.** coll. 31.7.64. — SERGIPE : Balneário de Atalaia, 5 ♂, 11 ♀ (5 ovig.), **M.A.S.** coll. 12.7.72. — RIO DE JANEIRO : Ilha Grande, Baia Abraão, 0-5 m, sand and mud, 1 ♂, *Calypso* St. 110, 8.12.61; Angra dos Reis, 1 ♂, 5 ♀ (part of MZUSP 41), 2 ♀ (1 ovig.) (MZUSP 43), 1 ♂ (MZUSP 49), *Emília*, March 1969.

OTHER MATERIAL. — BRAZIL : 1 ♂ (MNRJ). — SÃO PAULO : Cananéia, Mar de Cananéia, 0.37 to 0.70 m, mud, 21.62 to 29.30 °C, 03.07 to 29.00 ‰, 18 samples (IOUSP), **C.J., M.I.** and **Li.** coll. 21.2.73

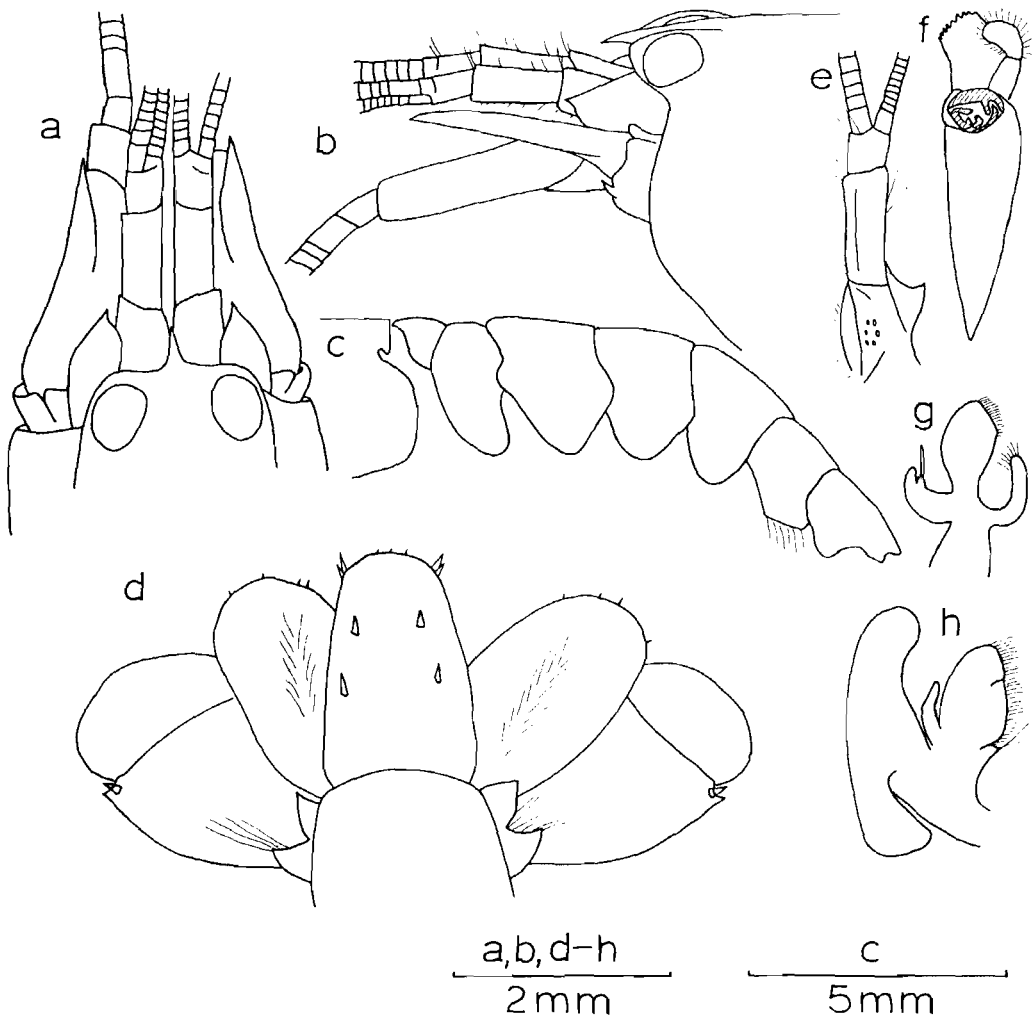

FIG. 11. — Alpheus maxilliplanus *sp. n., male paratype from Atalaia, Sergipe :* a, *anterior region, dorsal view;* b, *same, lateral view;* c, *abdomen, lateral view;* d, *telson and uropods, dorsal view;* e, *antennule, lateral view;* f, *mandible;* g, *first maxilla;* h, *second maxilla.*

to 13.3.75; *ibid.*, Baia do Trapandé, 0.30 to 0.55-0.80 m, mud, 18.67 to 31.00 °C, 07.88 to 26.90 ‰, 51 samples (IOUSP), C.J., M.I. and Li. coll. 22.2.73 to 3.4.75.

DESCRIPTION. — Rostrum (fig. 11 *a, b*) sharp, dorsally rounded, reaching to half the visible portion of the basal antennular segment. Ocular hoods slightly produced dorsally, separated from rostrum by shallow and indistinct depressions; anterior margins straight or slightly sinuous. Anterior margin of carapace almost vertical from ocular hood nearly to ventral margin of basal antennal segment. Posterior margin of carapace (fig. 11 *c*) with pronounced cardiac notch.

Abdominal pleura of five anterior somites (fig. 11 *c*, 13 *g*) broadly rounded, not overlapping in the ventral region in males and females with few eggs. Sixth somite produced into narrowly rounded triangular lobe dorsal to insertion of uropod.

Telson (fig. 11 *d*) half again as long as wide at base, twice as long as wide at distal region; lateral margins almost straight; posterior margin convex, with both pairs of lateral spines short and hardly overreaching distal margin; space between spines with few short spiniform setae, as well as long setae. Anterior pair of dorsal spines inserted distinctly anterior to midlength of telson, posterior pair approximately midway between anterior pair and posterior margin of telson.

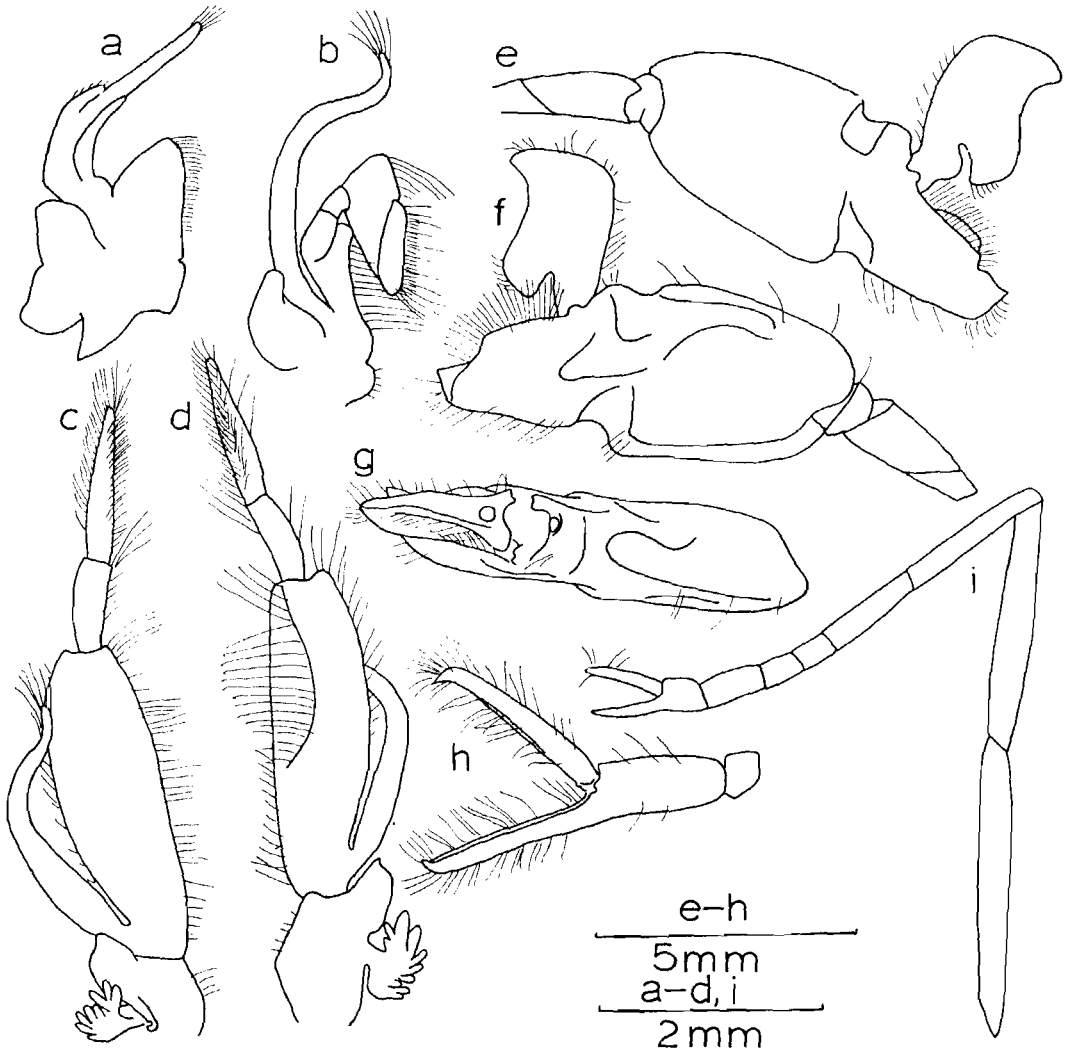

FIG. 12. — Alpheus maxilliplanus *sp. n., male paratype from Atalaia, Sergipe :* a, *first maxilliped;* b, *second maxilliped;* c, *third maxilliped, ventral surface;* d, *same, dorsal surface;* e, *major cheliped, lateral surface;* f, *same, mesial surface;* g, *major chela, dorsal surface;* h, *minor chela and carpus, lateral surface;* i, *second pereiopod.*

Antennular peduncle (fig. 11 *a, b, e*) with stylocerite proximally broad, narrowing abruptly into short distal spine, which does not reach to distal margin of basal segment. Ventral carina of basal antennular segment well developed and produced into strong curved spine. Second antennular segment subequal in length to first, about twice as long as third. Thickened portion of outer flagellum of antennule slightly longer than peduncle, consisting of 17-20 articles; these are followed by 13-15 narrow articles.

Antennal scale (fig. 11 *a*, b 13 *h*) with blade reaching about to the end of antennular peduncle; lateral spine slightly longer or not overreaching blade. Antennal peduncle overreaching antennular peduncle by length of distal segment of latter; basal segment with sharp lateral spine below scale, shorter than stylocerite and rostrum.

Mouth parts as figured (fig. 11 *f-h*, 12 *a-d*). Third maxilliped reaching to end of antennal peduncle or overreaching it by up to one-third length of ultimate segment; exopod shorter than antepenultimate segment; latter conspicuously enlarged and flattened, slightly over three times as long as broad, smooth on ventral surface and with sinuous carina ornamented by long setae on dorsal surface; ultimate segment unarmed, half as long again as the penultimate segment.

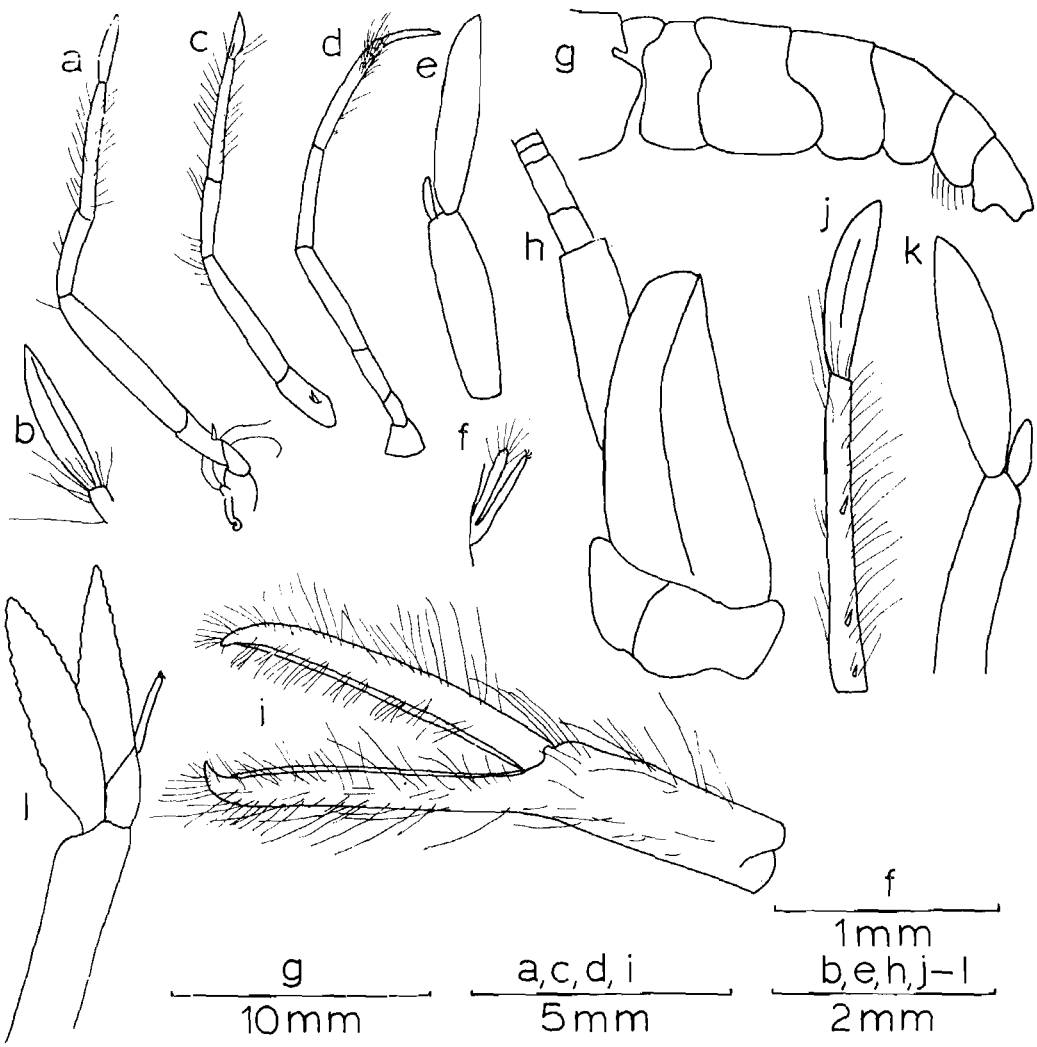

FIG. 13. — Alpheus maxilliplanus *sp. n., male paratype from Atalaia, Sergipe :* a, *third pereiopod;* b, *dactyl of same;* c, *fourth pereiopod;* d, *fifth pereiopod;* e, *first pleopod;* f, *appendix interna and masculina of second pleopod. Female paratype from Atalaia :* g, *abdomen, lateral view;* h, *antenna, dorsal view;* i, *minor chela, mesial surface;* j, *dactyl and propodus of third pereiopod;* k, *first pleopod;* l, *second pleopod.*

Branchial formula characteristic of *Alpheus*, a rudimentary pleurobranch being present at base of third maxilliped.

Major first cheliped (fig. 12 *e-g*) with propodocarpal articulation reaching to anterior margin of carapace or up to half length of basal antennular segment. Chela compressed, notched dorsally and ventrally, with conspicuous depressions and longitudinal grooves on mesial surface; lateral surface of fixed finger with opposable margin slightly elevated along margin of socket and distinctly notched distal to socket; ventral margin of fixed finger truncate near apex, which is thus somewhat sharply triangular and shorter than the movable finger; extensor margin of movable finger with proximal and distal parts almost straight and perpendicular to each other. Merus with flexor margins unarmed distally.

Minor first cheliped with propodocarpal articulation reaching from middle to distal end of second antennular segment. Chela (fig. 12 *h*, 13 *i*) straight, subcylindrical, without grooves or depressions, fingers half again as long as palm; movable finger rounded, similar in both sexes. Merus with flexor margins unarmed distally.

Second pereiopod (fig. 12 *i*) overreaching antennular peduncle by chela and four distal articles, and sometimes up to half of fifth article. Chela subequal to length of two distal articles and half to all of third article of carpus, fingers twice as long as palm. Carpal articles decrease in length as follows : 1>2>5>3=4. Merus seven-tenths as long as carpus, subequal in length to ischium.

Third pereiopod (fig. 13 *a, b, j*) overreaching antennular peduncle by dactyl and from half to all of propodus. Dactyl subspatulate, half or almost half as long as propodus. Propodus unarmed or with up to four inconspicuous spinules along ventral margin, not thicker than setae of this segment. Carpus two-thirds as long as propodus and half as long as merus. Merus almost six times longer than wide. Ischium with movable spine near ventral margin.

Fourth pereiopod (fig. 13 *c*) overreaching antennular peduncle by dactyl and up to half length of propodus. Dactyl less conspicuously subspatulate than in third pereiopod, two-fifths as long as propodus. Carpus three-fourths as long as propodus and three fifths as long as merus. Remaining characters similar to third pereiopod.

Fifth pereiopod (fig. 13 *d*) overreaching antennular peduncle by dactyl and up to one-fourth length of propodus. Dactyl inconspicuously subspatulate, two-fifths as long as propodus. Propodus unarmed, with several transversal rows of short setae in distal third. Carpus over four-fifths as long as propodus and three-fourths as long as merus. Ischium unarmed.

First pleopod (fig. 13 *e, k*) with endopod larger in females than in males. Second pleopod (fig. 13 *f, l*) with appendix masculina subequal to length of appendix interna in males. Eggs small, 0.30-0.80 mm in largest diameter.

Uropod (fig. 11 *d*) with short uncolored movable spine on outer branch, flanked laterally by short fixed spine and mesially by a rounded lobe, which is continued over the transversal suture by an almost straight dorsal margin; inner branch of uropod with scattered series of short spiniform setae on distal margin.

SIZE. — Largest male, 13+26 mm; major chela, 21.5:9.5:5 mm; minor chela, 13.5:3 mm. Largest ovigerous female, 10+21 mm; major chela missing; minor chela, 8:15 mm. Smallest ovigerous female, 7+14 mm; major chela, 9:3.5:2 mm; minor chela, 7:1 mm.

COLOR. — Not registered.

REMARKS. — *A. maxilliplanus* sp. n. seems to be most closely related to *A. heterochaelis* Say, a species known with certainty only from North Carolina to Surinam (CHACE, 1972 : 68). Specimens of *A. heterochaelis* collected by myself in Beaufort, North Carolina, differ from the new species mainly in the following points : Ocular hoods and rostrum more pronounced dorsally; third maxilliped with antepenultimate segment narrow and not flattened, penultimate segment half as long as ultimate segment and exopod longer than antepenultimate segment; major chela with extensor margin of movable finger more conspicuously arched throughout its length and with ventral margin of fixed finger more regularly rounded distally; minor chela with fingers of same length as palm and with movable finger conspicuously « balaeniceps-shaped » in male; three last pereiopods with narrow dactyls or, in males, only slightly subspatulate dactyls, and with propodi armed with 8-12 strong movable spines along flexor margins.

NAME. — The new species is named after the characteristically broadened and flattened antepenultimate segment of the third maxilliped (*maxilla*, L. = mouth part; *planus*, L. = flat).

HABITAT. — From 0.30 to 0.70-5 m deep. Mud; sand and mud. Known only from estuarine regions. Measured water temperatures, 18.67 to 31.00 °C; salinities, 03.07 to 29.00 ‰.

GEOGRAPHICAL DISTRIBUTION. — Paraiba to São Paulo.

Alpheus normanni Kingsley, 1878

Alpheus affinis Kingsley, 1878 *a* (not Guise, 1854) : 195 (Syntypes : 7 spec. [2 ♂, MCZ 4983; 4 spec., YPM 744]; Type locality : Panama Bay, Pacific coast of Panama). — LOCKINGTON, 1898 : 476.

Alpheus normanni Kingsley, 1878 *b* : 93 (*nom. nov. pro A. affinis* Kingsley); 1878 *c* : 58. — WASS, 1955 : 143 (Alligator Harbor, Florida, frequently among colonies of *Styela plicata*); 1965 : 41 (York River, Virginia). — MENZEL, 1956 : 42 (Apalache Bay region, Florida, ascidian colonies and oyster beds). — HULINGS, 1961 : 217 (Panama City, Florida). — TABB and MANNING, 1961 : 595 (Florida Bay); 1962 : 62. — HAZLETT, 1962 : 82 (Coney Island Pond, Bermuda, under rocks). — HAZLETT and WINN, 1962 : 29. — WILLIAMS, 1965 : 65, fig. 53 (Beaufort, North Carolina; Sabine, Texas; Louisiana; Mississippi; Sonora, Mexico [?]; Cuba; Curaçao; Aruba; down to 73 m). — O'GOWER and WACASEY, 1967 : 187 (Key Biscayne and Virginia Key, Florida, in *Thalassia* and *Diplanthera* grass flats). — ROUSE,

1970 : 138 (Everglades, Florida, 0.61-2.13 m, mud, marl, shell rubble and hard sediments, 16-30 °C, 24-43 ‰). — NOLAN and SALMON, 1970 : 289 (Carolinas). — KNOWLTON, 1970 : 383 (Beaufort, benthic and plankton samples). — HENDRIX, 1971 : 158 (South Florida). — CHACE, 1972 : 68 (Tortola; Barbuda; Saint Christopher; Antigua Island; Dominica; Carriacou Island; Tobago; Isla de Cozumel; Bahía de la Ascensión; sand and mud flats covered with turtle-grass and *Porites*, mud bottom under rocks and oysters, or in and among reef corals). — VAN ENGEL and SANDIFER, 1972 : 156 (Chesapeake Bay, Virginia, among oysters). — SANDIFER, 1973 : 240 (planktonic larvae in Chesapeake Bay, 25.3-26.90 °C, 21.35-25.77 ‰). — GRIZZLE, 1974 : 134 (Brevard County, Florida, below 2 m, sand and mud with algae, and from stomach of *Cynoscion nebulosus* [Cuvier]). — RAY, 1974 : 109, fig. 89-94 (Isla de Lobos reef, Veracruz, 7.6-15.2 m, coral heads). — GOY, 1976 : 28 (larvae in Cheasapeake Bay). — CAMP, WHITING and MARTIN, 1977 : 25 (Hutchinson Island, Florida, 8.4-11.2 m and intertidal zone, in *Phragmatopoma*). — GORE, SCOTTO and BECKER, 1978 : 225 (Indian River region, Florida, intertidal zone, in *Phragmatopoma*).

Alpheus packardii Kingsley, 1880 : 417 (Syntypes : 3 ♂, USNM 84328; Type locality : Key West, Florida); 1883 : 118, pl. 2, fig. 2; 1899 : 716, fig. 9. — RATHBUN, 1902 : 107 (Bermudas; Mayaguez, Boqueron Bay, Playa de Ponce, Arroyo, off Vieques, 11.0-29.2 m, off Culebra, 26.5-27.4 m, Ensenada Honda, and Fajardo, Puerto Rico). — FORNERIS, 1969 : 87 (Baía do Flamengo, São Paulo, 1-32 m, 23 °C, 25.38 ‰).

Alpheus normanii, KINGSLEY, 1883 : 118.

Alpheus bermudensis Bate, 1888 : 547, pl. 98, fig. 3 (Type locality : Bermuda, shallow water; Other localities : Saint Thomas). — YOUNG, 1900 : 463. — RANKIN, 1900 : 540, pl. 17, fig. 4 (Bermudas, intertidal zone, 1.8-3.6 m).

Alpheus avarus, p.p. HEILPRIN, 1888 (not Fabricius, 1798) : 321 (Bermuda); 1889 : 150.

Alpheus minor, BROOKS and HERRICK, 1891 (not De Haan, 1849) : 361, pl. 16, fig. 1-4, 6-8, pl. 17, pl. 18, fig. 4, pl. 25, fig. 5, pl. 26, fig. 12-14, pl. 28, fig. 22, 23, 29 (Beaufort).

Alpheus minus, HERRICK, 1891 (not Say, 1818) : 372, pl. 1, pl. 26.

Alpheus Normanni, COUTIÈRE, 1899 : 29.

Alpheus Packardi, COUTIÈRE, 1899 : 30.

Alpheus Bermudensis, COUTIÈRE, 1899 : 30.

Alpheus packardi, ZIMMER, 1916 : 409, fig. A²-G² (Saint Thomas; Kingston, Jamaica). — WELLS, 1961 : 247 (Beaufort, oyster beds).

Crangon packardii, HAY and SHORE, 1918 : 385, pl. 26, fig. 4 (Beaufort, among shells and oysters). — SCHMITT, 1924 *c* : 79 (Barbados, coral heads); 1935 : 144 (Condado Bay, Guanica Harbor, Parguera, off Parguera, and Point Brea, Puerto Rico).

Alpheus heterochaelis, VERRILL, 1922 (not Say, 1818) : 78 (Fort Macon, Beaufort).

Alpheus or *Crangon packardii*, VERRILL, 1922 : 80, pl. 20, fig. 2, 5, pl. 21, fig. 5, pl. 22, fig. 7, pl. 23, fig. 6 *c-d*, pl. 25, fig. 4 *a*, *b*, pl. 31, fig. 1 *b-l*, 2 *b-u*, 3 *u*, *t* (Hamilton Harbor and Hungary Bay, Bermudas).

Alpheus or *Crangon beanii* VERRILL, 1922 : 81, text. fig. 7, pl. 22, fig. 5, pl. 32, fig. 1 *a-u* (Syntypes : 2 spec., YPM 6610; Type locality : Challenger Bank, off Bermuda, 44 m) *(syn. n.)*.

Crangon normanni, CHACE, 1937 *a* : 122 (Santa Inez Bay, Baja California, 54.8 m, sand and broken shells). — PEARSE, 1950 : 150 (Bimini, in *Spheciospongia vesparia*). — PEARSE and WILLIAMS, 1951 : 143 (reefs off North Carolina).

Crangon packardi, WASS, 1953 : 2 (Alligator Harbor, Florida).

Alpheus beanii, CHACE, 1972 : 63.

MATERIAL. — BERMUDA : 10 spec. (3 ovig. ♀) (ANSP 129), **A.H.** coll. 1888; Challenger Bank, 43.9 m, 2 spec., Syntypes of *Alpheus beanii* Verrill (YPM 6610), **T.H.B.** coll. — USA, NORTH CAROLINA : Carteret County, Beaufort, Fort Macon, 1 spec. (YPM 1830), **H.C.Y.** coll. 1871; *ibid.*, Shackleford Jetty, intertidal zone, between stones, **M.L.C.** coll. 4.4.78; *ibid.*, Newport River, mud flats opposite Gallant Point, 1 ♂, 1 ovig. ♀ (part of DML 788), 23.6.61; Beaufort, mud flats opposite Smith Factory, 1 spec. (DML 687), Ecology class coll. 11.6.64; *ibid.*, Lennoxville Point, in oyster valves on mud, 1 ovig. ♀ (IMS 2249), **R.E.K.** coll. 26.8.63; Carteret County, Core Sound, Drum Shoal, 1.8 m, 8 spec. (IMS 800), **A.F.C.** coll. 4.2.54; Carteret County, Morehead City, Bogue Sound, Institute of Fisheries Research pier, plankton tows, 15 samples (1 ovig. ♀, 61 spec.) (IMS 321 to 1253), **A.B.S.**, **W.L.**, **E.E.D.**, **G.S.P.**, **A.B.W.**, **Ro.**, **Ph.** and **Fo.** coll. 1.5.57 to 5.10.59; Institute of Fisheries Research pier, oyster bed, 1 ovig. ♀ (IMS 949), **H.J.P.** coll. 27.7.60; Carteret County, Bogue Sound, near Rog Island, 2 spec. (IMS 1635), **A.B.W.** and others coll. 29.3.63; Carteret County, Bogue Banks, about 4.8 km west of Atlantic Beach, in debris on beach after hurricane, 4 spec. (1 ovig. ♀) (IMS 973), **A.B.W.** and **G.W.B.** coll. 13.9.60; Brunswick County, Folly Inlet, inner waterways near Lockwoods, 6 spec. (IMS 1550), **A.B.W.** and **W.C.N.** coll. 29.10.62; 34°34.5′ N, 76°25.5′ W, 20 m, 1 spec. (IMS 2553), **R.V.B.** coll. 19.1.60; 34°31.0′ N, 76°12.5′ W, 36-37 m, 2 spec. (DML 2283), *Eastward* St. 12867, **Ke.** coll. 1.10.69; 34°20′ N, 76°53′ W, 33 m, 1 ovig. ♀ (IMS 2661), *Eastward* St. 11962, 5.5.69; Cape Fear, 1 spec. (IMS), **P.R.** and **P.K.** coll. 7.3.75. — SOUTH CAROLINA : 1 spec. (MCZ 1464), **Ku.** and **W.S.** coll. — FLORIDA : Key West, Holotype of *Alpheus packardii* Kingsley (USNM 84328), **J.S.K.** coll.; Cedar Key, 2 spec. (part of USNM 63545), **H.H.** coll.; *ibid.*, near Seashore Key, 1 ovig. ♀ (MCZ 12049), **R.W.F.** coll. January 1942; Sanibel Island, 3 spec. (1 ovig. ♀) (ANSP 4851), **J.S.S.** coll. 4.9.41. — PACIFIC COAST OF PANAMA : Panama Bay, Syntypes of *Alpheus affinis* Kingsley (= *A. normanni* Kingsley), 4 spec. (YPM 744), 2 ♂ (MCZ 4983), Yale Expedition, **F.H.B.** coll. 1866. — BRAZIL, AMAPÁ : 02°20.5′ N, 48°01.5′ W (MNRJ). — FERNANDO DE NORONHA : Baia de Santo Antonio, intertidal zone, rocks, 1 ovig. ♀, *Calypso* St. 13, 18.11.61; 3°48.6′ S, 32°24.8′ W, 52 m, sand,

2 spec., *Calypso* St. 17, 18.11.61; 3°49.7' S, 32°26.0' W, 31 m, sand, 9 spec. (3 ovig. ♀), *Calypso* St. 19, 18.11.61. — Atol das Rocas : 3°51.1' S, 33°50.1' W, 27 m, rocks, calcareous algae and other algae, 1 spec., *Calypso* St. 8, 17.11.61. — Paraíba : 7°29' S, 34°30' W, 45 m, rocks, shells, broken shells, calcareous algae and other algae, 1 spec., *Calypso* St. 1, 16.11.61. — Pernambuco : 8°15' S, 34°42' W, 33 m, calcareous algae and corals, 5 spec. (2 ovig. ♀), *Calypso* St. 22, 21.11.61. — Alagoas : 9°40' S, 35°18' W, 47-54 m, calcareous algae, 1 spec., *Calypso* St. 31, 22.11.61. — Bahia : Salvador, Itapagipe, Praia do Bugari, 1 ♂ (part of MZUSP 36), **V.A.** coll. 11.7.76; 13°02.0' S, 38°32.5' W, 31 m, mud, 1 spec., *Calypso* St. 56, 24.11.61; 15°37' S, 38°44' W, 39 m, corals, calcareous algae and other algae, 1 spec., *Calypso* St. 69, 27.11.61; 16°46' S, 38°53' W, 27 m, mud, shells and broken shells, 1 spec., *Calypso* St. 75, 27.11.61; 17°16.7' S, 39°05' W, 20 m, sand, 1 ovig. ♀, *Besnard* St. 3770, **R.P.F.S.** coll. 10.12.78; 17°59' S, 38°43' W, 17 m, rocks and mud, 1 spec., *Calypso* St. 83, 28.11.61; 18°05' S, 38°46' W, 27 m, algae and sponges, 1 spec., *Calypso* St. 82, 28.11.61; 18°06' S, 38°42' W, 37 m, rocks and calcareous algae, 1 ovig. ♀, *Calypso* St. 81, 28.11.61. — Rio de Janeiro : 21°22' S, 40°43' W, 25 m, sand and mud, 1 ovig. ♀, *Calypso* St. 98, 1.12.61; Ilha Grande, Baia Abraão, 0-5 m, sand and mud, 1 ovig. ♀, *Calypso* St. 110, 8.12.61. — São Paulo : São Sebastião, 1 major chela (MNRJ 59-63), **M.T.L.** coll. 22.8.60; *ibid.*, Praia do Araçá, 1 ♀.

Size. — Largest female, 9+14 mm; major chela, 8:3:2 mm; minor chela, 5.5:1.5 mm. Largest male, 6+13 mm; major chela, 8:3:1.5 mm; minor chela, 6:1.5 mm. Largest ovigerous female, 6.5+11.5 mm; major chela, 6:2.5:1.5 mm; minor chela, 4:1 mm. Smallest ovigerous female, 4.5+8 mm; major chela, 5.5:2:1 mm; minor chela, 3:0.75 mm.

Color. — A colored figure of a specimen in dorsal view was given by Brooks and Herrick (1891, pl. 1). Additional notes on color pattern were given by Verrill (1922 : 80), Williams (1965 : 66), Rouse (1970 : 138) and Hendrix (apud Ray, 1974 : 111).

Remarks. — The subtriangular lobe on the anterior margin of each ocular hood is occasionally inconspicuous or absent; the same is true for the shallow sinus on the ventral margin of the major chela, at the base of the fixed finger. As these were the only important characters distinguishing *A. beanii* Verrill (1922 : 84) from *A. normanni* Kingsley (*see* also Chace, 1972 : 59), I have synonymized both species. Verrill (1922 : 84) mentioned that the color pattern of both species differed, but did not describe the color of *A. beanii*.

The following characters apply to the new Brazilian material : Mandible with 11 teeth on incisive process; third and fourth pereiopod with 5-7 pairs of movable spines on propodus and one movable spine on ischium; sternal plates of first four abdominal somites with median spine; appendix masculina slightly shorter than appendix interna; a series of short movable spines present on posterior margin of telson and both branches of uropod.

Habitat. — Intertidal zone to 73 m deep. Common in saltier portions of estuaries, both in plankton and benthos. Mud; sand; broken shells; shells and marl; algae and sponges; in *Spheciospongia vesparia;* among colonies of the ascidian *Styela plicata;* sand and mud flats covered by turtle-grass and the coral *Porites; Thalassia* and *Diplanthera* grass flats; oyster beds; from stomach of fish *Cynoscium nebulosus* (Cuvier) ; in *Phragmatopoma* worm reefs ; calcareous algae; between stones. Measured water temperatures, 16 to 30 °C; salinities, 21.35 to 43 ‰.

Geographical distribution. — Bermudas; Virginia to South Carolina; East Florida to Key West; Bimini, Bahamas; Southwest Florida to Texas and Veracruz, Gulf of Mexico; Quintana Roo, Yucatan Peninsula; Cuba; Jamaica; Puerto Rico and Virgin Islands to Tobago; Curaçao; Aruba; Amapá; Fernando de Noronha, Rocas and Paraíba to São Paulo. East Pacific from Gulf of California and Panama Bay.

Alpheus pouang sp. n.

(fig. 14, 15)

Holotype. — ♂, MZUSP 4543; 23°39' S, 43°37' W, off the State of São Paulo, 120-121 m, mud and sand, 15.20 °C, *Besnard* St. 1019, 27.5.70.

Paratypes. — Brazil, Paraná : 25°58' S, 46°07' W, 268 m, fine sand, 13.97 °C, 1 spec. (IOUSP-CO305), *Besnard* St. 1282, 6.12.70. — Santa Catarina : 26°00' S, 46°38' W, 138 m, sand and calcareous rock, 13.79 °C, 2 spec. (IOUSP-CO307), *Besnard* St. 1283, 7.12.70. — Rio Grande do Sul : 29°39' S, 48°41' W,

122-124 m, mud and clay, 15.66 °C, 35.67 ‰, 1 spec. (IOUSP-CO451), *Besnard* St. 1696, 30.1.72; 29°51′ S, 48°11′ W, 200 m, 5 spec. (IOUSP-CO465), *Besnard* St. 1709 extra, 7.4.72; 29°52′ S, 48°20′ W, 200 m, calcareous rock, 15.88° C, 35.71 ‰, 3 spec. (IOUSP-CO464), *Besnard* St. 1708, 7.4.72; 30°36′ S, 49°25′ W, 145 m, mud, 16.80° C, 35.82 ‰, 8 spec. (1 ovig. ♀) (IOUSP-CO477), *Besnard* St. 1718, 9.4.72; 30°40′ S, 49°35′ W, 135-141 m, sand and mud, 14 spec., *Calypso* St. 150, 17.12.61; 30° 42.7′ S, 49°12.0′ W, 200 m, 03.89° C, 34.30 ‰, 1 spec. (IOUSP-CO535), *Besnard* St. 1856, 5.8.72; 31°02′ S, 49°52′ W, 135 m, live shells, 16.99° C, 35.85 ‰, 3 spec. (IOUSP-CO480), *Besnard* St. 1722, 10.4.72; 31°03′ S, 49°55′ W, 134 m, mud and coarse sand, 16.46° C, 35.77 ‰, 1 spec. (IOUSP-CO438), *Besnard* St. 1680, 27.1.72 ; 32°21′ S, 50°13.5′ W, 169 m, mud, clay and non-living shells, 16.12° C, 35.69 ‰, 11 spec. (IOUSP-CO599), *Besnard* St. 1908, 21.8.72; 32°46′ S, 50°25′ W, 148-155 m, mud and clay, 16.85° C, 35.81 ‰, 3 spec. (IOUSP-CO422), *Besnard* St. 1664, 21.1.72; 33°17′ S, 50°34′ W, 166 m, fine sand and mud, 15.83 °C, 35.80 ‰, 6 spec. (IOUSP-CO414), *Besnard* St. 1656, 19.1.72; 33°18.0′ S, 50°35.0′ W, 187 m, shell fragments and calcareous rock, 13.73° C, 35.35 ‰, 1 spec. (IOUSP-CO589), *Besnard* St. 1899, 19.8.72; 33°39.5′ S, 51°07′ W, 250 m, clay, 11.78° C, 35.08 ‰, 1 spec. (IOUSP-CO580), *Besnard* St. 1891. — URUGUAY : 34°06′ S, 51°33′ W, 139-145 m, gravel, 14.47° C, 35.58 ‰, 1 spec. (IOUSP-CO407), *Besnard* St. 1648, 17.1.72; 34°45.0′ S, 52°05.0′ W, 175 m, sand and mud, 10.49° C, 34.86 ‰, 2 spec. (IOUSP-CO566), *Besnard* St. 1881, 15.8.72.

DESCRIPTION. — Rostrum (fig. 14 *a, h*) sharply triangular, dorsally rounded, reaching nearly as far as distal margin of basal antennular segment. Ocular hoods separated from rostrum by shallow indistinct depression, and armed with a sharp tooth, shorter than rostrum, directed anteriorly; anterior margin slanting anterolaterally from base of rostrum to end of ocular tooth, forming between these a V-shaped space. Anterior margin of carapace almost vertical from ocular hood nearly to ventral margin of basal antennal segment. Posterior margin of carapace with pronounced cardiac notch.

Abdominal pleurae of four anterior somites rounded, of fifth somite acuminate. Sixth somite rounded both dorsal and ventral to insertion of uropod, more narrowly above.

Telson (fig. 15 *a*) almost twice as long as broad at base; posterior margin convex, slightly over half as wide as anterior margin; lateral margins almost straight. Anterior pair of dorsal spines inserted distinctly anterior to midlength of telson, posterior pair approximately midway between anterior pair and posterior margin of telson.

Eyes sometimes partially uncovered dorsally, in angles formed by rostrum and ocular hoods.

Antennular peduncle (fig. 14 *a, h*, 15 *b*) with stylocerite shorter than basal segment, equal in length or slightly longer than rostrum; ventral carina of basal segment rounded. Second antennular segment subequal in length to first, about twice as long as third. Thickened portion of outer flagellum of antennule equal in length or distinctly longer than antennular peduncle, consisting of 18-34 articles ; these are followed by 14-25 narrow articles.

Antennal scale (fig. 14 *a, h*, 15 *c*) with distal spine overreaching antennular peduncle by about half length of distal segment of latter; blade gradually narrower from near base to distal end, falling far short of tip of spine. Antennal peduncle varying slightly in length, but overreaching antennular peduncle; sharp lateral tooth on basal segment, below antennal scale, shorter than stylocerite and rostrum.

Mouth parts as figured (fig. 15 *d-i*). Third maxilliped reaching end of second antennular segment; distal segment unarmed, twice as long as penultimate segment.

Branchial formula characteristic of *Alpheus*, a rudimentary pleurobranch being absent from base of third maxilliped.

Major cheliped (fig. 14 *b, c*, 15 *j-m*) with propodocarpal articulation reaching end of basal antennular segment. Chela twisted, true dorsal margin being dislocated onto lateral surface and separated from apparent dorsal margin by a longitudinal groove. Movable finger with longitudinal axis in vertical plane of chela, opening towards lateral surface in an oblique plain of about 45°; extensor margin regularly arched, movable finger being almost semicircular in profile; molar tooth triangular, without distinct grooves separating it from lateral surface of movable finger. Lateral surface of fixed finger with two small elevations on opposable margin, anterior and posterior to socket. Palm with two deep longitudinal grooves on lateral surface, separated by subcylindrical elevation tapering distally to sharp conical tip; mesial surface convex, with transverse notch on apparent dorsal margin delimiting distal elevation, latter with convex or slightly sinuous dorsal margin and terminating in

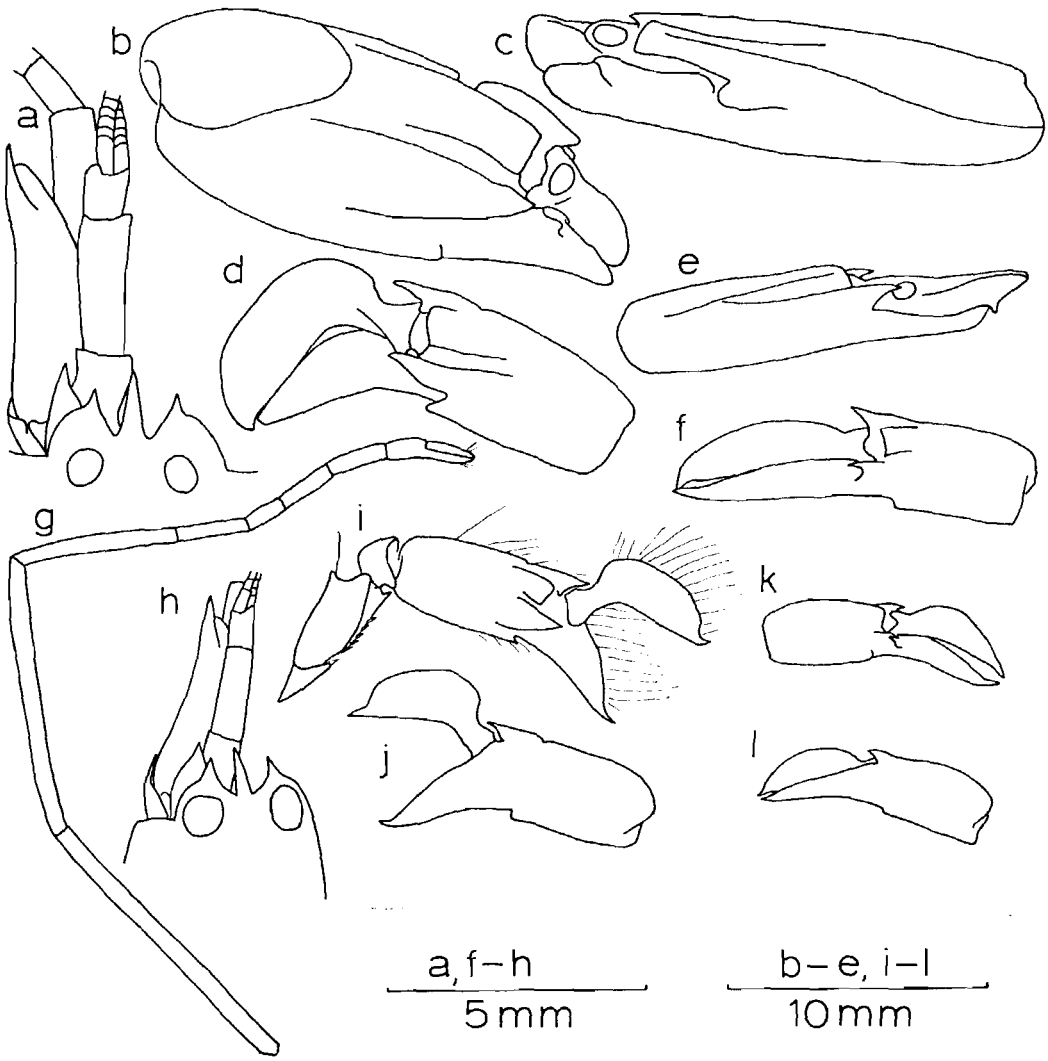

FIG. 14. — Alpheus pouang *sp. n., male holotype :* a, *anterior region, dorsal view;* b, *major chela, lateral surface;* c, *same, dorsal surface;* d, *minor chela, lateral surface;* e, *same, dorsal surface. Young female paratype from* Calypso *St. 150 :* f, *minor chela, lateral surface. Male paratype from* Calypso *St. 150 :* g, *second pereiopod;* h, *anterior region, dorsal view;* i, *minor cheliped, lateral surface;* j, *minor chela, mesial surface. Female paratype from* Calypso *St. 150 :* k, *minor chela, lateral surface;* l, *same, mesial surface.*

compressed sharp tooth; ventral margin with distinct constriction (but no true transverse notch). Merus with 6-10 movable spines, distinctly thicker than interspersed setae, and sharp distal tooth on mesial flexor margin. Ischium with 2-4 movable spines on mesial flexor margin.

Minor cheliped (fig. 14 *d-f, i-l*) with propodocarpal articulation reaching to middle of second antennular segment. Differs from major cheliped by presence of 5-7 movable spines on merus and 1-3 on ischium, by absence of conspicuous transverse notch on dorsal margin of palm and especially, by form of both fingers : In adult males, fingers shorter than palm, strongly compressed, conspicuously curved downwards, with tips twisted, that of movable finger pointing mesially and that of fixed finger pointing laterally; furthermore, high, sharp crest present on extensor margin of movable finger; in females, fingers less curved and dorsal crest less developed; in young specimens, latter two characters even less conspicuous, fingers being longer than palm.

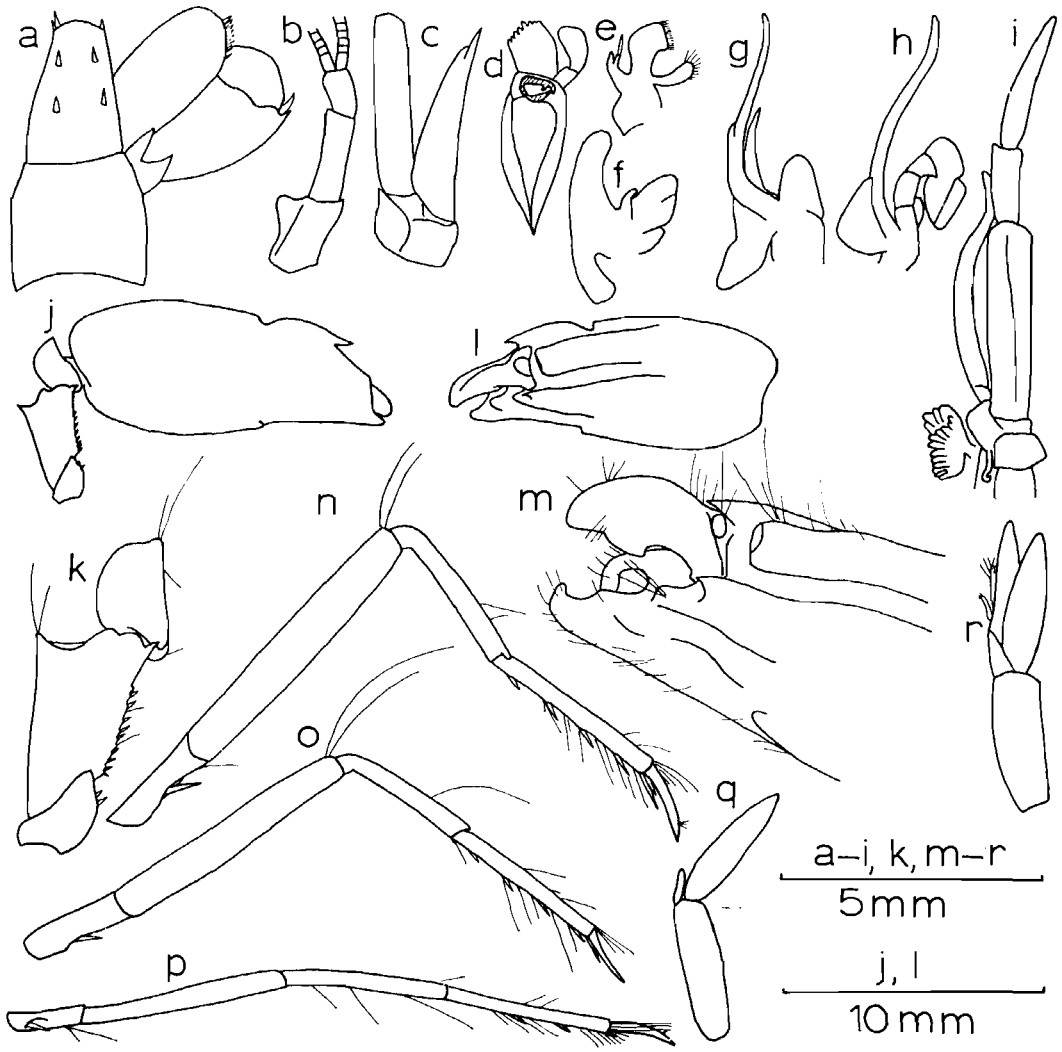

FIG. 15. — Alpheus pouang *sp. n., male paratype from* Calypso *St. 150 :* a, *telson and uropod, dorsal view;* b, *antennule, mesial surface;* c, *antenna, dorsal view;* d, *mandible;* e, *first maxilla;* f, *second maxilla;* g, *first maxilliped;* h, *second maxilliped;* i, *third maxilliped;* j, *major cheliped, mesial surface;* k, *proximal portion of same;* l, *major chela, lateral surface;* m, *distal portion of same;* n, *third pereiopod;* o, *fourth pereiopod;* p, *fifth pereiopod;* q, *first pleopod;* r, *second pleopod.*

Second pereiopod (fig. 14 *g*) overreaching antennular peduncle by chela and carpus. Movable finger slightly longer than palm, propodus longer than fifth article of carpus. First article of carpus over twice length of second : fourth slightly shorter than second and subequal in length to fifth; third considerably shorter than fourth. Merus as long as proximal two and half to all of third article of carpus. Ischium one-tenth longer than merus.

Third pereiopod (fig. 15 *n*) overreaching antennular peduncle by dactyl and from half to all of propodus. Dactyl simple, both margins entire, with small tuft of setae on extensor margin at about one-fourth of distance from tip. Propodus two and one half to almost three times as long as dactyl, with series of two distal pairs and 2-3 single spines along flexor margin. Carpus four-fifths to five-sixths as long as propodus. Merus unarmed, almost eight times longer than wide, almost twice as long as carpus. Ischium with movable spine near ventral margin.

Fourth pereiopod (fig. 15 *o*) overreaching antennular peduncle by dactyl and up to about half of propodus. Similar to third pereiopod, but more

slender and with series of two distal pairs and 2-5 single spines along flexor margin of propodus.

Fifth pereiopod (fig. 15 *p*) reaching to end of antennular peduncle or only to end of second antennular segment, more slender than fourth pereiopod. Propodus with three inconspicuous spines along flexor margin and transverse rows of setae in distal third. Carpus about as long as propodus, merus slightly longer. Ischium with movable spine near ventral margin.

First pleopod (fig. 15 *q*) similar in both sexes. Second pleopod of male (fig. 15 *r*) with appendix masculina distinctly longer than appendix interna. Eggs small and scarce in the single ovigerous female, about 0.70 mm in largest diameter.

Uropod (fig. 15 *a*) with uncolored movable spine of outer branch flanked laterally by sharp tooth and mesially by rounded lobe, which is continued over the transversal suture by a slightly sinuous dorsal margin; mesial branch with series of conspicuous spines on posterolateral margin.

SIZE. — Largest male (holotype), 13+23 mm; major chela, 19:8:5 mm; minor chela, 15:5:2.5 mm. Ovigerous female, 9+15 mm; both chelae missing.

COLOR. — Not recorded.

REMARKS. — *A. pouang* sp. n. seems closest to *A. amblyonyx* Chace, treated above, which differs mainly in the following (*see* fig. 1) : Mesial margin of ocular hoods less slanting and conspicuously angled at junction with ocular spine; major chela with movable finger bulbous distally, fixed finger appreciably shorter than movable finger and palm distinctly notched on ventral margin; fingers of minor chela curved in horizontal plane rather than in vertical plane; second pereiopod with first article of carpus measuring distinctly less than twice length of second article; dactyl of third pereiopod with minute denticle on extensor margin; outer branch of uropod terminating posterolaterally in two sharp teeth.

NAME. — The word « pouang » means « crooked hand » in aboriginal Tupi language; for the new species it refers to the peculiar shape of the minor chela of the males.

HABITAT. — From 120-121 to 268 m deep. Mud; clay; fine sand; mud and coarse sand; gravel; mud, clay and non-living shel's; live shells; calcareous rock. Measured water temperatures, 03.89 to 16.99° C; salinities, 34.30 to 35.85 ‰.

GEOGRAPHICAL DISTRIBUTION. — São Paulo to Uruguay.

Alpheus puapeba sp. n.

(fig. 16-18)

Alpheus dentipes, MOREIRA, 1905 (not Guérin Méneville, 1832) : 131 (near Ilha Rasa, Rio de Janeiro, among fish brought to market).

HOLOTYPE. — ♂, MNHN Na 3601; 35°05' S, 52°33' W, off the Province of Buenos Aires, 115 m, mud, *Calypso* St. 160, 21.12.61.

PARATYPES. — BRAZIL, ESPÍRITO SANTO : 20°27' S, 39°57.5' W, 62 m, 1 ♂, S.A.R. coll. 11.5.67. — RIO DE JANEIRO : 23°00' S, 42°10' W, 65 m, clay, 13.80° C, 3 spec. (2 ovig. ♀) (IOUSP-CO373), *Besnard* St. 1483, 10.3.71; 23°20' S, 43°25' W, 84 m, clay and mud, 15.14 °C, 18 spec. (3 ovig. ♀) (IOUSP-CO287), *Besnard* St. 1261, 2.12.70; off entrance to Baía de Guanabara, near Ilha Rasa, 1 spec. (MNRJ), *Annie*, 16.2.03. — SÃO PAULO : 23°24' S, 43°36' W, 84 m, mud, 15.72 °C, 22 spec. (1 ovig. ♀) (IOUSP-CO178), *Besnard* St. 1018, 26.5.70; 23°26' S, 43°51' W, 82 m, mud, 2 spec. (IOUSP-CO399), *Besnard* St. 1635, 18.12.71; 23°33' S, 44°11' W, 72 m, mud, 1 ovig. ♀ (IOUSP-CO398), *Besnard* St. 1632, 17.12.71; 23°46' S, 44°51' W, 55 m, 20 spec. (IOUSP-CO395), *Besnard* St. 1624, 16.12.71. — SANTA CATARINA : 26°34' S, 47°22' W, 100 m, mud, 1 spec., *Calypso* St. 145, 15.12.61; 27°28' S, 48°18' W, 57-58 m, deep mud, 18.44° C, 1 spec. (IOUSP-CO215), *Besnard* St. 1053, 2-3.6.70; 27°32' S, 48°05' W, 78-81 m, mud, 15.81° C, 22 spec. (2 ovig. ♀) (IOUSP-CO213), *Besnard* St. 1052, 2.6.70. — RIO GRANDE DO SUL : 29°24' S, 49°10' W, 55 m, mud and shells, 18.81° C, 35.39 ‰, 1 spec. (IOUSP-CO524), *Besnard* St. 1843, 2.8.72; 29°33' S, 48°57' W, 92 m, fine mud, 1 spec. (IOUSP-CO463), *Besnard* St. 1706, 6.4.72; 29°39' S, 48°41' W, 122-124 m, mud and clay, 15.66° C, 35.67 ‰, 3 spec. (IOUSP-CO451), *Besnard* St. 1696, 30.1.72; 30°27.0' S, 49°47.0' W, 72 m, mud and clay, 15.10° C, 32.15 ‰, 1 spec. (IOUSP-CO532), *Besnard* St. 1854, 5.8.72; 30°55' S, 50°11' W, 90 m, mud, 16.79° C, 35.79 ‰, 1 spec. (IOUSP-CO481), *Besnard* St. 1723, 10.4.72; 31°19' S, 50°22' W, 100 m, mud and clay, 17.54° C, 35.86 ‰, 4 spec. (IOUSP-

CO488), *Besnard* St. 1727, 11.4.72; 31°19′ S, 50°22′W, 99-101 m, mud and clay, 16.71° C, 35.78 ‰, 6 spec. (1 ovig. ♀) (IOUSP-CO431), *Besnard* St. 1675, 24.1.72; 32°20′ S, 51°22′ W, 52 m, mud and sand, 19.45° C, 35.90 ‰, 1 spec. (IOUSP-CO420), *Besnard* St, 1662, 21.1.72; 32°21.0′ S, 50°13.5′ W, 169 m, mud, clay and non-living shells, 16.12° C, 35.69 ‰, 2 spec. (IOUSP-CO599), *Besnard* St. 1908, 21.8.72; 33°10′ S, 50°50′ W, 101 m, mud and clay, 17.37° C, 35.83 ‰, 2 spec. (IOUSP-CO415), *Besnard* St. 1657, 20.1.72; 33°14.0′ S, 51°48.5′ W, 45 m, calcareous sand, 11.94° C, 33.19 ‰, 1 ovig. ♀ (IOUSP-CO581), *Besnard* St. 1893, 18.8.72; 33°29′ S, 51°28′ W, 80 m, fine sand and mud, 21.22° C, 36.04 ‰, 3 spec. (1 with ovigerous abdominal parasite) (IOUSP-CO511), *Besnard* St. 1747, 20.4.72. — URUGUAY : 34°09′ S, 52°29′ W, 72 m, clay, 20.12° C, 32.70 ‰, 3 spec. (1 ovig. ♀) (IOUSP-CO502), *Besnard* St. 1739, 18.4.72; 34°11′ S, 52°19′ W, 61 m, mud and clay, 14.47° C, 33.32 ‰, 1 spec. (IOUSP-CO403), *Besnard* St. 1645, 16.1.72; 34°18′ S, 52°12′ W, 66 m, calcareous sand, 10.56° C, 34.05 ‰, 1 spec. (IOUSP-CO569), *Besnard* St. 1884, 15.8.72; 34°45.0′ S, 52°05.0′ W, 175 m, mud and sand, 10.49° C, 34.86 ‰, 1 spec. (IOUSP-CO566), *Besnard* St. 1881, 15.8.72. — ARGENTINA, BUENOS AIRES : 35°05′ S, 52°33′ W, 115 m, mud, 10 spec. (1 ovig. ♀, 1 spec. with ovigerous abdominal parasite), *Calypso* St. 160, 21.12.61; 35°06′ S, 52°34′ W, 115 m, 3 spec., *Calypso* St. 160, 21.12.61; 35°10.0′ S, 52°46.0′ W, 90 m, fine sand, 8.14° C, 33.59 ‰, 3 spec. (IOUSP-CO555), *Besnard* St. 1873, 13.8.72; 35°15′ S, 52°33′ W, 168 m, mud, 12.16° C, 35.11 ‰, 1 spec. (IOUSP-CO553), *Besnard* St. 1872, 13.8.72.

DESCRIPTION. — Rostrum (fig. 16 *a*, 17 *a*) sharply triangular, dorsally rounded, reaching to middle of visible portion of basal antennular segment. Ocular hoods separated from rostrum by shallow indistinct depression, and armed with a sharp tooth, shorter than rostrum; anterior margin straight, almost perpendicular to lateral margin of rostrum, and obtusely angled at junction with ocular tooth. Anterior margin of carapace almost vertical from ocular hood nearly to ventral margin of basal antennal segment. Posterior margin of carapace with pronounced cardiac notch.

Abdominal pleurae of four anterior somites broadly rounded, of fifth somite subretangularly rounded. Sixth somite narrowly rounded ventral to insertion of uropod, more broadly rounded dorsally.

Telson (fig. 16 *b*) little more than one and a half to almost twice as long as broad at base; posterior margin convex, from about half to almost two-thirds as wide as anterior margin; lateral margins almost straight. Anterior pair of dorsal spines inserted distinctly anterior to midlength of telson, posterior pair approximately midway between anterior pair and posterior margin of telson.

Eyes totally covered by ocular hoods.

Antennular peduncle (fig. 16 *a*, 17 *a*, *e*) with stylocerite slightly shorter than basal segment, considerably longer than rostrum; ventral carina produced anteriorly into small, sharp point. Second segment about half again as long as basal segment, almost three times as long as third. Thickened portion of outer flagellum of antennule subequal in length to two distal segments of antennular peduncle, consisting of 20-22 articles.

Antennal scale (fig. 16 *a*, 17 *a*, *f*) with distal spine reaching to end of, or slightly overreaching, antennular peduncle; blade narrow distally, falling far short of tip of spine. Antennal peduncle varying slightly in length, but overreaching antennular peduncle; sharp lateral tooth on basal segment, below antennal scale, shorter than stylocerite but longer than rostrum.

Mouth parts as figured (fig. 17 *g-l*). Third maxilliped reaching from middle of second antennular segment to end of distal segment; exopod slightly overreaching antepenultimate segment; penultimate segment and sometimes distal region of antepenultimate segment provided with somewhat thicker setae mesially; ultimate segment unarmed slightly more than once and a half to almost twice as long as penultimate segment.

Branchial formula characteristic of *Alpheus*, a rudimentary pleurobranch being absent from base of third maxilliped.

Major cheliped (fig. 16 *c-e*, 17 *b*) with propodocarpal articulation reaching from base of first antennular segment to middle of second segment. Chela twisted, but this is obscured by the strong compression of movable finger and of dorsal and ventral margins of palm, as well as by movable finger opening in vertical plane of chela. Movable finger almost straight along proximal three-fourths of dorsal margin, in flexed position forming angle of approximately 45° with longitudinal axis of palm; distal fourth slightly arched, tip twisted towards mesial surface of chela; molar tooth vestigial. Fixed finger with socket of molar tooth small and shallow, tip considerably shorter than movable finger and twisted towards lateral surface of chela. Palm from two and

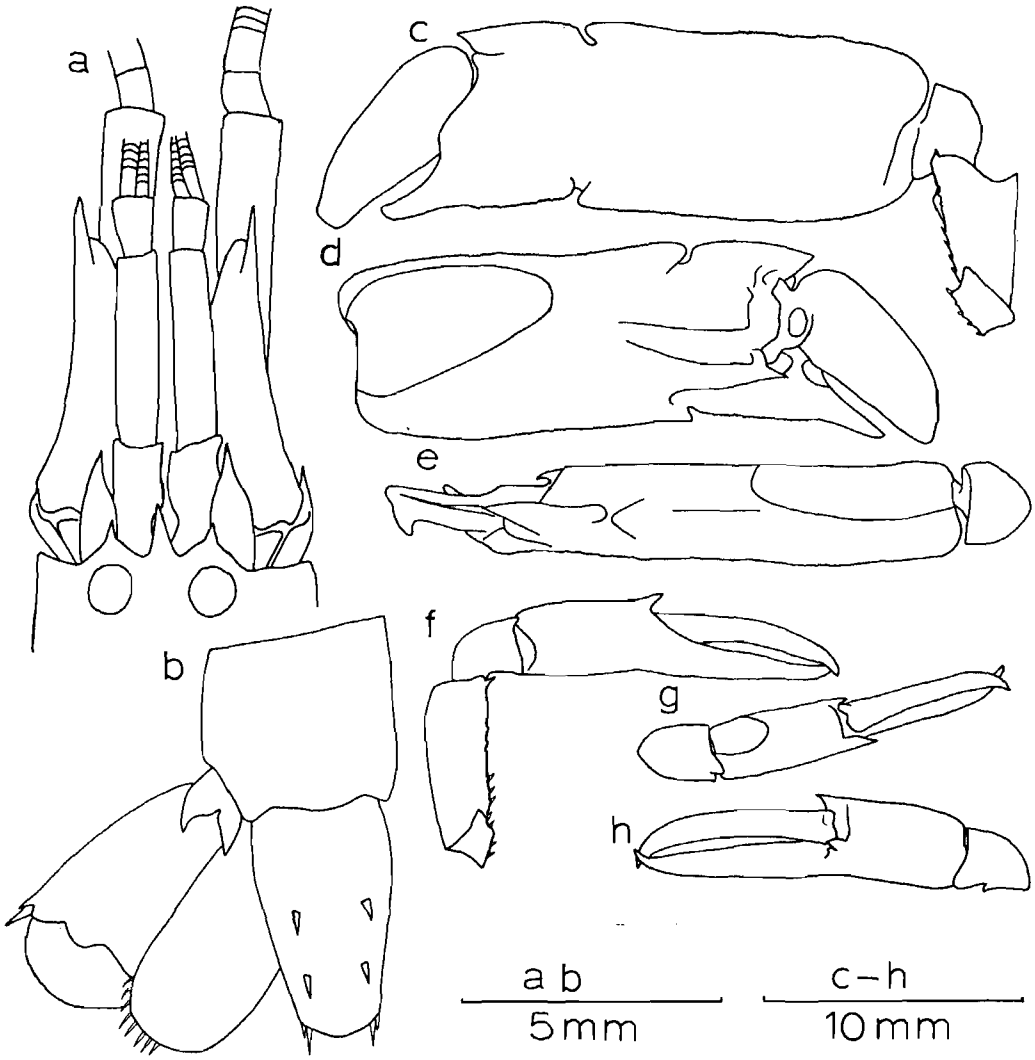

FIG. 16. — Alpheus puapeba *sp. n., male holotype :* a, *anterior region, dorsal view;* b, *telson and uropods, dorsal view;* c, *major cheliped, mesial surface;* d, *major chela, lateral surface;* e, *major chela and carpus, dorsal surface;* f, *minor cheliped, mesial surface;* g, *minor chela and carpus, dorsal surface;* h, *same, lateral surface.*

a half to three times longer than high, finely tuberculate; ventral and apparent dorsal margins deeply and narrowly notched; mesial surface convex, dorsodistal elevation with convex or almost straight upper margin and terminating in sharp distal tooth; lateral surface with median longitudinal elevation tapering to sharp distal tooth, delimited dorsally by deep longitudinal groove and ventrally by depression which extends to ventral margin and to fixed finger. Merus with sharp distal tooth and a variable number of small tubercles along mesial flexor margin; up to four movable spinules have been found on some of these tubercles. Ischium armed with up to four movable spinules along mesial flexor margin.

Minor cheliped (fig. 16 *f-h*, 17 *c*) with propodocarpal articulation reaching from middle of basal antennular segment to end of second segment. Chela similar in both sexes, subcylindrical, fingers straight in the horizontal plane and their extremities crossing in the vertical plane; palm smooth, without prominent grooves, two-thirds as long as fingers, with larger dorsal and smaller lateral sharp tooth flanking articulation of movable finger. Merus with sharp distal tooth and up to three movable spinules on mesial flexor margin. Ischium with up to four movable spinules on mesial flexor margin.

Second pereiopod (fig. 18 *a*) overreaching antennular peduncle by chela and four distal articles of

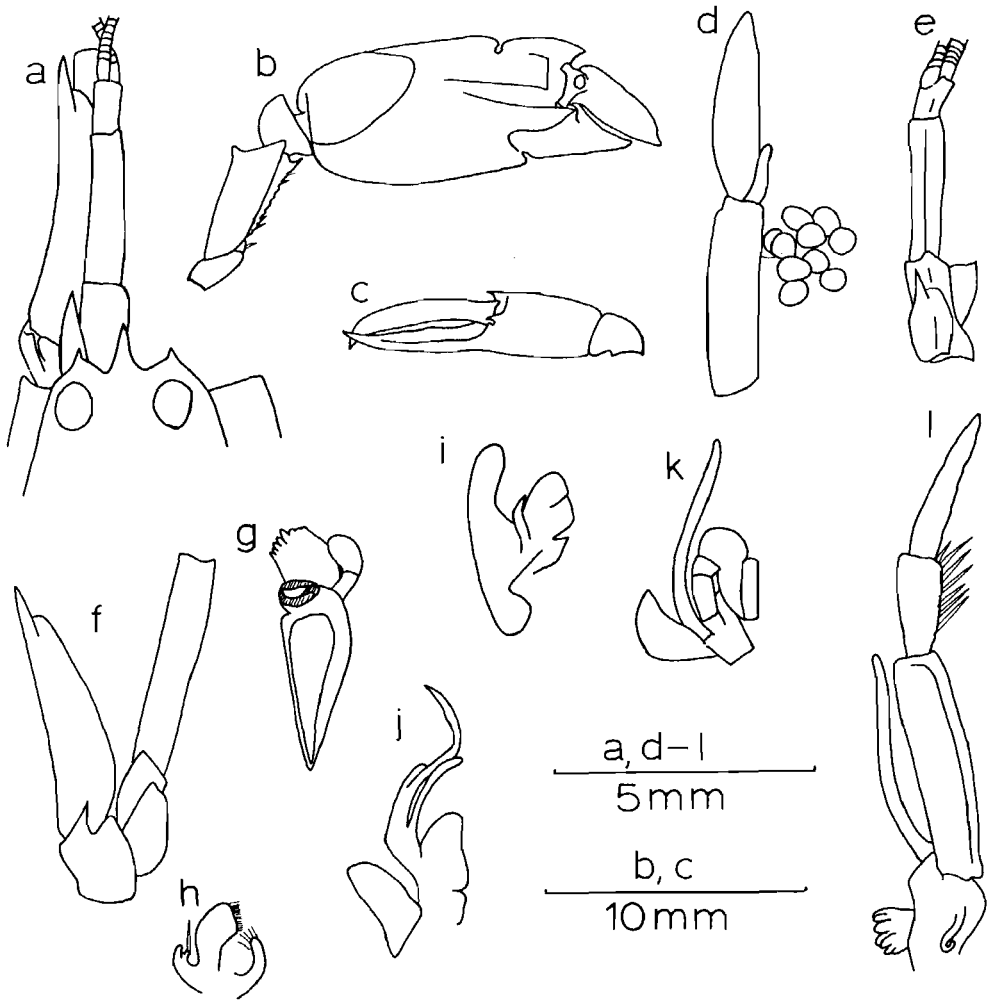

FIG. 17. — Alpheus puapeba *sp. n., ovigerous female paratype from* Calypso *St. 160 :* a, *anterior region, dorsal view;* b, *major cheliped, lateral surface;* c, *minor chela and carpus, lateral surface;* d, *first pleopod. Male paralype from* Calypso *St. 160 :* e, *antennule, lateral view;* f, *antenna, ventral view;* g, *mandible;* h, *first maxilla;* i, *second maxilla;* j, *first maxilliped;* k, *second maxilliped;* l, *third maxilliped.*

carpus. Movable finger subequal in length to palm, propodus longer than fifth article of carpus. First article of carpus about half again as long as second; fifth, fourth and third articles successively shorter, with slight difference in size between two last mentioned articles. Merus equalling first three and half of fourth carpal articles, being subequal in length to ischium.

Third pereiopod (fig. 18 *b*) overreaching antennular peduncle by dactyl and up to half of propodus. Dactyl simple, dorsal margin entire. Propodus just over two times to almost two and a half times longer than dactyl, with series of two distal pairs and 3-4 single spines along flexor margin. Carpus nine-tenths as long as propodus. Merus unarmed, six to slightly over eight times longer than broad, and about twice as long as carpus. Ischium with movable spine near ventral margin.

Fourth pereiopod (fig. 18 *c*) reaching to end of antennular peduncle; similar to third pereiopod, but slightly more slender.

Fifth pereiopod (fig. 18 *d*) reaching to middle of second antennular segment, differing from fourth pereiopod for being more slender and for having several transversal rows of setae in distal third of propodus.

First pleopod (fig. 17 *d*, 18 *e*) with endopod slightly more developed in female than in male. Second

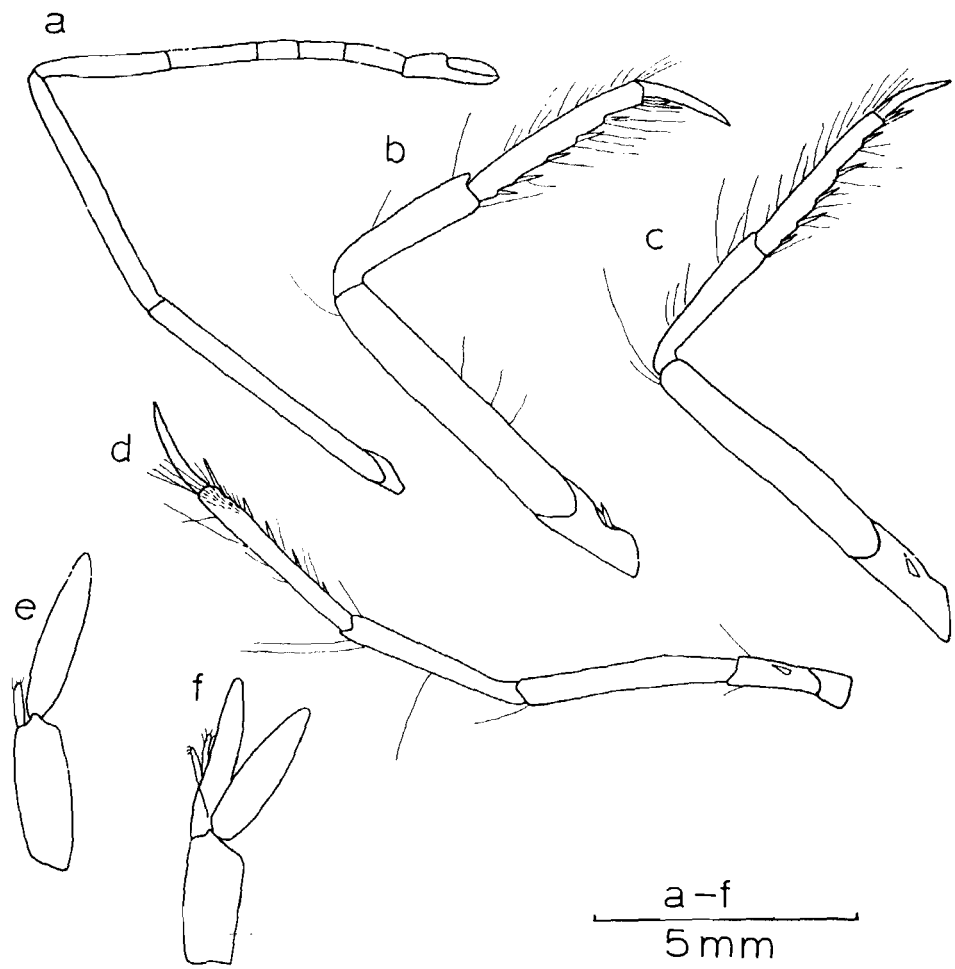

FIG. 18. — Alpheus puapeba *sp. n., male paratype from* Calypso *St. 160 :* a, *second pereiopod;* b, *third pereiopod;* c, *fourth pereiopod;* d, *fifth pereiopod;* e, *first pleopod;* f, *second pleopod.*

pleopod of male (fig. 18 *f*) with appendix masculina slightly longer than appendix interna. Eggs (fig. 17 *d*) numerous and small, 0.40-0.60 mm in largest diameter.

Uropod (fig. 16 *b*) with uncolored movable spine on outer branch flanked laterally by sharp tooth and mesially by rounded lobe, which is continued over transversal suture by a strongly sinuous dorsal margin; mesial branch with series of conspicuous spines on posterolateral margin.

SIZE. — Largest male (holotype), 13+24 mm; major chela, 20:7:3.5 mm; minor chela, 12:2.5 mm. Largest ovigerous female, 12.5+23 mm; major chela, 13:5:2.5 mm; minor chela, 10:2.5 mm. Smallest ovigerous female, 6.5 + 12.5 mm; both chelae missing,

COLOR. — In one sample preserved in formalin (IOUSP-CO178), some specimens had small red chromatophores on the telson and uropods.

REMARKS. — *A. puapeba* sp. n. could be the western counterpart of *A. platydactylus* Coutière, known from the Mediterranean to the Cape Verde Islands, from 50-75 to 600 m deep (CROSNIER and FOREST, 1966 : 221). The latter species differs mainly as follows (*see* CROSNIER and FOREST, 1966 : 220, fig. 2 *e-h*) : Major chela with fingers more slanting in sagittal plane and with palm not truly notched on ventral margin; second pereiopod with first article of carpus two and a half to three times longer than second article.

NAME. — The specific name was derived from aboriginal Tupi language (« pua », thumb; « peba », flat), referring to the shape of the movable finger of the major chela.

HABITAT. — From 45 to 175 m deep. Mud; clay; fine sand; calcareous sand; mud and shells. Measured water temperatures, 8.14 to 21.22 °C; salinities, 32.15 to 36.04 ‰.

GEOGRAPHICAL DISTRIBUTION. — Espirito Santo to the Province of Buenos Aires.

Synalpheus brevicarpus
(Herrick, 1891)
(fig. 19)

Alpheus minus, p.p. KINGSLEY, 1878 *a* (not Say, 1818) : 191 (Pearl Island, Panama Bay); p.p. 1880 : 416 (Harbor Key and Key West, Florida). — p.p. BATE, 1888 : 558, pl. 100, fig. 2. — COUTIÈRE, 1897 : 367; p.p. 1898 *c* : 1430 (Key West, 1.8-3.7 m).

Alpheus saulcyi var. *brevicarpus* Herrick, 1891 [p.p. ?] : 384, pl. 4, fig. 1-3, pl. 21, fig. 1-4, 8, 9, pl. 22, fig. 1, 2, 4-10, 12-16, pl. 23, fig. 1-8, pl. 24, fig. 1, 3 (Type locality : Nassau, New Providence, Bahamas, in green sponges).

Synalpheus saulcyi, RANKIN, 1898 (not *Alpheus saulcyi* Guérin Méneville, 1857) : 251 (Bahamas).

Synalpheus minus, COUTIÈRE, 1898 *b* : 191. — p.p. RATHBUN, 1902 : 109 (off Humaçao, Puerto Rico, 17.4 m). — p.p. VERRILL, 1922 : 102, pl. 33, fig. 5, 5 *a*. — BOONE, 1927 : 135 (Singuanea Bay, Isle of Pines, Cuba); 1930 *b* : 174, pl. 63 (Knights Key, Florida, 3.7 m, in sponges). — KNOWLTON and MOULTON, 1963 : 313, fig. 2, 4 (Bermuda). — p.p. CHACE, 1972 : 95, fig. 35-36 (Caribbean region).

Alpheus Saulcyi var. *brevicarpus*, COUTIÈRE, 1899 : 47.

Synalpheus minor, COUTIÈRE, 1899 (not *Alpheus minor* De Haan, 1849) : 76, fig. 32, 33, 98, 115, 165, 167, 181, 191, 200, 239, 240, 245, 247-250, 301, 326, 348, pl. 5, fig. 4.

Synalpheus brevicarpus, COUTIÈRE, 1909 : 50, fig. 29 (Elliots Key, Harbor Key, Key West and Dry Tortugas, Florida; Green Cay and Andros Island, Bahamas, some from sponges). — ZIMMER, 1916 : 383, fig. A (Saint John; Saint Thomas; Tortugas, 21.9 m). — VERRILL, 1922 : 110, pl. 36, fig. 3-3 *d* (Bahamas; Saint Thomas). — SCHMITT, 1924 *a* : 67 (Curaçao); 1930 : 344 (Tortugas); 1935 : 147 (Guanica Harbor, Puerto Rico); 1936 : 369 (Boca Porto Marie, Curaçao, between corals). — BOONE, 1930 *b* : 173, pl. 62 (Pigeon Key, Florida; Baie Carenge, Haiti; Limon Bay, Panama). — ARNDT, 1933 : 249. — PEARSE, 1950 : 150 (Bimini, in *Ircinia strobilina* and *Haliclona rubens*). — HOLTHUIS, 1955 : 94, fig. 63. — TABB and MANNING, 1961 : 596 (Florida Bay, in sponges). — ROUSE, 1970 : 138 (Everglades, Florida, 4.5-7.0 m, mud, marl, shell rubble and hard bottom, 24-34 °C, 31-40 ‰). — GORE, SCOTTO and BECKER, 1978 : 225 (Fort Pierce, Florida, intertidal zone, in *Phragmatopoma*).

Synalpheus brevicarpus guerini Coutière, 1909 : 51, fig. 52 (Holotype : USNM 24797; Type locality : Off Humaçao, Puerto Rico, 17.4 m [as *S. minus* by RATHBUN]; Other localities : Key West). — ARNDT, 1933 : 249 (Dry Tortugas, in *Spongia officinalis* [L.]). — CHACE, 1956 : 148 (Gran Roque, 0-1.8 m, pieces of *Acropora*, sand, shells, sponges, colonial anemones and algae, 27.2 °C).

Synalpheus digueti, VERRILL, 1922 (not Coutière, 1909) : 108.

Synalpheus brevicarpus var. ?, CHACE, 1956 : 148 (Gran Roque, 0-1.8 m, in annelid tube found in coraline rocks, 27.2 °C).

MATERIAL. — USA, FLORIDA : Key West, 1 spec. ? (YPM 1827), **E.P.** coll. August 1874. — BAHAMAS : Bimini, 25 spec. (10 ovig. ♀) (USNM 88612), **A.S.Pe.** coll. 15.10.48. — CUBA : Isle of Pines, Singuanea Bay, several spec. (YPM 6130), *Pawnee*, 6.4.25. — PACIFIC COAST OF PANAMA : Panama Bay, Pearl Island, 1 spec. ? (YPM 742), **F.H.B.** coll. — BRAZIL, PERNAMBUCO : 8°23' S, 34°42' W, 51 m, sand, 1 ♂, 1 ovig. ♀, *Calypso* St. 24, 21.11.61. — BAHIA : Abrolhos, south coast of Ilha de Santa Bárbara, 0-8 m, in sponge, 1 spec., *Calypso* St. 84, 28.11.61; 18°18' S, 38°53' W, 38 m, mud, 1 spec., *Calypso* St. 89, 29.11.61. — ESPÍRITO SANTO : Guarapari, Praia de Peracanga, 1-2 m, in coral head, 3 spec. (1 ovig. ♀), **M.L.C.** coll. 10.1.78; *ibid.*, Praia de Meaípe, intertidal zone, between stones, 9 spec., **M.L.C.** coll. 9.1.78; Anchieta, Praia do Ubu, intertidal zone, between stones, 3 spec., **M.L.C.** coll. 8.1.78; *ibid.*, Iriri, Praia dos Namorados, intertidal zone, between stones, 2 spec. (1 ovig. ♀), **M.L.C.** coll. 11.1.78; Marataízes, Praia de Marataízes, intertidal zone, between stones and sponges, 1 spec., **M.L.C.** coll. 6.1.78. — RIO DE JANEIRO : Cabo Frio, Armação dos Búzios, Praia do Forno, intertidal zone, between stones, 1 spec., **M.L.C.** coll. 21.1.78; *ibid.*, Praia de Geribá, intertidal zone, between stones, 1 ovig. ♀, **M.L.C.** coll. 22.1.78; Cabo Frio, Praia das Conchas, intertidal zone, between stones, several spec., **M.L.C.** coll. 24.1.78; Ilha de Cabo Frio, Praia do Farol, 1-2 m, in coral heads, 4 spec., in *Pocillopora*, 3 spec., in *Schizoporella*, 3 spec., **M.L.C.** coll. 14.1.77; *ibid.*, 1 spec., **M.L.C.** coll. 15.1.77; Cabo Frio, Arraial do Cabo, Praia do Forno, 1 spec. (MNRJ 61-63), 12.7.56; *ibid.*, 3 spec. (MNRJ), **N.S.** and class coll. 15.8.58; *ibid.*, 2 spec. (MNRJ 7-68), **L.N.T.**, **P.J.** and **A.C.** coll. August 1968; *ibid.*, Praia dos Anjos, intertidal zone, between stones, several spec., **M.L.C.** coll. 23.1.78; Maricá, Praia de Jaconé, intertidal zone, between stones and in *Phragmatopoma*, several spec., **M.L.C.** coll. 25.1.78; Niterói, Praia de Itaipu, 1 spec. (MNRJ 22-959), **J.Bec.**, **A.R.** and **H.S.** coll. 6.6.59; Angra dos Reis, Praia de Garatucaia, intertidal zone,

between stones, 3 spec., **M.L.C.** coll. 9.2.78. — São Paulo : Ubatuba, Praia de Picinguaba, intertidal zone, between stones and sponges, 1 spec., **M.L.C.** coll. 7.1.77; *ibid.*, west of Praia da Enseada, 0-5 m, sand, 1 spec., *Calypso* St. 126, 10.12.61; *ibid.*, Saco da Ribeira, Praia do Codó, in *Zygomycale parishii*, 6 spec., **L.F.D.** coll. 14.5.77; *ibid.*, Praia do Lázaro, intertidal zone, between stones, 2 spec., **M.L.C.** coll. 12.7.76; *ibid.*, intertidal zone, in dark-green sponge, **M.L.C.** coll. 13.7.76; *ibid.*, Praia da Fortaleza, 2 m, in coral heads, 3 spec., **M.L.C.** coll. 26.6.76; Ilha de São Sebastião, Praia da Siriúba, intertidal zone, between stones, 1 spec., **N.J.H.** coll. 8.9.76; *ibid.*, Praia do Pequeá, on buoy at Yatch Club, among *Herdmannia momos* and *Ascidia nigra*, 1 spec., **S.A.R.** coll. 10.4.77; *ibid.*, Barra Velha, intertidal zone, between stones, several spec., **M.L.C.** coll. 20-21.1.77; Canal de São Sebastião, in *Zygomycale parishii*, 9 spec. (6 ovig. ♀), **S.A.R.** coll. 24.10.77; São Sebastião, 5 spec. (MNRJ 78-61), 1 spec. (MNRJ 59-63), **M.T.L.** coll. 22.8.60; *ibid.*, 10 spec. (MNRJ 94-61), **M.T.L.** coll. 5.9.61; *ibid.*, 1 ovig. ♀ (MNRJ), **A.L.C.** coll. 9.2.66; *ibid.*, Praia do Araçá, in *Zygomycale parishii*, 2 samples (several spec.), **L.F.D.** coll. 20.3.76 and 16.5.76; *ibid.*, in *Zygomycale parishii*, 1 ovig. ♀ (with bopyrid parasite in branchial chamber) (MNRJ), **L.F.D.** coll. 23.11.76; *ibid.*, in yellow sponges, 5 spec. (1 ovig. ♀), **M.M.D.S.** coll. 11.11.77; *ibid.*, Praia do Segredo, 1 spec. (with spec. of *Bopyrella harmopleon* Bowman in branchial chamber) (MNRJ 49-61), **M.T.L.** coll. 5.9.60; *ibid.*, in sponges, 2 spec. (1 with bopyrid in branchial chamber), **M.M.D.S.** coll. 6.8.77; *ibid.*, Praia de Boissucanga, intertidal zone, between stones, 8 spec., **M.L.C.** coll. 17.2.77; Ilha de Santo Amaro, Praia de Pernambuco, intertidal zone, between stones, several spec., **M.L.C.** coll. 25.8.76; Itanhaém, Praia do Cibratel, intertidal zone, between stones, 4 spec., **M.L.C.** coll. 31.7.77. — Rio Grande do Sul : Torres, 1 spec. (with epicarid isopod in branchial chamber), **J.Ber.** coll. 5.11.64.

Size. — Largest ovigerous female, 9+16.5 mm; major chela, 8.5:4:2.5 mm; minor chela, 4:1.5 mm. Largest male, 7.5+11.5 mm; major chela, 10:4:2.5 mm; minor chela, 4:1.5 mm. Smallest ovigerous female, 6+9 mm; major chela, 6:3:2 mm; minor chela, 2.5:1 mm.

Color. — The color pattern was indicated by Herrick (1891 : 381, pl. 4, fig. 1-3), who mentions green, rarely yellow, eggs. In all live ovigerous females I have seen, the eggs are yellow, orange or brown; green eggs are characteristic of the closely related and sympatric species *S. minus* (Say). Only three samples examined seemed to agree with the color pattern indicated for the chelae by Herrick; in these specimens, the distal two-thirds of the chelae and the tip of the third maxilliped are dark red, the major chela having a transversal white band and some diffuse white pigment on the mesial surface. In the remaining specimens I have examined, the red pigment on the distal half of the major chela, and all the red pigment on the minor chela and third maxilliped is obscured by varying amounts of green and blue pigments; furthermore, the mesial surface of the major chela has a characteristic longitudinal white stripe that runs close to the opposable margin of the movable finger and onto the anterior region of the palm, followed by a small white dot. The molar tooth is bright yellow.

Remarks. — This species is not easy to distinguish from *S. minus* (Say). After previously synonymyzing the two species, Coutière (1909 : 2) considered *S. brevicarpus* (Herrick) distinct. Based on a careful study of the variability of both forms, Chace (1972 : 99) again proposed to consider them a single species « ... while being fully aware that further study of living material may reveal characters, such as color pattern, by which it may be possible to reestablish the two species » *(loc. cit.)*. Such color differences were found in Florida specimens by Jacques van Montfrans (personal communication) and are also described herein for Brazilian material of both species (*see* below, under *S. minus*). A second difference seems to be the much larger size attained by specimens of *S. brevicarpus* collected in the same locality as *S. minus*. Finally, Dr. Fenner A. Chace, Jr. (personal communication) called my attention to a morphological difference in the shape of the large chela : Whereas in *S. minus* the lateral surface of the palm has at its distal margin only two rather broad and sinuous lateral lobes, as well as the sharp dorsal tooth (fig. 28 *d*), in *S. brevicarpus* an additional narrow, prominent and unarmed projection occurs between the dorsal spine and the two broader lateral lobes (fig. 19 *d*). Only females with small eggs were encountered (*cf.* Coutière, 1909 : 51). Variations occur in the length and width of the ocular spines and rostrum, and 6-9 sharp spines may be present on the propodus of the third pereiopod.

I was unable to distinguish the Panama Bay specimen, identified *S. minus* by Kingsley (1878 *a* : 191) from *S. brevicarpus*. Due to great specific variability

it is also difficult to distinguish *S. brevicarpus* from descriptions of the East Pacific species *S. digueti* Coutière; the latter's color pattern differs slightly : « In fresh material the body is translucent, the appendages are blue, and the tips of the fingers of the first pereiopods are red » (ABELE, 1975 : 78).

HABITAT. — Intertidal zone to 51 m deep. Mud; sand; broken shells; shells and marl; in sponges, including *Ircinia strobilina, Haliclona rubens, Spongia officinalis* and *Zygomycale parishii;* among the ascidians *Herdmannia momos* and *Ascidia nigra;*

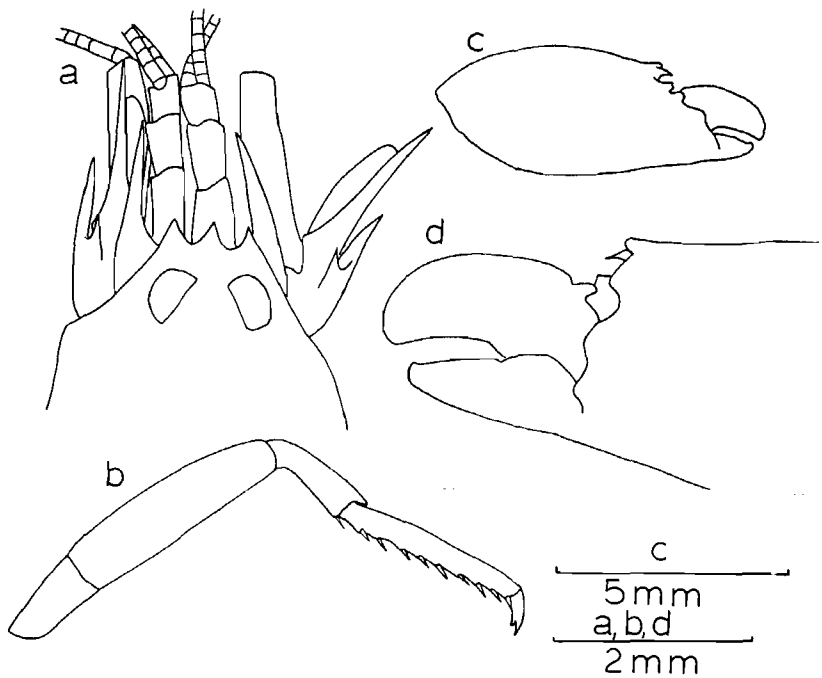

FIG. 19.

Synalpheus brevicarpus *(Herrick), male from* Calypso *St. 24 :* a, *anterior region, dorsal view;* b, *third pereiopod;* c, *major chela, mesial surface;* d, *distal portion of major chela, lateral surface.*

in blocks of the branching colonial bryozoan *Schizoporella;* in *Phragmatopoma* worm reefs; between stones; in corals, including *Pocillopora;* in annelid tube found in coraline rocks; among pieces of *Acropora,* sand, shells, sponges, colonial anemones and algae. Measured water temperatures, 24 to 34 °C; salinities, 31 to 40 ‰.

GEOGRAPHICAL DISTRIBUTION. — Bermudas; east Florida to Dry Tortugas; southwest Florida; Bahama Islands; Cuba to the Virgin Islands; Los Roques Islands; Curaçao; Panama; Pernambuco to the north of Rio Grande do Sul. East Pacific from Panama Bay.

Synalpheus brooksi Coutière, 1909

(fig. 20-22)

Synalpheus brooksi Coutière, 1909 : 69, fig. 41 (Syntypes : 40 spec., USNM 38402; Type locality : Sugar Loaf Key, Florida; Other localities : Harbor Key; Salt Pond Key; Key West; Gulf of Mexico, 49 m; Yucatan, 46 m; Vieques, 23-26 m; Saint Thomas, 37-42 m; off Cabo São Roque, Brazil, 37 m); 1910 : 487 (Dry Tortugas, Florida, in sponges). — MCCLENDON, 1911 : 17, pl. 1 fig. 1, 3 (Tortugas, in *Ircinia acuta*). — PEARSE, 1932 : 107 (Dry Tortugas, in sponge); 1934 : 119; 1950 : 150 (Bimini, in *Spheciospongia vesparia*). — ARNDT, 1933 : 248. — SCHREITMÜLLER, 1935 : 34 (photo). — SCHMITT, 1935 : 148. — HOLTHUIS, 1959 : 104 (Surinam, in sponge, 44 m). — DOBKIN, 1965 : 450, fig. 1-5 (Biscayne Bay, Florida, in *Spheciospongia vesparia*). — CHACE, 1972 : 92 (Barbuda; Antigua Island; Tobago Cays; Tobago; Isla Mujeres; Isla Cozumel; Bahia de la Ascensión; down to 5 m, in sponges, coral rock, turtle-grass flats or among mangrove roots). — COELHO and RAMOS, 1972 : 151 (Paraiba).

Synalpheus brooksi strepsiceros Coutière, 1909 : 72, fig. 42 (Holotype : 1 spec., USNM 8936; Type locality : Saint Thomas).

Synalpheus brooksi eleutherae Coutière, 1909 : 72, fig. 43 (Syntypes : 5 ♂, 3 ♀, USNM 38403; Type locality : Eleuthera Islands, Bahamas).

Synalpheus herricki Coutière, 1909 : 74, fig. 44 (Syntypes : ± 150 spec., USNM 38404; Type locality : « Anclote, Florida », probably Anclote Keys, off Tarpon Springs;

Other localities : 25°50'15" N, 02°41'45" W, Gulf of Mexico, 39 m; Anclote Section, Florida, 23 m). — CHACE, 1937 *a* : 123 (Arena Bank, Baja California, 64.0 to 82.3 m, mud); 1972 : 93. — TABB and MANNING, 1961 (Florida Bay, in sponge). — ROUSE, 1970 : 138 (Everglades, Florida, 1.5-2.1 m, marl, shell rubble, and hard sediment, 22-24 °C, 32-35 ‰). — RAY, 1974 : 134, fig. 114-121 (West Flower Garden reef, Texas, 22.8 m, dead coral) *(syn. n.)*.

Synalpheus herricki angustipes Coutière, 1909 : 76, fig. 45 (Holotype : 1 spec., USNM 38406; Type locality : Anclote Section, Florida, 23 m) *(syn. n.)*.

Synalpheus herricki dimidiatus Coutière, 1909 : 76, fig. 46 (Syntypes : 6 spec., USNM 38405; Type locality : Anclote Section, Florida, 23 m) *(syn. n.)*.

Synalpheus tanneri Coutière, 1909 : 77, fig. 47 (Holotype : 1 spec., USNM 38407; Type locality : 29°15'30" N, 85°29'30" W, Gulf of Mexico, 49 m). — CHACE, 1972 : 104. — RAY, 1974 : 170, fig. 162-168 (West Flower Garden reef, Texas, dead coral) *(syn. n.)*.

Synalpheus bousfieldi Chace, 1972 : 86, fig. 29, 30 (Holotype : Ovig. ♀, USNM 135369; Type locality : West side of reef, east of anchorage, Bahía del Espíritu Santo, Territorio de Quintana Roo, Mexico, 0-3 m, eroded coral; Other localities : Virgin Gorda, reef) *(syn. n.)*.

Synalpheus longicarpus, CORRÊA, 1972 (not *Alpheus sauloyi* var. *longicarpus* Herrick, 1891) : 3 (Abrolhos, Bahia).

MATERIAL. — USA, FLORIDA : Sugar Loaf Key, 40 spec., Syntypes (USNM 38402), 14.3.1888. — BAHAMAS : Eleuthera Island, 5 ♂, 3 ♀, Syntypes of *S. brooksi eleutherae* Coutière (USNM 38403), 5.7.03. — MEXICO : Quintana Roo, Bahía del Espíritu Santo, west side of reef, east of anchorage, 0-3 m, 1 ovig. ♀, Holotype of *S. bousfieldi* Chace (USNM 135369), Smithsonian-Bredin Expedition St. 41-60, 6.4.60. — SAINT THOMAS : 1 ♂ [without major chela], Holotype of *S. brooksi strepsiceros* Coutière (USNM 8936), *Albatross*, 1884. — SURINAM : 6°49' N, 55°25' W, 43.9 m, mud and small shells, 4 spec. (USNM 103052), *Coquette*, 28.6.57. — BRAZIL, AMAPÁ : 04°22.0' N, 50°27.0' W, in sponge, 34 spec. (MNRJ). — RIO GRANDE DO NORTE : Off Cabo São Roque, 36.6 m, 15 spec. (USNM 41688), 1 spec. (USNM 41689), *Albatross*, 16.12.1887. — PERNAMBUCO : 8°15' S, 34°42' W, 33 m, calcareous algae and corals, 1 spec., *Calypso* St. 22, 21.11.61; 8°22' S, 34°44' W, 38-52 m, mud and sand, 9 spec., *Calypso* St. 25, 21.11.61; 8°23' S, 34°42' W, 51 m, sand, 6 spec., *Calypso* St. 24, 21.11.61; 8°25' S, 34°48' W, 33 m, calcareous algae and corals,

TABLE II. — *Morphological characters in some spe*

	Shape of ocular spines	*Shape of stylocerite*	*Presence of blade; length of antennal scale*	*Length of antennal s in relation antennal s*
Calypso St. 85	sharp	sharp	absent; to end of 2nd antennular segment	slightly l
Calypso St. 84	rounded	sharp	absent; to end of 2nd antennular segment	sltghtly sh
Calypso St. 84 (from sponge)	sharp (fig. 21 *e*)	sharp (fig. 21 *e*)	absent; to end of 2nd antennular segment fig. 21 *e*)	same len (fig. 21
Calypso St. 80 (spéc. *A*, ovig. ♀)	rounded (fig. 22 *a*)	rounded (fig. 22 *a*)	absent; overreaches antennular peduncle (fig. 22 *a*)	shorter (fig
Calypso St. 80 (spec. *B*, ovig. ♀)	rounded and slightly elongate	rounded	present; to middle of 2nd antennular segment (fig. 22 *f*)	shorter (fig
Calypso St. 69 (ovig. ♀)	rounded	rounded	absent; overreaches antennular peduncle	shorte
Calypso St. 66	rounded	sharp	absent; to end of antennular peduncle	longe
Calypso St. 58 (ovig. ♀)	rounded	sharp	present; to end of antennular peduncle (fig. 22 *e*)	shorter (fig
Calypso St. 27	somewhat sharp and elongate (fig. 22 *c*)	sharp and elongate (fig. 22 *c*)	absent; to middle of 2nd antennular segment (fig. 22 *c*)	shorter (fig
Calypso St. 24	rounded and short (fig. 21 *g*)	sharp	absent; to middle of 3rd antennular segment	same le

1 spec., *Calypso* St. 27, 21.11.61. — Sergipe : 10°54' S, 36°45' W, 34 m, muddy sand, shells and broken shells, 1 ♀, *Calypso* St. 40, 23.11.61. — Bahia : 12°56.4' S, 38°34.3' W, 44-60 m, sand, shells, broken shells and stones, 2 ovig. ♀, *Calypso* St. 58, 24.11.61; 13°28' S, 38°50' W, 37 m, sand and shells, 1 spec., *Calypso* St. 66, 26.11.61; 15°37' S, 38°44' W, 39 m, calcareous algae, other algae and corals, 27 spec. (1 ovig. ♀), *Calypso* St. 69, 27.11.61; 18°09' S, 38°30' W, 50 m, calcareous algae, corals and rocks, 1 ovig. ♀, *Calypso* St. 80, 28.11.61; Abrolhos, Ilha de Santa Bárbara, 1 ovig. ♀ (MNRJ), 28.9.69; *ibid.*, south coast of Santa Bárbara, 5-8 m, sand and rocks, 5 spec., *Calypso* St. 84, 28.11.61; *ibid.*, 0-8 m, in sponge, 9 spec. (1 ovig. ♀), *Calypso* St. 84, 28.11.61; *ibid.*, between Santa Bárbara and Siriba, 2-5 m, sand and calcareous algae, 1 spec., *Calypso* St. 85, 28.11.61.

Size. — Largest ovigerous female, 4.5+7 mm. Largest male, 4+6 mm. Smallest ovigerous female, 3+5 mm. Major chela attains 5:2 mm. Minor chela attains 2 mm.

Color. — The colored plates of a whole specimen and the major chela (McClendon, 1911 : 17, pl. 1, fig. 1-3) are the only references to color pattern for *S. brooksi* Coutière.

Remarks. — Chace (1937 *a*, 1972) did not recognize the infraspecific forms of *S. herricki* Coutière and *S. brooksi* Coutière. With Figures 20-22 and Table II, I exemplify how many of the diagnostic characters utilized in the original descriptions of *S. brooksi* Coutière, *S. brooksi strepsiceros* Coutière, *S. brooksi eleutherae* Coutière, *S. herricki* Coutière, *S. herricki angustipes* Coutière, *S. herricki dimidiatus* Coutière, *S. tanneri* Coutière and *S. bousfieldi* Chace occur inconstantly and in different combinations in the new South American material.

The specimens from *Calypso* St. 84 and 84 (from sponge) (Table II) are similar to each other, being close to typical *S. brooksi*. But the assymetrically bidentate fixed finger of the minor chela in the first specimen and small differences in the relative lengths of the basal antennal spine and antennal scale in

of S. brooksi *Coutière collected by the* Calypso.

General shape of major chela	*Shape of distal proeminence of palm of major chela*	*Shape of fixed finger of minor chela*	*Number of fixed teeth on free lateral margin of each outer uropodal branch*	*Relative size of fixed sutural tooth of outer uropodal branch*	*Conspicuousness of transversal suture of outer uropodal branch*
not twisted	somewhat sharp	assymetrically bidentate	1-2	large	inconspicuous
not twisted	reduced in size (fig. 22 *j*)	—	1-2	large	inconspicuous
not twisted	sharp (fig. 21 *e*)	bidentate	2-2 (fig. 21 *d*)	large	inconspicuous (fig. 21 *d*)
not twisted	reduced in size	—	2-2 (fig. 22 *b*)	reduced in size only on one side of animal	partially conspicuous (fig. 22 *b*)
not twisted	sharp	bidentate	1-1	reduced in size on both sides of animal	inconspicuous
2 minor chela in this specimen	—	simple	1-1 (fig. 22 *h*)	large	partially conspicuous (fig. 22 *h*)
slightly twisted	sharp	simple	2-2	reduced in size on both sides of animal	inconspicuous
—	—	bidentate	1-1	large	conspicuous
not twisted	somewhat sharp	bidentate (fig. 22 *d*)	1-1	large	conspicuous
slightly twisted	rounded	simple	1-1	large	inconspicuous

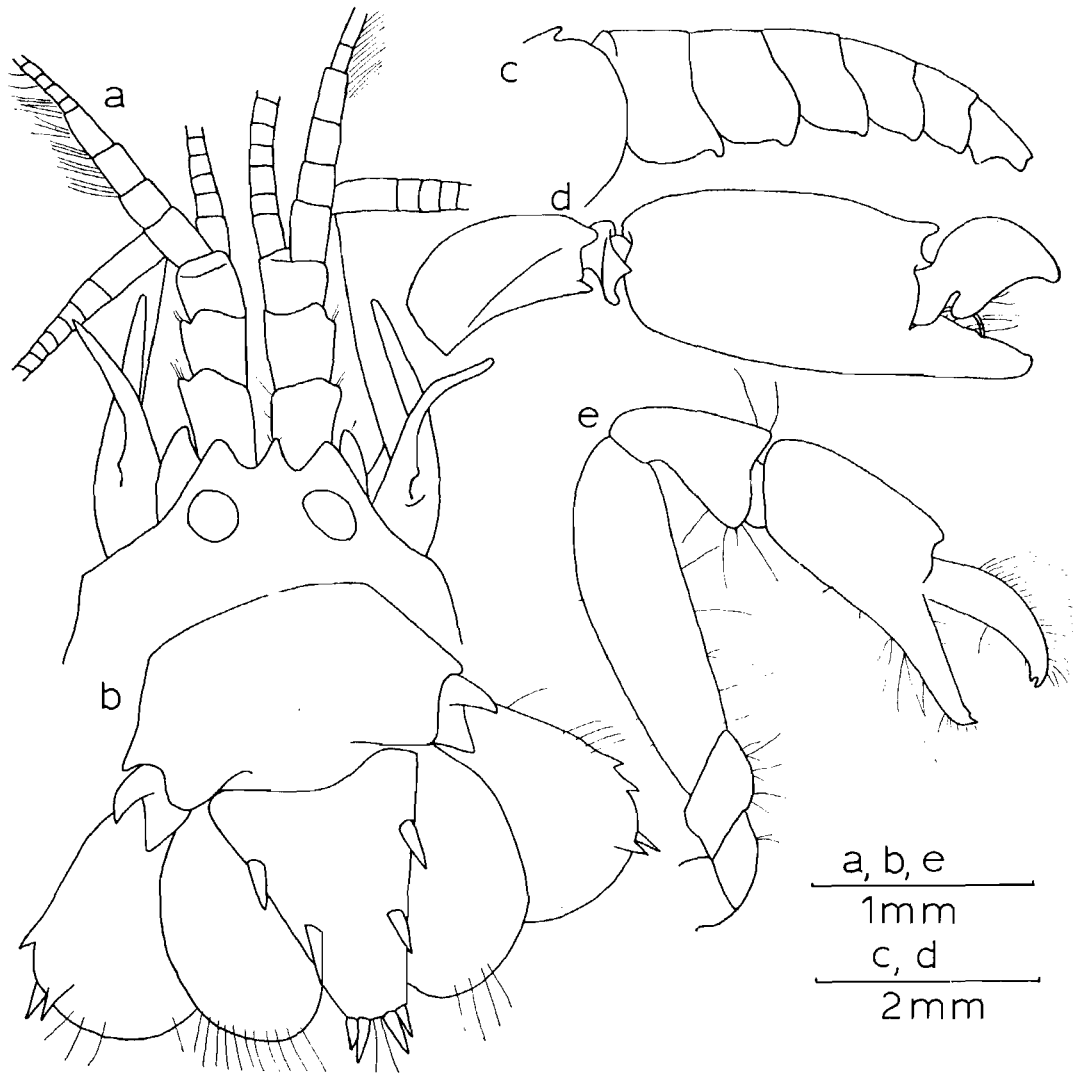

FIG. 20. — Synalpheus brooksi *Coutière, male from 04°22.0'N, 50°27.0'W :*
a, *anterior region, dorsal view;* b, *telson and uropods, dorsal view;*
c, *abdomen, lateral view;* d, *major cheliped, lateral surface;* e, *minor cheliped, mesial surface.*

both these specimens are characters shared with the types of *S. brooksi strepsiceros* and *S. brooksi eleutherae.* Variations in the relative lengths of the antennal scale and basal antennal spine are shared with the Brazilian material from Cabo São Roque, identified as *S. brooksi* by COUTIÈRE (1909), whereas these variations plus the presence of one or two fixed teeth on the free margin of the outer uropodal branch are shared with specimens from Surinam identified as *S. brooksi* by HOLTHUIS (1959), although the latter have a simple fixed finger on the minor chela.

The specimen from St. 66 (Table II) has two fixed teeth on the outer uropodal branch and a simple fixed finger on the minor chela, but its rounded ocular spines, longer antennal spines, slightly twisted major chela and reduced sutural teeth of uropod indicate similarities with *S. bousfieldi* Chace.

The specimen *B* from St. 80 and specimens from St. 58 and 27 (Table II) could possibly best be identified with *S. herricki,* particularly the latter specimen (*see* COUTIÈRE, 1909 : 74, fig. 44; RAY, 1974 : 134, fig. 114-121). The first two specimens have

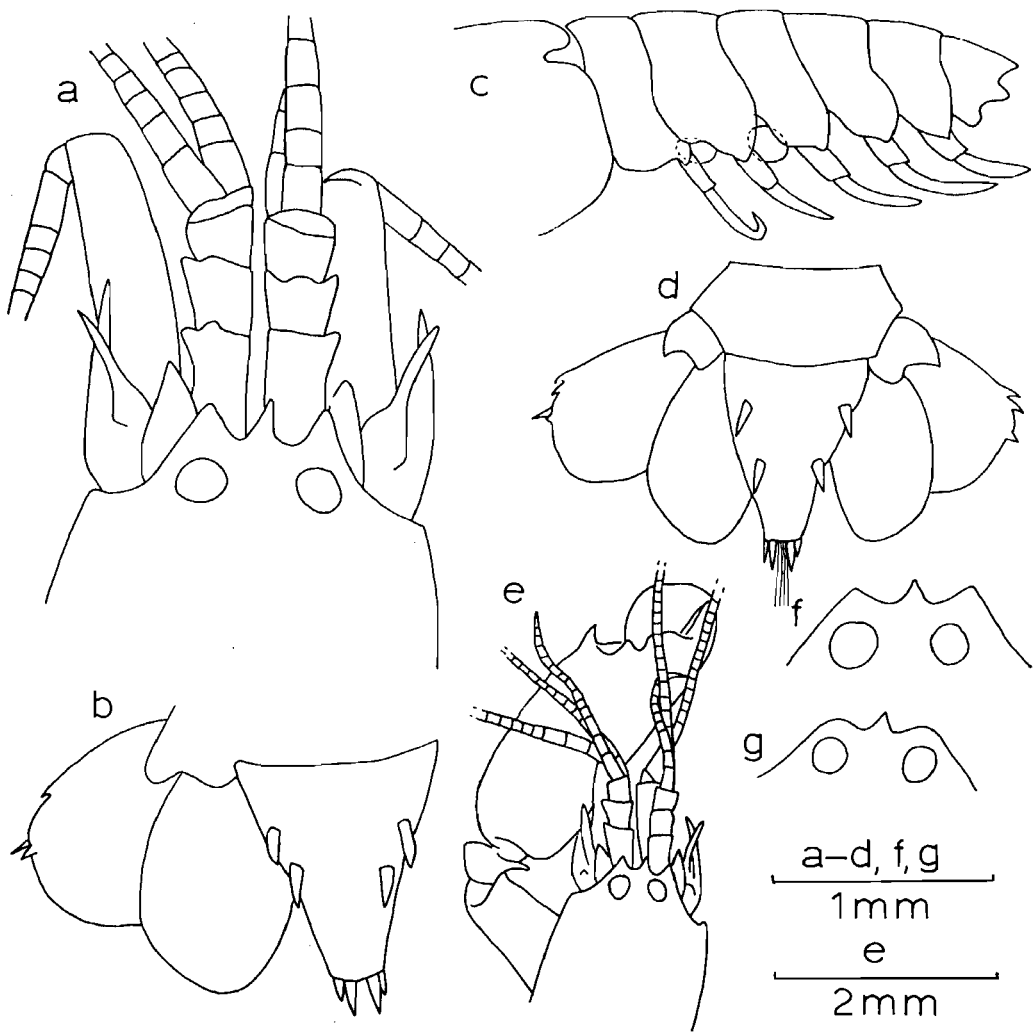

FIG. 21. — Synalpheus brooksi *Coutière, ovigerous female from Abrolhos (MNRJ) :* a, *anterior region, dorsal view;* b, *telson and uropods, dorsal view;* c, *abdomen, lateral view. Specimen from sponge,* Calypso *St. 84 :* d, *telson and uropods, dorsal view;* e, *anterior region and major chela, dorsal view; A second specimen from sponge,* Calypso *St. 84 :* f, *frontal margin of carapace, dorsal view. Specimen from* Calypso *St. 24 :* g, *frontal margin of carapace, dorsal view.*

a blade on the antennal scale, also reported by CHACE (1937 *a :* 123) for specimens from Baja California identified as *S. herricki,* but, although females, have a single lateral tooth on outer uropodal branch, instead of usually three (COUTIÈRE, 1909 : 76). Furthermore, in specimen *B* of St. 80 the sutural spine of the uropod is reduced as in *S. bousfieldi* (CHACE, 1972 : 87, fig. 29 *d*).

The specimen from St. 84, specimen *A* from St. 80 and the specimen from St. 69 and 24 (Table II) agree more or less with the characters of *S. tanneri* but, as in the previous cases, each one of them has characters that differ from, and overlap with, the specimens shown in Table II.

The following morphological variations are thus considered intraspecific for *S. brooksi* s.l. : Spines on frontal region of carapace and stylocerite variable in shape (fig. 20 *a,* 21 *a, e,* 22 *a, c, e*); these, as well as antennular and antennal peduncles, occasionally considerably elongate (*cf.* fig. 22 *a* and 22 *c*). Basal antennal spine slightly shorter than antennal scale (fig. 22 *a, c, e, f*), equal in length (fig. 21 *e*) or slightly longer (fig. 20 *a,* 21 *a*). Antennal scale reaching from middle of second antennular segment to slightly

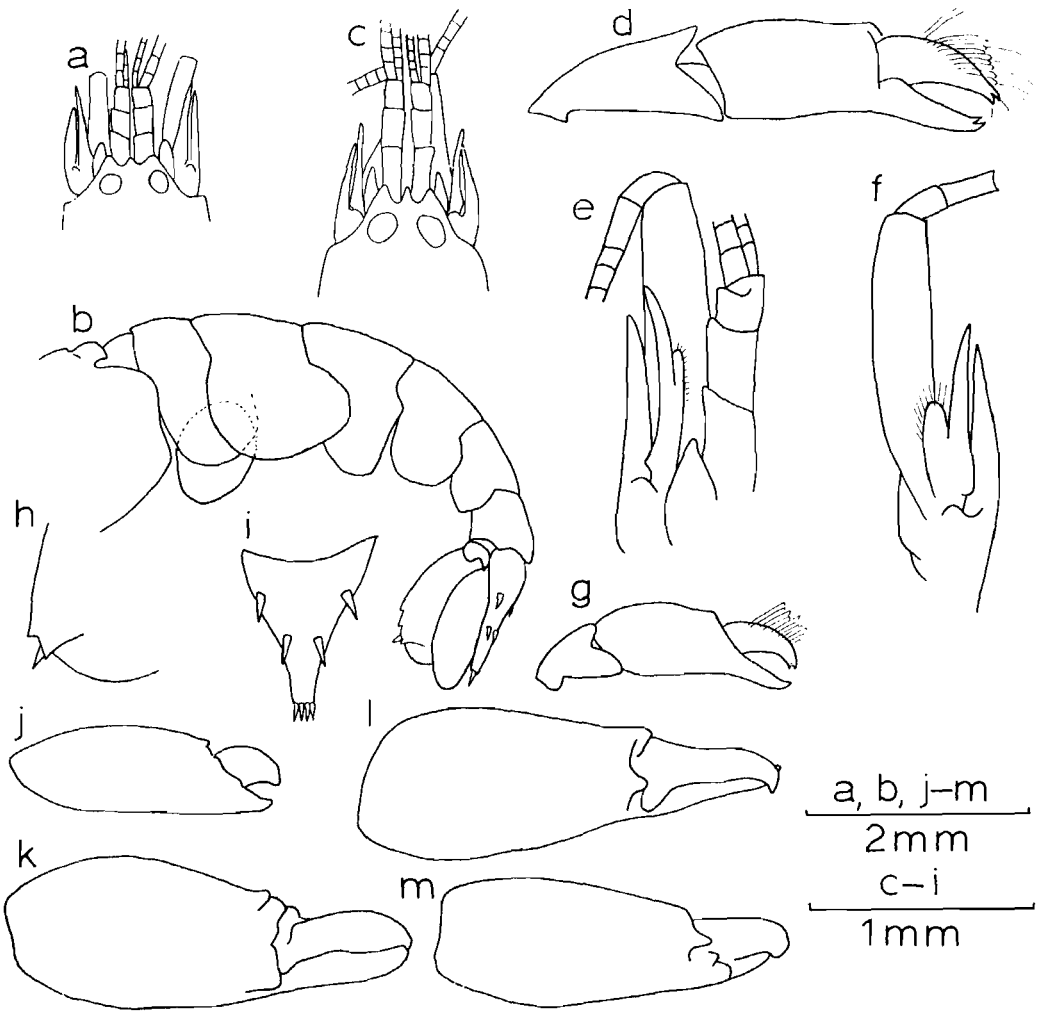

FIG. 22. — Synalpheus brooksi *Coutière, ovigerous female from* Calypso *St. 80 :* a, *anterior region, dorsal view;* b, *posterior region, lateral view. Specimen from* Calypso *St. 27 :* c, *anterior region, dorsal view;* d, *minor chela and carpus, lateral surface. Ovigerous female from* Calypso *St. 58 :* e, *antennule and antenna, dorsal view. Ovigerous female from* Calypso *St. 80 :* f, *antenna, dorsal view. Specimen from* Calypso *St. 84 :* g, *minor chela and carpus, mesial surface. Ovigerous female from* Calypso *St. 69 :* h, *posterolateral margin of lateral uropodal branch, dorsal view. Second specimen from* Calypso *St. 84 :* i, *telson, dorsal view;* j, *major chela, mesial surface. Specimen from* Calypso *St. 69 :* k, *major chela, lateral view. Second specimen from* Calypso *St. 69 :* l, *major chela, lateral view. Third specimen from* Calypso *St. 69 :* m, *major chela, lateral view.*

beyond distal end of antennular peduncle (fig. 20 *a*, 21 *a, e*, 22 *a, c, e*). Small basal thickening on mesial margin of antennal scale usually present in females (fig. 21 *a*), absent in males (fig. 20 *a*); among larger females, two specimens with rather reduced blade (fig. 22 *e*), third specimen with more developed blade (fig. 22 *f*). Major chela with tooth on distal margin of palm sharp (fig. 21 *e*), rounded (fig. 20 *d*) or, exceptionally, reduced in size (fig. 22 *j*); movable finger short, moving in vertical plane of chela (fig. 20 *d*, 22 *j*) or variably elongate, moving in more or less oblique plane (fig. 22 *k-m*). Minor chela with movable finger bidentate, but fixed finger simple (fig. 22 *g*), assymmetrically bidentate (fig. 20 *e*) or symmetrically bidentate (fig. 22 *d*). Abdominal pleurae rounded in females with large eggs (fig. 22 *b*), acuminate in remaining specimens, first pleura having ventral hook (fig. 20 *c*, 21 *c*). Lateral margins of telson straight (fig. 20 *b*) or variably concave in distal half (fig. 21 *b, d*, 22 *i*). Outer branch of uropod with one or two fixed teeth on free lateral margin, in one specimen close to movable spine (fig. 22 *h*),

in remaining distinctly removed from this spine (fig. 20 *b*, 21 *b, d*, 22 *b*); fixed sutural tooth and transversal suture variably developed.

S. brevifrons Chace (1972 : 89, fig. 31, 32) differs very slightly from *S. brooksi* : Rostrum and ocular spines shorter; basal antennal spine shorter, only slightly overreaching middle of antennal scale; palm of major chela terminating dorso-distally in little developed and broadly rounded tubercle; posterior margin of telson distinctly convex; both pairs of dorsal spines of telson occurring along lateral margins; inner branch of uropod more developed.

The West African species *S. parfaiti* Coutière (*see* Coutière, 1909 : 64, fig. 37; Holthuis, 1951 : 88, fig. 18) is also not easy to distinguish from *S. brooksi* s. l. : Stylocerite just short of, or longer than, basal antennular segment; rudimentary antennal blade usually present in both sexes, although variable in size; pterigostomial angle of carapace sharply pointed; both fingers of minor chela simple, not bidentate; major cheliped with spine occasionally present at distal end of upper margin of merus.

Habitat. — From 0-2.1 to 82.3 m deep. Mud; sand; broken shells; shells and marl; in sponges, including *Ircinia acuta* and *Spheciospongia vesparia; Thalassia* grass flats; among mangrove roots; in eroded corals; in coral rock; calcareous algae, corals and rocks. Measured water temperatures, 22 to 24 °C; salinities, 32 to 35 ‰.

Geographical distribution. — Southeast Florida to Dry Tortugas; southwest Florida and Texas, Gulf of Mexico; Bimini and Eleuthera Islands, Bahamas; Yucatan Peninsula; Puerto Rico to Tobago; Surinam; Amapá and Rio Grande do Norte to the south of Bahia. East Pacific from the Gulf of California.

Synalpheus fritzmuelleri Coutière, 1909

Synalpheus fritzmülleri Coutière, 1909 : 35, fig. 18 (Syntypes : 10 spec., USNM 6970; Type locality : Marco, Florida; Other localities : Cape Florida; Key West; west coast of Florida, 51.2 m; Saint Thomas; Mayaguez, Puerto Rico; Baja California). — Zimmer, 1916 : 382 (Saint John; Kingston, Jamaica; Saint Thomas; Tortugas, some in corals and sponges, others at 21.9 m). — Schmitt, 1924 *a* : 66 (Curaçao); 1930 : 343 (Tortugas, Florida); 1935 : 148; 1936 : 369 (Aruba, between corals; Bonaire, coral rock at water's edge, under stones and in colonies of *Zoanthus socialus;* Lac, Bonaire, sandy debris); 1939 : 28 (Old Providence Island). — ? Stephensen, 1950 : 98, fig. 33 (Neqe, Greeland, 54 m). — Knowlton, 1970 : 383 (off Cape Hatteras, North Carolina, 31.1 m, in *Ircinia campana*).

Synalpheus fritzmülleri elongatus Coutière, 1909 : 37, fig. 19 (Holotype : USNM 38394; Type locality : Entrance to Bull Creek, South Carolina; Other localities : Eastern Dry Rock, Saint Martins Reef and Key West, Florida; Jamaica; Venezuela; Bahia; Desterro, Santa Catarina). — Schmitt, 1924 *c* : 79 (Barbados).

Synalpheus fritzmuelleri, Verrill, 1922 : 97 (Bermudas). — Williams, 1965 : 69, fig. 56 (Off Beaufort, North Carolina; Port Aransas, Texas; Tres Marias Archipelago, Mexico). — Chace, 1966 : 629 (Saint Helena Island, 0-75 m); 1972 : 92 (Tortola; Guana Island; Virgin Gorda; Anguilla; Barbuda; Antigua Island; Guadeloupe; Dominica; Sainta Lucia Island; Mustique; Tobago Cays; Carriacou Island; Tobago; Isla de Cozumel; Bahía de la Ascensión; Bahía del Espiritu Santo; sponges, eroded dead coral, weed-covered rocks, ships and timbers, and commonly among roots of mangroves and on grass flats studded with living and dead *Porites* and *Pocillopora*). — Goldberg, 1971 : 318 (Florida Keys, under bases of gorgonians). — Wood, 1974 : 36, pl. 2, fig. 6. — Ray, 1974 : 127, fig. 105-110 (Isla de Lobos reef, Veracruz, 7.6-9.8 m). — Camp, Whiting and Martin, 1977 : 26 (Hutchinson Island, Florida, in *Phragmatopoma*). — Gore, Scotto and Becker, 1978 : 225 (Indian River region, Florida, intertidal zone, in *Phragmatopoma*).

Synalpheus fritzmuelleri var. *caribaea* Verrill, 1922 : 98, text fig. 8, pl. 39, fig. 3 *a-c* (Type locality : Dominica).

Synalpheus fritzmuelleri var. *carolinensis* Verrill, 1922 : 99, pl. 22, fig. 6, pl. 39, fig. 1-1 *d* (Syntypes : YPM 1831; Type locality : Fort Macon, Beaufort, North Carolina).

Synalpheus fritzmulleri, Pearse and Williams, 1951 : 143 (reefs off the Carolinas). — Wass, 1953 : 3 (Alligator Harbor area, Florida); 1955 : 143 (Alligator Harbor, in *Callyspongia vaginalis*). — Menzel, 1956 : 42 (Apalache Bay region, Florida).

Synalpheus fritzmulleri elongatus, Pearse and Williams, 1951 : 143 (reefs off the Carolinas). — Coelho and Ramos, 1972 : 150. — Ray, 1974 : 131, fig. 111-113 (Isla de Lobos reef, Veracruz, 7.6 m).

Synalpheus fritzmülleri fritzmülleri, Chace, 1956 : 147 (SW of Gran Roque, in *Callyspongia*, 5.5 m, 26.1 °C; Los Roques, 5.5 m, rocks).

Material. — USA, North Carolina : Off Cape Hatteras, 31.1 m, in *Ircinia campana* (Lamark), 1 ♀ (IMS 1927), **E.B.** coll. 12.3.64; Carteret County, Bogue Banks, about 4.8 km west of Atlantic Beach, from debris washed ashore by hurricane, 5 spec. (4 ovig. ♀) (IMS 974), **A.B.W.** and **G.W.B.** coll. 13.9.60; Cape Lookout jetty, 34°36'55" N, 76°33'37" W, 5 to 7 m, coral, 5 samples (DML 381 to 1058), **L.M.** coll. 29.3.63 to 24.5.66; 34°35.3' N, 76°13.0' W, 52 m, 1 spec. (DML 263), Eastward St. 3648, **I.E.G.** coll. 13.1.66. — South Carolina : Entrance to Bull Creek, 1 spec., Holotype of *Synalpheus fritzmuelleri elongatus* Coutière (USNM 38394), *Fish Hawk*, January 1891. — Florida : Marco, 1.8-16.5 m, among sponges, 9 spec. (USNM 41744), **H.H.** coll. — Brazil : Baia do Cotovelo, 1 spec. (USNM 25811), Branner-Agassiz Expedition, **A.W.G.** coll. — Pernambuco : Rio Formoso, 1 spec. (USNM 41697), Hartt Exploration, **R.Ra.** coll. 1875-77. — Alagoas : Maceió, coral reef, 2 spec. (part of

USNM 25810), Branner-Agassiz Expedition, **A.W.G.** coll. 3-4.8.1899; *ibid.*, outer side of pier, 5 m, rocks and calcareous algae, 6 spec. (2 ovig. ♀), *Calypso* St. 34, 22.11.61. — BAHIA : Continental Platform, 1 spec. (USNM 41701), Hartt Explorations, **R.Ra.** coll. 1875-77; Salvador, Praia de Ondina, among bases of *Halimeda opuntia*, 2 spec., **Y.M.R.L.** coll. September 1975; *ibid.*, 12 spec., **Y.M.R.L.** coll. 15.2.76; Ilha de Itaparica, Praia de Manguinhos, among bases of *H. opuntia*, 8 spec., **Y.M.R.L.** coll. February 1975; *ibid.*, 13 spec., **Y.M.R.L.** coll. September 1975; Abrolhos, between Ilha de Santa Bárbara and Siriba, 2-5 m, sand and calcareous algae, 3 spec., *Calypso* St. 85, 28.11.61. — ESPÍRITO SANTO : Manguinhos, Praia de Manguinhos, intertidal zone, between stones, 1 spec., **M.L.C.** coll. 12.3.79; Guarapari, 3 spec. (MNRJ 64-63), **J. Bec.** coll. 14.4.60; *ibid.*, Praia de Peracanga, 0-2 m, coral heads, 22 spec. (8 ovig. ♀), **M.L.C.** coll. 10.1.78; *ibid.*, 0-2 m, coral heads, several spec., **M.L.C.** coll. 11.1.78; *ibid.*, Praia de Meaípe, intertidal zone, between stones, several spec., **M.L.C.** coll. 9.1.78; Anchieta, Praia do Ubu, intertidal zone, between stones, 7 spec. (2 ovig. ♀), **M.L.C.** coll. 8.1.78; *ibid.*, Praia do Parati, intertidal zone, in cavity of eroded rock, 1 ovig. ♀, **M.L.C.** coll. 9.1.78; *ibid.*, Iriri, Praia dos Namorados, intertidal zone, between stones, several spec., **M.L.C.** coll. 11.1.78; Marataizes, Praia de Marataizes, intertidal zone, between stones and sponges, 11 spec. (5 ovig. ♀), **M.L.C.** coll. 6.1.78; *ibid.*, intertidal zone, in *Phragmatopoma*, 25 spec., **M.L.C.** coll. 13.3.79. — RIO DE JANEIRO : 22°22' S, 41°07' W, 42 m, calcareous rock, 19.48 °C, 1 spec. (IOUSP-CO279), *Besnard* St. 1252, 30.11.70; Ilha de Cabo Frio, in coral blocks (MNRJ), **A.L.C.** and **A.C.** coll. 16.12.65; *ibid.*, Praia do Farol, 0-2 m, in *Pocillopora*, 4 spec., in *Schizoporella*, 3 spec., **M.L.C.** coll. 14.1.77; *ibid.*, 0-2 m, in *Schizoporella*, **M.L.C.** coll. 15.1.77; Cabo Frio, Praia das Conchas, intertidal zone, between stones and sponges, several spec., **A.I.K.** and **M.L.C.** coll. 24.1.78; Cabo Frio, Arraial do Cabo, Praia dos Anjos, intertidal zone, between stones, several spec., **M.L.C.** coll. 23.1.78; Maricá, Praia de Jaconé, intertidal zone, in *Phragmatopoma*, 12 spec. (2 ovig. ♀), **M.L.C.** coll. 25.1.78; Niterói, Praia de Itaipu, 1 ovig. ♀ (MNRJ 22-959), **A.C., J.Bec., A.R.** and **H.S.** coll. 6.6.59; *ibid.*, Saco de São Francisco, 1 ovig. ♀ (MNRJ), **A.L.C.** coll. 27.3.59; Mangaratiba, island in front of Praia do Sai, intertidal zone, between stones, 2 spec. (1 ovig. ♀), **M.L.C.** coll. 7.2.78; *ibid.*, intertidal zone, between stones, 9 spec. (5 ovig. ♀), **M.L.C.** coll. 8.2.78; Angra dos Reis, Praia de Garatucaia, intertidal zone, between stones, 11 spec. (6 ovig. ♀), **M.L.C.** coll. 9.2.78. — SÃO PAULO : Ubatuba, Praia de Picinguaba, intertidal zone, between stones, 3 spec., **M.L.C.** coll. 7.1.77; *ibid.*, Praia Vermelha do Norte, intertidal zone, under crusts of calcareous algae covering slab of stone, 1 spec., **M.L.C.** coll. 3.1.77; *ibid.*, Praia da Enseada, 2-5 m, in coral heads, 6 spec., **M.L.C.** coll. 2.1.77; *ibid.*, Praia do Lamberto, 1-2 m, in *Schizoporella*, 2 spec., **M.L.C.** coll. 10.10.76; *ibid.*, Praia do Lázaro, intertidal zone, between stones, 2 spec., **M.L.C.** coll. 12.7.76; *ibid.*, Praia da Fortaleza, 1 m, in green sponge, 2 spec., and in coral head, 1 spec., **M.L.C.** coll. 26.6.76; Ilha de São Sebastião, Praia da Siriúba, intertidal zone, between stones, 1 spec., **N.J.H.** coll. 8.9.76; *ibid.*, intertidal zone, between stones, 10 spec., **M.L.C.** coll. 19.1.77; *ibid.*, Praia do Pequeá, on buoy at Yatch Club, among *Herdmannia momos* and *Ascidia nigra*, 1 spec., **S.A.R.** coll. 10.4.77; *ibid.*, Barra Velha, intertidal zone, between stones, several spec., and about 1 km south of Praia do Veloso, 4 m, in coral head, 1 spec., **M.L.C.** coll. 20-21.1.77; Canal de São Sebastião, in *Zygomycale parishii*, 1 ♂, 4 ovig. ♀, **S.A.R.** coll. 24.10.77; São Sebastião, 4 spec., (MNRJ 59-63), **M.T.L.** coll. 22.8.60; *ibid.*, Praia do Araçá, in *Zygomycale parishii*, 1 spec., **L.F.D.** coll. 20.3.76; *ibid.*, 7 spec., **L.F.D.** coll. 16.5.76; *ibid.*, in yellow sponges, 7 spec., **M.M.D.S.** coll. 11.11.77; *ibid.*, Praia Grande, intertidal zone, between stones, 2 spec., **M.L.C.** coll. 21.2.77; *ibid.*, Praia do Segredo, in sponges, 3 spec. (1 ovig. ♀), **M.M.D.S.** coll. 6.8.77; *ibid.*, 5 m, in dead coral, 2 spec., **A.S.F.D.** coll. 29.7.77; *ibid.*, Praia de Baraqueçaba, intertidal zone, between stones, 5 spec., **M.L.C.** coll. 20.2.77; *ibid.*, Praia do Toque-Toque Grande, intertidal zone, between stones, 6 spec., **M.L.C.** coll. 19.2.77; *ibid.*, Praia do Toque-Toque Pequeno, 3-4 m, in coral heads, 2 spec., **M.L.C.** coll. 2.4.76; *ibid.*, intertidal zone, between stones, 4 spec. (2 ovig. ♀), **M.L.C.** coll. 31.12.78; *ibid.*, Praia de Boissucanga, intertidal zone, between stones, 8 spec., **M.L.C.** coll. 17.2.77; Santos, Praia de Boracéia, intertidal zone, in *Tedania ignis*, 1 spec., between stones, 1 spec., **M.L.C.** coll. 15.2.77; Ilha de Santo Amaro, Praia de Pernambuco, intertidal zone, between stones, 7 spec., **M.L.C.** coll. 25.8.76; Itanhaém, Praia do Cibratel, intertidal zone, between stones, 7 spec., **M.L.C.** coll. 31.7.77. — PARANÁ : Caiobá, Ilha de Caiobá, close to Praia Mansa, intertidal zone, between stones, 8 spec. (2 ovig. ♀), **M.L.C.** coll. 24.2.78; Guaratuba, Ponta da Caieira, intertidal zone, between stones, 4 spec. (2 ovig. ♀), **M.L.C.** coll. 23.2.78. — SOUTH ATLANTIC : Saint Helena Island, off Ruperts Bay, 0-75 m, from buoy cable, 5 samples (7 ♂,

25 ovig. ♀) (USNM 11500 to 11510), A.L. coll. from 17.1.58 to 11.2.63; *ibid.*, 1 ♂, 14 ♀ (11 ovig.) (USNM 11520), skin diver coll. April 1964.

SIZE. — Largest ovigerous female, 7.5+13 mm; major chela, 9:3:2.5 mm; minor chela, 3.5:1.2 mm. Largest specimen without eggs, 7.5+12 mm; major chela, 10:3.5:2.5 mm; minor chela, 4:1.5 mm. Smallest ovigerous female, 4.5+8 mm; major chela, 6:2:1.5 mm; minor chela missing.

COLOR. — This agrees with SCHMITH's (1930, *apud* WILLIAMS, 1965 : 70) account for the typical species. Some specimens have traces of blue pigment on the pereiopods. Eggs dark-red, sometimes purple or brown.

REMARKS. — In the new South American material, the posterolateral angles of the telson are produced into a sharp tooth, instead of being obtusely angled (COUTIÈRE, 1909 : 36). The remaining characters agree with those of previous accounts.

Obviously BOONE's (1930 *b* : 176, pl. 64) specimen is not *S. fritzmuelleri* Coutière, judging from the shape of the rostrum, dactyls of the last three pereiopods and dorsodistal spine on palm of major chela.

Very closely related species are sympatric *S. hemphilli* Coutière (*see* remarks for this species), East Pacific *S. nobili* Coutière (1909 : 40, fig. 22) and *S. sanlucasi* Coutière (1909 : 41, fig. 23), and Indic *S. heroni* Coutière (1909 : 42, fig. 24).

HABITAT. — Intertidal zone to 51.2-75 m deep. In sponges, including *Ircinia campana, Callyspongia vaginalis, Zygomycale parishii* and *Tedania ignis;* on buoy, among ascidians *Herdmannia momos* and *Ascidia nigra ;* in colonies of *Zoanthus sociatus ;* under bases of gorgonians; among roots of mangroves; on grass flats studded with the living and dead corals *Porites* and *Pocillopora;* from algae; from ships and timbers; sand and calcareous algae; among the bases of the green calcareous algae *Halimeda opuntia;* under crusts of red calcareous algae covering intertidal stone slab; in branching colonies of the bryozoan *Schizoporella;* in *Phragmatopoma* worm reefs ; in corals, including *Pocillopora ;* between stones; in cavity of eroded rock; calcareous rock. Measured water temperatures, 19.48 and 26.1 °C.

GEOGRAPHICAL DISTRIBUTION. — Northwest Greenland (doubtful record). Bermudas; Carolinas; east Florida to Dry Tortugas; west coast of Florida, Texas and Veracruz, Gulf of Mexico; Quintana Roo, Yucatan Peninsula; Old Providence Island; Jamaica; Puerto Rico to Tobago and westward to Aruba; Venezuela; Pernambuco to Santa Catarina. Saint Helena Island. East Pacific from Tres Marias Archipelago.

Synalpheus hemphilli Coutière, 1909

Synalpheus neptunus, p.p. RATHBUN, 1902 (not *Alpheus neptunus* Dana, 1852) : 110 (Bermuda).

Synalpheus Hemphilli oxyceros Coutière, 1908 : 711.

Synalpheus hemphilli Coutière, 1909 : 38, fig. 20 (Syntypes : 2 spec., USNM 9817; Type locality : 27°04′ N, 83°21′ W, west coast of Florida, 48 m). — VERRILL, 1922 : 94, pl. 33, fig. 3-3 *a*, pl. 39, fig. 2 *a-b*, pl. 40, fig. 1-1 *e* (Fort Macon, North Carolina; Castle Harbor, Bermuda, dead corals). — SCHMITT, 1924 *a* (Curaçao, in sponge). — HAZLETT, 1962 : 82 (Bermuda, in *Haliclona variabilis*). — HAZLETT and WINN, 1962 : 26. — — ROUSE, 1970 : 138 (Everglades, Florida, 1.5-2.1 m, shells and hard sediment, 24 °C, 33-35 ‰). — KNOWLTON, 1970 : 382 (Bermuda, in *Callyspongia vaginalis*). — CHACE, 1972 : 93 (Dominica, 11-27 m).

Synalpheus hemphilli longicornis Coutière, 1909 : 39, fig. 21 (Holotype : USNM 38395; Type locality : West coast of Florida, 38.4-51.2 m; Other localities : Bermudas).

Synalpheus hemphilli hemphilli, CHACE, 1956 : 147 (SW of Gran Roque, 3.7 m and in *Callyspongia*, 5.5 m, 26.1 °C; Los Roques, 3.7 m, rocks).

MATERIAL. — BERMUDAS : Hamilton Parish, Harrington Sound, in *Callyspongia vaginalis* (IMS 2250), R.E.K. coll. 27.6.62. — BRAZIL, BAHIA : Abrolhos, south coast of Ilha de Santa Bárbara, 0-8 m, in a sponge, 2 spec., *Calypso* St. 84, 28.11.61.

SIZE. — Largest specimen, 5+10 mm; major chela, 7:3:2 mm; minor chela, 2.5:1 mm.

COLOR. — VERRILL (1922 : 96) indicates « ... olive green or brown eggs. After two months' preservation in formol and alcohol... specimens... nearly uniform bright light red, but with darker specks, larger on the chelae ».

REMARKS. — *S. hemphilli* Coutière can be distinguished from the sympatric species *S. fritzmuelleri* Coutière, treated above, by the rostrum almost twice as long as the ocular spines and by the shape of the dactyl of third pereiopod, which is shorter, has the ventral hook slightly sinuous and inserted almost

perpendicularly to axis of dactyl, and has the proximal proeminence more developed and forming a sharp point.

HABITAT. — From 1.5-2.1 to 48-51 m deep. In sponges, including *Haliclona variabilis* and *Callyspongia vaginalis;* dead corals; rocks. Measured water temperatures, 24 and 26.1 °C; salinities, 33-35 ‰.

GEOGRAPHICAL DISTRIBUTION. — Bermudas; North Carolina; Florida Gulf Coast; Dominica; Los Roques Islands; Curaçao; south of Bahia.

Synalpheus longicarpus
(Herrick, 1891)
(fig. 23-27)

Alpheus saulcyi var. *longicarpus* p.p. Herrick, 1891 : 383 (Type locality : Bahamas [probably Nassau, New Providence]).

Synalpheus laevimanus var. *longicarpus,* p.p. COUTIÈRE, 1900 : 357 (Florida).

Synalpheus longicarpus, COUTIÈRE, 1909 : 53, fig. 31 (North Carolina, 27 m; Gulf of Mexico, 44-51 m; Yucatan, 38-46 m; Jamaica, 18-22 m, in large black sponges; Curaçao). — ZIMMER, 1916 : 384, fig. B (Saint Thomas; Barbados). — HAY and SHORE, 1918 : 383, text fig. 6, pl. 26, fig. 2 (North Carolina). — p.p. VERRILL, 1922 : 113, pl. 25, fig. 1 *a-h* (West Indies). — SCHMITT, 1924 *b* : 80 (Barbados); 1936 : 369 (Bonaire, in colonies of *Zoanthus sociatus*). — ARNDT, 1933 : 249. — PEARSE, 1950 : 150 (Bimini, in *Spheciospongia vesparia*). — PEARSE and WILLIAMS, 1951 : 143 (South Carolina, 12-17 m). — WASS, 1953 : 3; 1955 : 144 (Alligator Harbor area, Florida, in sponges). — MENZEL, 1956 : 42 (Apalache Bay region, Florida). — WILLIAMS, 1965 : 73, fig. 59. — CERAME-VIVAS and GRAY, 1966 : 263 (North Carolina). — CHACE, 1972 : 93 (Virgin Gorda; Saint Lucia Island; Mustique; Tobago Cays; Bahia de la Ascensión; down to 2 m, from loggerhead sponges or in and under coral rock). — RAY, 1974 : 140, fig. 122-132 (North Carolina, 13 m; West Flower Garden reef, Texas ?, 25 m).

Synalpheus longicarpus approxima Coutière, 1909 : 56, fig. 32 (Syntypes : 4 spec., USNM 38398; Type locality : West coast of Florida, 48 m).

Synalpheus grampusi Coutière, 1909 : 62, fig. 36 (Syntypes : 1 ♂, 2 ♀, USNM 38399; Type locality : 26°33' N, 83°10' W, Gulf of Mexico, 51 m; Other localities : Between 25°50'15" N, 82°41'45" W and 27°04'00" N, 83°21'15" W, 38.4 to 60.3 m) *(syn. n.).*

Synalpheus pandionis Coutière, 1909 : 67, fig. 39 (Syntypes : 2 ♂, 4 ♀, USNM 38401; Type locality : Off Saint Thomas, 36-42 m). — ZIMMER, 1916 : 385, fig. C-E Saint Thomas; Saint John; Tortugas). — SCHMITT, 1924 *a* : 68 (Curaçao); 1924 *b* : 81 (Barbados); 1935 : 149 (Puerto Rico). — CHACE, 1972 : 102 (Tortola; Guana Island; Virgin Gorda; down to 2 m, probably on turtle-grass flats studded with clumps of *Porites*). — RAY, 1974 : 157, fig. 142-149 (West Flower Garden reef, Texas, 22.8 m, in coral head; Isla de Lobos reef, Veracruz, 7.6-15.2 m) *(syn. n.).*

Synalpheus pandionis extentus Coutière, 1909 : 69, fig. 40 (Holotype : 1 ♀, USNM 38401; Type locality : Off Saint Thomas, 36-42 m). — CHACE, 1956 : 149 (Los Roques, 38.4 m, sand) *(syn. n.).*

Synalpheus longicarpus var. ?, CHACE, 1956 : 148 (Los Roques).

Synalpheus pandionis pandionis, CHACE, 1956 : 149 (Los Roques, 38.4 m, sand).

MATERIAL. — USA, NORTH CAROLINA : 34°11.5' N, 76°06.3' W, 1 spec. (IMS 2416), *Eastward,* **Je.** coll. 18.3.69 ; off Cape Lookout, 34°06' N, 76°08' W, 164.5 m, 2 ♀ (1 ovig.) (IMS 1881), **M.J.C.-V.** coll. 17.6.63; rocks off Cape Lookout, 2.7 m, 1 spec. (with bopyrid isopod in branchial chamber) (IMS 1890), **H.S.B.** coll. 17.6.63. — SOUTH CAROLINA : 33°40.5' N, 76°59.5' W to 33°40.5' N, 77°04.5' W, 36.6-38.4 m, in sponge, several spec. (IMS 928), *Silver Bay* St. 1506, **E.E.D.** coll. December 1959. — VENEZUELA : Los Roques Archipelago, 3 spec. (1 ovig. ♀) (USNM 95705), **F.H.W.** coll. September 1950. — BRAZIL, PARAÍBA : 7°29' S, 34°29' W, 42 m, algae, 1 ♀ (with abdominal parasite), *Calypso* St. 2, 16.11.61; 7°29' S, 34°30' W, 45 m, rocks, shells, broken shells, calcareous algae and other algae, 1 spec., *Calypso* St. 1. 16.11.61. — PERNAMBUCO : 8°15' S, 34°42' W, 33 m, calcareous algae and corals, 1 spec., *Calypso* St. 22, 21.11.61; 8°22' S, 34°44' W, 38-52 m, sand and mud, 6 spec., *Calypso* St. 25, 21.11.61. — SERGIPE : 10°54' S, 36°45' W, 34 m, muddy sand, shells and broken shells, 1 spec., *Calypso* St. 40, 23.11.61. — BAHIA : Salvador, Itapagipe, 2 spec. (MNRJ), **H.S.L.** coll. November 1951; *ibid.,* Monte Serrat, 2 spec., 9.7.72; 12°56.0' S, 38°33.2' W, 27 m, mud and stones, 1 ovig. ♀, *Calypso* St. 63, 26.11.61; 12°36.4' S, 38°34.3' W, 44-60 m, sand, stones, shells and broken shells, 3 spec. (2 ovig. ♀), *Calypso* St. 58, 24.11.61; 18°06' S, 38°42' W, 37 m, rocks and calcareous algae, 1 spec., *Calypso* St. 81, 28.11.61; 18°18' S, 38°53' W, 38 m, mud, 1 spec., *Calypso* St. 89, 29.11.61. — ESPÍRITO SANTO : 18°51' S, 39°08' W, 49 m, mud, 2 spec. (1 ovig. ♀), *Calypso* St. 90, 29.11.61. — RIO DE JANEIRO : Ilha Grande, Baia do Sítio Forte, 10-15 m, rocks, 1 ovig. ♀, *Calypso* St. 118, 9.12.61.

SIZE. — Largest male, 7.5+11 mm; major chela, 8.5:3.5 mm; minor chela, 3 mm. Largest ovigerous female, 7.5+11 mm; major chela, 8:3 mm; minor chela, 2 mm. Smallest ovigerous female, 3.5:5 mm; chelae missing.

COLOR. — « A translucent milky white; the tip of the large chela brown » (HAY and SHORE, 1918 : 383).

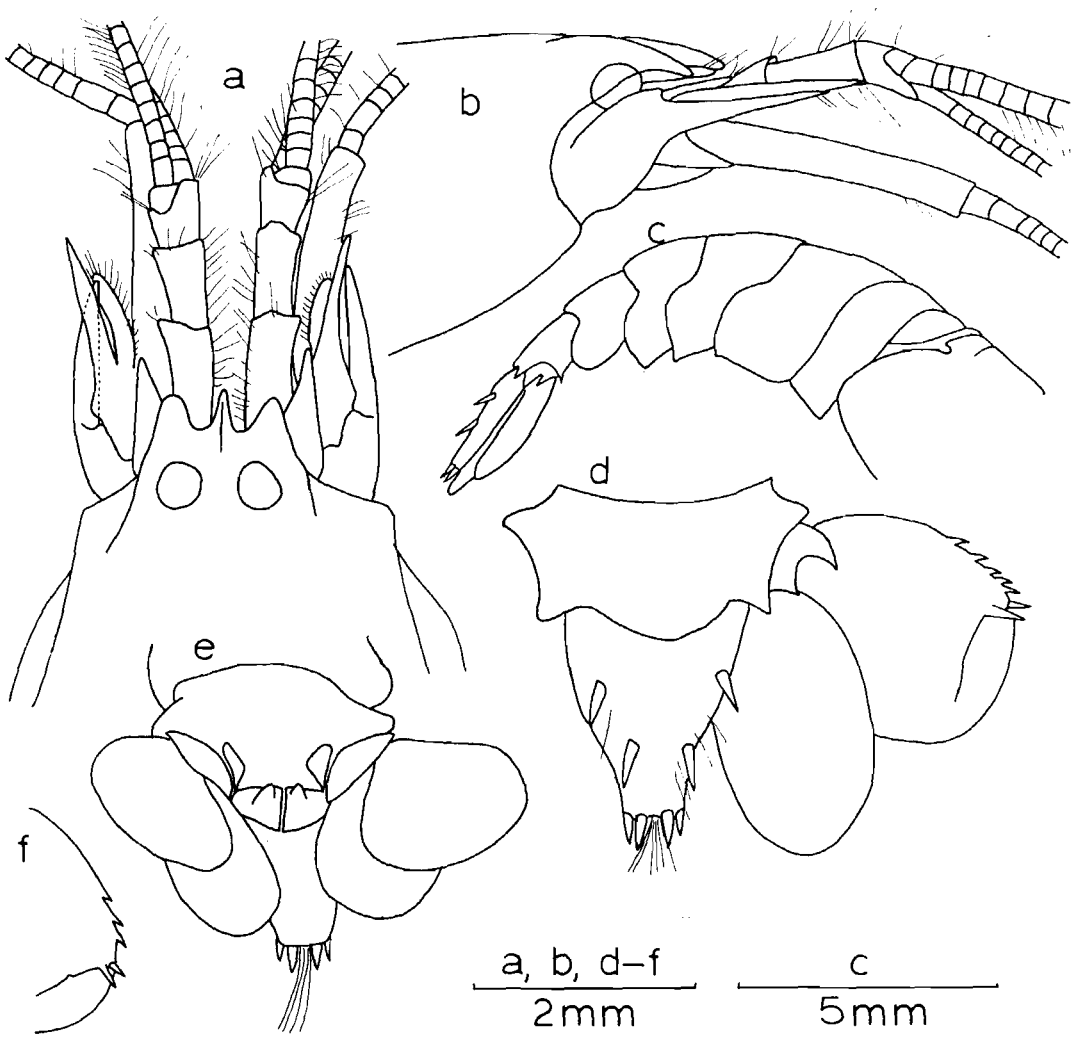

FIG. 23. — Synalpheus longicarpus *(Herrick), larger specimen from Monte Serrat, Bahia :* a, *anterior region, dorsal view;* b, *same, lateral view;* c, *posterior region, lateral view;* d, *telson and uropods, dorsal view. Smaller specimen from Monte Serrat :* e, *sixth abdominal segment, telson and uropods, ventral view;* f, *posterolateral margin of lateral uropodal branch, dorsal view.*

REMARKS. — COUTIÈRE (1909 : 3) divided *Alpheus saulcyi* var. *longicarpus* Herrick (1891 : 383, pl. 21, fig. 5-7, pl. 22, fig. 3, 11, 17, pl. 24, fig. 2, 4-9) into four distinct species : *S. longicarpus* (Herrick) s.s., *S. pectiniger* Coutière, *S. brooksi* Coutière and *S. herricki* Coutière (I have shown above that the last two species are synonyms).

The 5,000 to 6,000 specimens of *Synalpheus laevimanus* var. *longicarpus* (Herrick), from a single dredging in Florida (COUTIÈRE, 1900 : 357), belong in part to *S. pectiniger* and in part to *S. longicarpus* (COUTIÈRE, 1909 : 17); the remaining references of *S. laevimanus* var. *longicarpus* (COUTIÈRE, 1898 *b*, 1899, 1907; VERRILL, 1900; RATHBUN, 1902) must be considered doubtful as they may belong to other species recognized only in 1909. At least part of VERRILL's figures (1922, pl. 34, fig. 3, 3 *c*, pl. 36, fig. 5, 5 *a*), based on HERRICK (1891, pl. 24, fig. 7, 8, pl. 36, fig. 4, 5), belong to *S. pectiniger*. BOONE's description and illustration of *S. longicarpus* (1930 *b* : 178, pl. 65) do not agree with the original description.

The lengths of the basal antennal spine, antennal scale and antennal blade in relation to the segments

of the antennular peduncle were among the characters utilized by COUTIÈRE (1909) to distinguish *S. longicarpus approxima* from the typical form and to set apart *S. grampusi*, *S. pandionis* and *S. pandionis extentus*. Variations in the relative lengths of these structures were later indicated for *S. longicarpus* s.s. (ZIMMER, 1916 : 385; RAY, 1974 : 140) and *S. pandionis* (ZIMMER, 1916 : 385; SCHMITT, 1935 : 149; CHACE, 1972 : 103); these variations led the last mentioned author to include *S. grampusi* in the synonymy of *S. pandionis*.

The morphology of one of the new samples is illustrated in fig. 23-25, 26 *a*, *b*. In Table III and fig. 26 *c-k*, 27, I try to demonstrate that the main differences that have still been used to distinguish *S. longicarpus* s.s. from *S. pandionis* (respectively : Basal antennal spine distinctly shorter *versus* almost same length or longer than antennal scale; distal tubercle on palm of major chela with terminal sharp tooth directed horizontally *versus* distoventral sharp tooth directed obliquely downwards) are not constantly correlated in the material examined. It is also shown that characters initially used by COUTIÈRE (1909) to distinguish *S. longicarpus*, *S. longicarpus approxima*, *S. grampusi*, *S. pandionis* and *S. pandionis extentus*, occur in diverse combinations, so that the recognition of these forms as distinct species or subspecies is not justified.

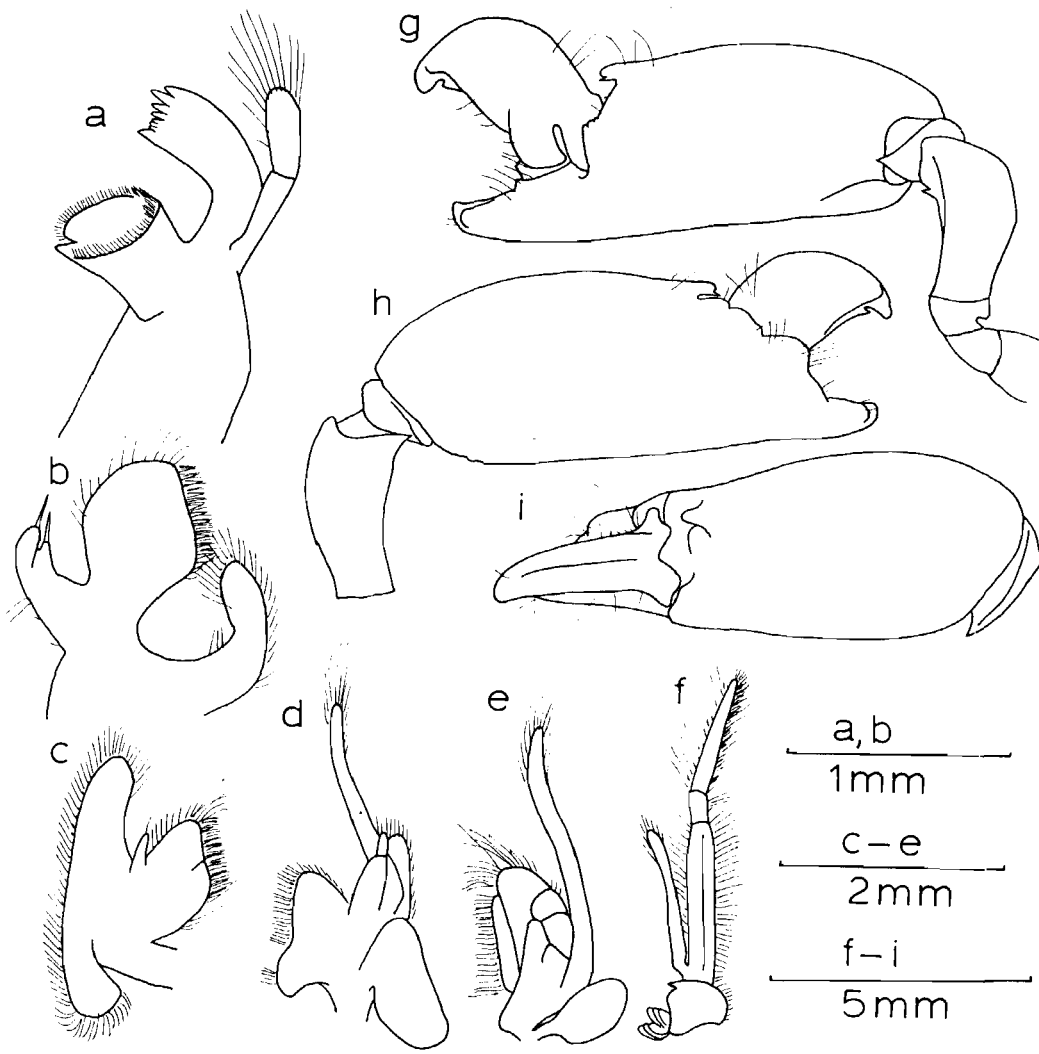

FIG. 24. — Synalpheus longicarpus *(Herrick), larger specimen from Monte Serrat, Bahia :* a, *mandible;* b, *first maxilla;* c, *second maxilla;* d, *first maxilliped;* e, *second maxilliped;* f, *third maxilliped;* g, *major cheliped, lateral surface;* h, *same, mesial surface;* i, *major chela and carpus, dorsal surface.*

TABLE III. — *Distribution of morphological characters in some specimens of* S. longicarpus *(Herrick) collected by the* Calypso.

	Calypso *St. 22*	Calypso *St. 25 spec. A*	Calypso *St. 25 spec. B*	Calypso *St. 58 spec. A*	Calypso *St. 58 spec. B*	Calypso *St. 63 (ovig. ♀)*	Calypso *St. 81*	Calypso *St. 90*
minor chela	fig. 26 *c*	fig. 26 *f*	fig. 26 *i*	fig. 27 *a*	fig. 27 *d*	fig. 27 *g*	fig. 27 *j*	fig. 27 *m*
major chela	fig. 26 *d*	fig. 26 *g*	fig. 26 *j*	fig. 27 *b*	fig. 27 *e*	fig. 27 *h*	fig. 27 *k*	fig. 27 *n*
anterior region	fig. 26 *e*	fig. 26 *h*	fig. 26 *k*	fig. 27 c	fig. 27 *f*	fig. 27 *i*	fig. 27 *l*	fig. 27 *o*
shape of 1rst and 3rd to 5th abdominal pleurae	with hook; acuminate	with hook; acuminate	with hook; acuminate	with hook; acuminate	with hook; acuminate	without hook; rounded	with hook; acuminate	with hook; acuminate
number of fixed teeth on free margin of each outer uropodal branch	4-4	3-4	4-4	7-8	4-4	5-6	4-4	4-5

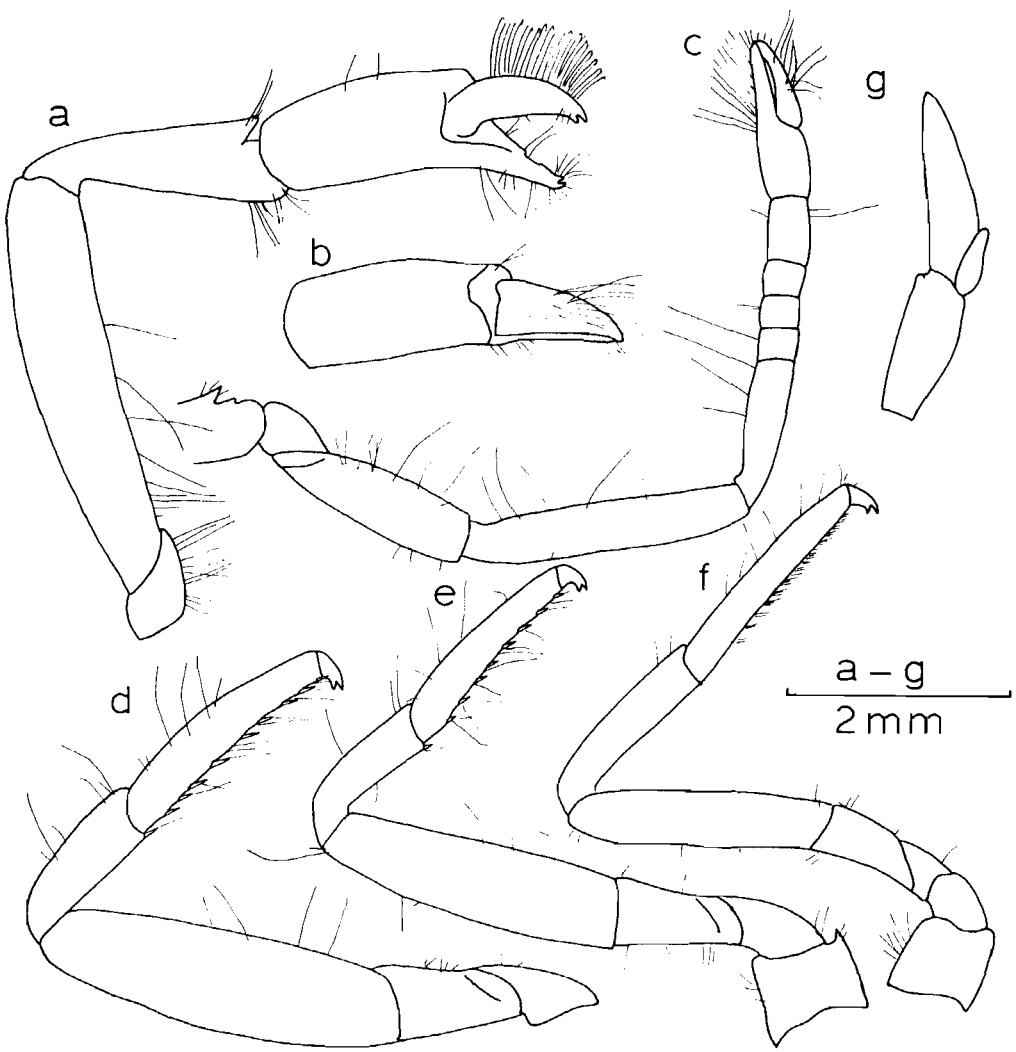

FIG. 25. — Synalpheus longicarpus *(Herrick), larger specimen from Monte Serrat, Bahia :* a, *minor cheliped, lateral surface;* b, *minor chela, dorsal surface;* c, *second pereiopod;* d, *third pereiopod;* e, *fourth pereiopod;* f, *fifth pereiopod;* g, *first pleopod.*

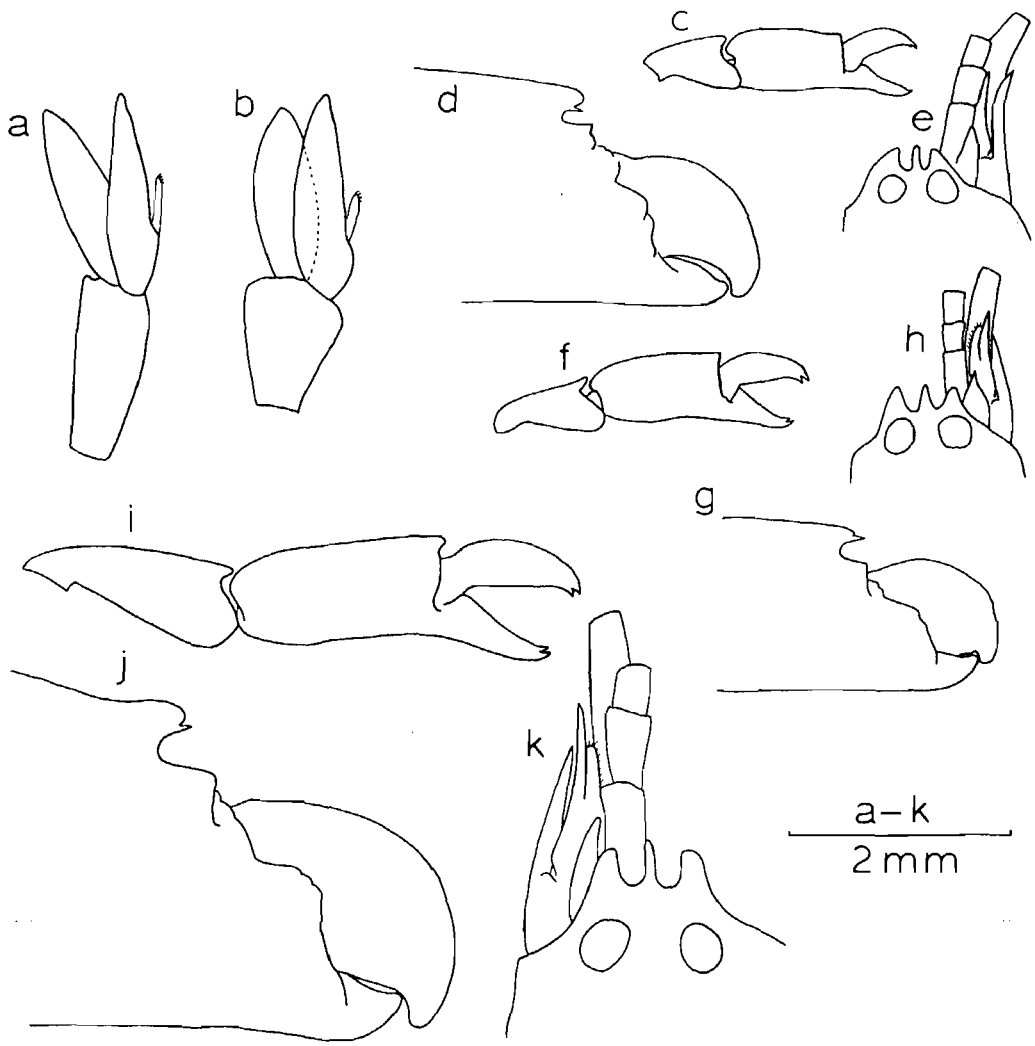

FIG. 26. — Synalpheus longicarpus *(Herrick), larger specimen from Monte Serrat, Bahia :* a, *second pleopod;* b, *fifth pleopod. Specimen from* Calypso *St. 22 :* c, *minor chela and carpus, lateral surface;* d, *distal portion of major chela, mesial surface;* e, *anterior region, dorsal view. Specimen from* Calypso *St. 25 :* f, *minor chela and carpus, lateral surface;* g, *distal portion of major chela, mesial surface;* h, *anterior region, dorsal view. Second specimen from* Calypso *St. 25 :* i, *minor chela and carpus, lateral surface;* j, *distal portion of major chela, mesial surface;* k, *anterior region, dorsal view.*

Notwithstanding, individuals from a same sample may sometimes have similar morphology and strikingly different sizes, as specimens *A* and *B* from *Calypso* St. 25 (Table III, fig. 26 *f-h versus i-k*), or similar size, but conspicuous morphological differences, as specimens *A* and *B* from *Calypso* St. 58 (Table III, fig. 27 *a-c versus d-f*).

Following are the main variations encountered for the new material of *S. longicarpus* s.l. :

Ocular spines rounded, much larger than rostrum, spaces between these spines and rostrum U-shaped or V-shaped (fig. 23 *a*, 26 *e, h, k*, 27 *c, f, i, l, o*). Frontal region of carapace, antennular and antennal peduncles variably elongate. Stylocerite sharp, reaching from middle to almost distal end of basal antennular segment. Antennal scale reaching to end of second antennular segment or beyond, sometimes overreaching antennular peduncle; blade absent or present in both sexes, reaching to end of basal antennular segment or up to middle of third segment. Basal antennal spine narrower, just as broad as, or wider than lateral antennal spine, being

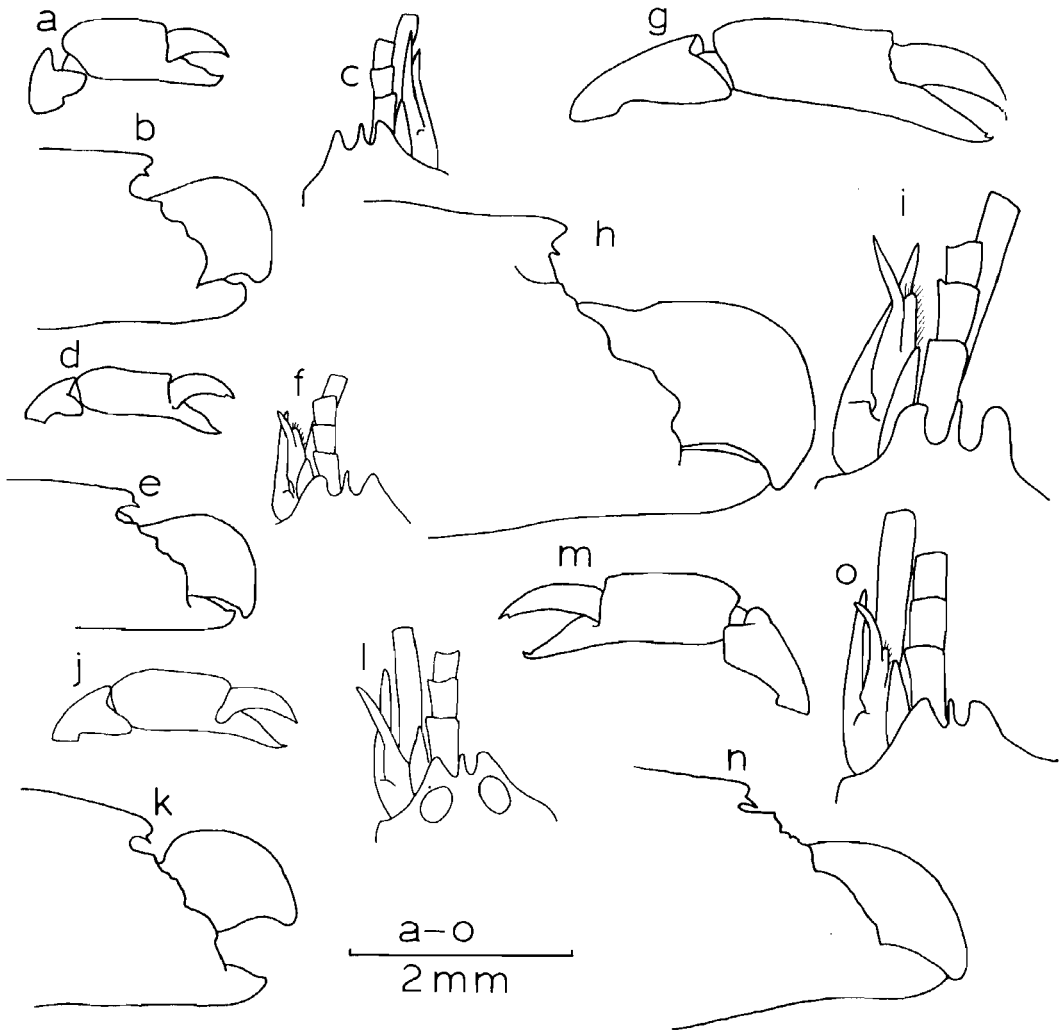

FIG. 27. — Synalpheus longicarpus *(Herrick), specimen from* Calypso *St. 58 :* a, *minor chela and carpus, lateral surface;* b, *distal portion of major chela, mesial surface;* c, *anterior region, dorsal view. Second specimen from* Calypso *St. 58 :* d, *minor chela and carpus, lateral surface;* e, *distal portion of major chela, mesial surface;* f, *anterior region, dorsal view. Ovigerous female from* Calypso *St. 63 :* g, *minor chela and carpus, lateral surface;* h, *distal portion of major chela, mesial surface;* i, *anterior region, dorsal view. Specimen from* Calypso *St. 81 :* j, *minor chela and carpus, lateral surface;* k, *distal portion of major chela, mesial surface;* l, *anterior region, dorsal view. Specimen from* Calypso *St. 90 :* m, *minor chela and carpus, lateral surface;* n, *distal portion of major chela, mesial surface;* o, *anterior region, dorsal view.*

slightly shorter, equal in length, or slightly longer than latter. Pterigostomial angle of carapace rounded (fig. 23 *b*) or sharply triangular. Major chela with dorsal tubercle on palm armed distally with sharp spine directed horizontally or armed distoventrally with sharp spine directed obliquely downwards (fig. 24 *g, h,* 26 *d, g, j,* 27 *b, e, h, k, n*). Minor chela with fingers simple, assymmetrically or symmetrically bidentate; carpus variably elongate (fig. 25 *a,* 26 *c, f, i,* 27 *a, d, g, j, m*). Females with large eggs have rounded abdominal pleura; females with small eggs, non-ovigerous females and males (fig. 23 *c*) have third to fifth abdominal pleura (and usually also second) acuminate, first pleura with ventral hook. Telson with posterior margin truncate, lateral margins straight or slightly concave (fig. 23 *d*). Outer branches of uropods with 3-4, 4-4, 4-5, 5-6 or 7-8 fixed teeth on free lateral margin, second combination more frequent; fixed sutural tooth larger than lateral teeth (fig. 23 *d, f*).

S. goodei Coutière is very close to *S. longicarpus* s. l., differing maybe only because « the basicerite of the antenna has its superior angle somewhat sharp » (COUTIÈRE, 1909 : 58). Even this distinction is not always clearcut, as « the two species ... are further connected through the forms [specimens of *S. goodei occidentalis* Coutière] which represent them on the Pacific coast » (COUTIÈRE, 1909 : 59).

S. osburni Schmitt, known from a single ovigerous female from Puerto Rico, seems to differ from *S. longicarpus* s. l. by the rostrum almost twice as long as the ocular spines and because « the superior angle of the basicerite forms a well marked subacute tooth ... » (SCHMITT, 1933 : 1, fig. 1).

HABITAT. — From 0-2 to 60.3 m deep. Mud; sand; probably on turtle-grass flats studded with clumps of the coral *Porites;* in sponges, including *Spheciospongia vesparia;* in colonies of *Zoanthus sociatus;* muddy sand, shells and broken shells; calcareous algae and corals; under coral rock; in coral heads; rocks.

GEOGRAPHICAL DISTRIBUTION. — Carolinas; Dry Tortugas; west coast of Florida, Texas (?) and Veracruz, Gulf of Mexico ; Yucatan Peninsula ; Bimini and probably New Providence, Bahamas; Jamaica; Puerto Rico and Virgin Islands through the Lesser Antilles to Curaçao; Paraíba to the State of Rio de Janeiro.

Synalpheus minus (Say, 1818)
(fig. 28)

Alpheus minus Say, 1818 : 245 (Syntypes : 7 spec. [2 of which in the British Museum, according to Coutière, 1909]; Type locality : « Coasts of the southern States and of East Florida », in sponges). — H. MILNE EDWARDS, 1837 : 356. — DE KAY, 1844 : 26 (South Carolina; Florida). — WHITE, 1847 : 75. — GIBBES, 1850 : 196 (Charleston Harbour, South Carolina; Key West, Florida). — p.p. KINGSLEY, 1878 *a* : 190 (Bermudas; Fort Macon, North Carolina; Charleston, South Carolina; Fort Jefferson and Key West, Florida; Nassau, New Providence, Bahamas); 1878 *c* : 57; 1878 *d* : 328; p.p. 1880 : 416 (Beaufort, North Carolina; Florida : Key West, Harbor Key, Sarasota, Florida Bays; Marcon Pass); 1883 : 114 (Bahamas; Trinidad); 1899 : 716. — COUES and YARROW, 1878 : 298 (Fort Macon, in sponges). — PACKARD, 1881 *a* : 788 (Key West, in sponges); 1881 *b* : 447. — SMITH, 1887 : 659 (Cape Hatteras, North Carolina, 29.2 m). — p.p. BATE, 1888 : 558 (off Bahia; 3°47'0" S, 32°24'30" W, off Fernando de Noronha, 12.8-45.7 m, vulcanic sand and gravel; Saint Paul Rocks). — HEILPRIN, 1888 : 322 (Harrington Sound, Bermudas, from sponges and tunicates); 1889 : 150. — SHARP, 1893 : 114 (Port Antonio, Jamaica). — COUTIÈRE, 1899 : 9. — WILSON, 1900 : 352. — MOREIRA, 1901 : 9. — STILES and HASSAL, 1927 : 215. — OLIVEIRA, 1940 : 142.

Alpheus minor, LOCKINGTON, 1878 (not De Haan, 1849) : 472. — POCOCK, 1890 : 518 (Fernando de Noronha). — ORTMANN, 1893 : 45 (Bermuda). — NOBILI, 1898 : 2 (Saint Thomas). — RANKIN, 1898 : 250 (Nassau, New Providence); 1900 : 540 (Bermudas).

Synalpheus minus, COUTIÈRE, 1899 : 15; 1909 : 43, fig. 44 (24 km SE of Charleston, South Carolina, in fragment of madrepore. Florida : 26°33' N, 83°10' W, Elliots Key, 51.2 m; Harbor Key; Salt Pond Key; Eastern Dry Rock; Key West; Dry Tortugas; Florida Bay; 3.2 km west of Cape Romano, 4.6-5.5 m; Marco; Sarasota Bay; Anclote; 28°56' N, 28°15' W, Florida Banks, 3.7 m; Saint Martin Reef. Bahamas : Andros Island, in sponges; Green Cay. Bermudas); 1910 : 486 (Dry Tortugas, Florida). — RATHBUN, 1900 *b* : 152 (Maceió, coral reef); p.p. 1902 : 109 (Puerto Rico : Mayaguez Harbor, 7.3-11.0 m; Mayaguez, coral reef; Puerto Real; Playa de Ponce; Arroyo; off Vieques, 27.4-29.2 m; off Humaçao, 17.4 m; off Culebra, 27.4-28.3 m; Ensenada Honda, Culebra. Off Saint Thomas, 36.6-42.0 m). — MOREIRA, 1905 : 132 (Ponta de Guaratiba, Rio de Janeiro, 80 m). — FOWLER, 1912 : 558. — HAY and SHORE, 1918 : 382, pl. 26, fig. 3, text-fig. 5. — p.p. VERRILL, 1922 : 102, pl. 21, fig. 1, pl. 23, fig. 3, pl. 33, fig. 4-4 *a*, pl. 34, fig. 2-2 *n*, pl. 47, fig. 1-1 *c*, 2, pl. 48, fig. 3-3 *c* (Bermudas, in cavities of dead corals and among sponges). — SCHMITT, 1924 *c* : 80 (Barbados, 1.8-11.0 m, in sponges and coral heads); 1935 : 149 (entrance of Guayanilla Harbor, Puerto Rico); 1936 : 369 (Bonaire : Oranjepan, in *Sargassum* washed ashore; Kralendijk, at surface, in coralin rock with algae). — ARNDT, 1933 : 250. — PEARSE, 1950 : 150 Bimini, Bahamas, in *Ircinia strobilina*). — PEARSE and WILLIAMS, 1951 : 143 (reefs off the Carolinas). — WASS, 1953 : 3; 1955 : 143 (Alligator Harbor, Florida, in sponges and ascidians). — MENZEL, 1956 : 42 (Apalache Bay region, Florida, estuary, in ascidian *Styela,* 25-37 ‰). — BULLIS and THOMPSON, 1965 : 8 (between 28°33' N, 84°24' W and 25°26' N, 81°40' W, SW of Florida, 8.2-40.2 m). — WILLIAMS, 1965 : 70, fig. 57. — ROUSE, 1970 : 138 (Everglades, Florida, 1.5-2.1 m, shell rubble and hard sediment, 24-26 °C, 31-37 ‰). — KNOWLTON, 1970 : 383 (off Cape Hatteras, North Carolina, in *Ircinia campana,* 31.1 m). — p.p. CHACE, 1972 : 95, fig. 35, 36 (Caribbean). — COELHO and RAMOS, 1972 : 150. — RAY, 1974 : 149, fig. 136-140 (Isla de Lobos reef, Veracruz, 7.6-13.7 m). FAUSTO-FILHO, 1974 : 6. — BANNER and BANNER, 1977 : 282. — CAMP, WHITING and MARTIN, 1977 : 26 (Hutchinson Island, Florida, in *Phragmatopoma*). — GORE, SCOTTO and BECKER, 1978 : 225 (Saint Lucie and Fort Pierce, Florida, in *Phragmatopoma*).

Synalpheus minor, COUTIÈRE, 1899 : 25.

Synalpheus minus bahiensis Coutière, 1909 : 45, fig. 26 (Syntypes : 2 spec. [1 ovig. ♀], USNM 38396; Type locality : Bahia, Brazil, Continental Platform). — RAY, 1974 : 156 (Isla de Lobos reef, Veracruz, 7.6 m).

Synalpheus minus antillensis Coutière, 1909 : 46, fig. 27 (Holotype : USNM 38397; Type locality : Saint Thomas, 36.6-42.0 m [as *S. minus* by RATHBUN, 1902]; Other localities : Playa de Ponce and Humaçao, Puerto Rico, 17.4 m [as *S. minus* by RATHBUN, 1902]). — CHACE, 1956 : 148 (South of Gran Roque, Los Roques Archipelago, 11.0-16.5 m, in *Callyspongia,* 25.8 °C). — RAY, 1974 : 153, fig. 141 (Isla de Lobos reef, Veracruz, 7.6 m).

Synalpheus minus ?, Zimmer, 1916 : 382 (Dry Tortugas, in sponge).
Synalpheus minus var. *somersi* Verrill, 1922 : 108, pl. 34, fig. 1-1 *u*, pl. 36, fig. 1-1 *e*, 2 (Type locality : Bermuda, coral reef).
Synalpheus minus minus, Chace, 1956 : 148 (Los Roques).

Material. — USA, North Carolina : Off Cape Hatteras, 31.1 m, in *Ircinia campanula* (Lamarck); 2 spec. (IMS 1926), **E.B.** coll. 12.3.64; Cape Lookout, 34°24′ N, 76°30′ W, 18 m, coral, 17 spec. (DML 1107), Praia das Conchas, intertidal zone, between stones, 8 spec. (4 ovig. ♀), **A.I.K.** and **M.L.C.** coll. 24.1.78; Angra dos Reis, Praia de Garatucaia, intertidal zone, 1 ovig. ♀, **M.L.C.** coll. 9.2.78. — São Paulo : São Sebastião, Praia de Baraqueçaba, intertidal zone, between stones, 1 spec., **M.L.C.** coll. 20.2.77; *ibid.*, Praia de Boissucanga, intertidal zone, between stones, mud and broken shells, 1 spec., **M.L.C.** coll. 17.2.77.

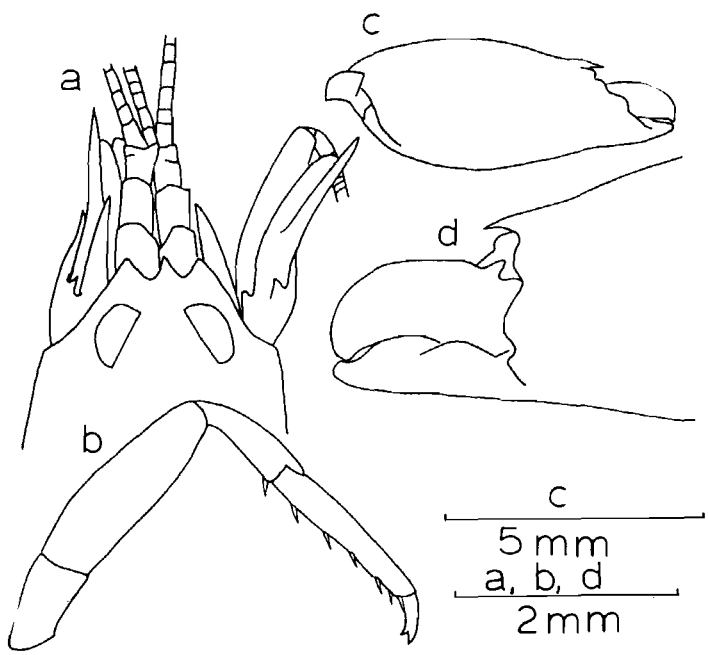

Fig. 28.

Synalpheus minus *(Say), specimen from* Calypso *St. 84 :* a, *anterior region, dorsal view;* b, *third pereiopod;* c, *major chela and carpus, mesial surface;* d, *distal portion of major chela, lateral surface.*

L.M. coll. 7.9.66; *ibid.*, coral, 16 spec. (DML 1106), **L.M.** coll. 1.2.67; 34°06.4′ N, 76°15.0′ W, 85 m, 1 spec. (DML 266), *Eastward* St. 4926, **Ve.** coll. 27.6.66. — Florida : Key West, 25 spec. (USNM 84372), Kingsley Collection, **A.S.Pa.** coll. — Brazil, Alagoas : Maceió, coral reef, 1 spec. (part of USNM 25810), Branner-Agassiz Expedition, **A.W.G.** coll. 3-4.8.1899. — Bahia : Continental Platform, 2 spec. (1 ovig. ♀), Syntypes of *Synalpheus minus bahiensis* Coutière (USNM 38396), Hartt Explorations, **R.Ra.** coll. 1875-77; *ibid.*, 2 spec. (USNM 41743), 1 ♀ (USNM 41656), 1 young spec. (USNM 41657), Hartt Explorations, **R.Ra.** coll. 1875-77; *ibid.*, 1 spec. (USNM 63480), **B.H.** coll.; Abrolhos, south of Ilha de Santa Bárbara, 5-8 m, rock and sand, 1 spec., *Calypso* St. 84, 28.11.61; *ibid.*, between Santa Bárbara and Siriba, 2-5 m, sand and calcareous algae, 2 spec., *Calypso* St. 85, 28.11.61. — Rio de Janeiro : Cabo Frio,

Size. — Largest ovigerous female, 6+10 mm ; major chela, 6:2.5:1.5 mm; minor chela, 2.5:1 mm. Largest male, 5+7.5 mm; major chela, 6:2.5:1.5 mm; minor chela, 2.5:1 mm. Smallest ovigerous female, 5+7.5 mm; major chela, 5.5:2:1.5 mm; minor chela, 2:1 mm.

Color. — Indicated by Say (1818 : 245), de Kay (1841 : 26), Verrill (1922 : 106), Wass (1955 : 143), Williams (1965 : 71), Rouse (1970 : 138) and Ray (1974 : 153). Possibly in some of these, confusion has occurred with other species, e.g. *S. brevicarpus* (Herrick).

The live specimens of what I call *S. minus* (Say) have the body sparsely dotted by green chromatophores, whereas the tips of the third maxillipeds and the distal third of the first pair of chelae are bright pink; the eggs are green. This color pattern

corresponds to observations of Jacques VAN MONTFRANS (personal communication) on Florida specimens of *S. minus*.

REMARKS. — Probably many of the above references will turn out to be *S. brevicarpus* (Herrick), as I have concluded from the descriptions or drawings of at least some specimens studied by KINGSLEY (1878 *a*), BATE (1888), COUTIÈRE (1899), VERRILL (1922), BOONE (1930 *b*) and KNOWLTON and MOULTON (1963), and as I have confirmed from the examination of some of KINGSLEY's and BOONE's material. However, as the only reliable taxonomic character recognized for distinguishing *S. minus* from *S. brevicarpus* refers to the shape of the major chela (*see* « Remarks » under *S. brevicarpus*), the true status of incomplete material such as MOREIRA's (1905), deposited in the MNRJ, remains uncertain.

Some details of the new material are illustrated in fig. 28. In the ovigerous female from Angra dos Reis, the basal antennal segment was not produced dorsally into a sharp prominent tooth.

HABITAT. — Intertidal zone to 85 m deep. Volcanic sand and gravel; in *Sargassum* washed ashore; in ascidians, including *Styela;* in sponges, including *Ircinia strobilina, Ircinia campana* and *Callyspongia;* broken shells; shells and marl; sand and calcareous algae; in *Phragmatopoma* worm reefs; in corals; in coraline rock with algae; between stones. Measured water temperatures, 24 to 26 °C; salinities, 25 to 37 ‰.

GEOGRAPHICAL DISTRIBUTION. — North Carolina to São Paulo.

The search for further distinguishing characters and a revision of the material studied by previous authors is desirable to establish the detailed geographical distribution of this species.

Synalpheus sanctithomae Coutière, 1909

(fig. 29, 30)

Synalpheus sanctithomae Coutière, 1909 : 61, fig. 35 (Syntypes : 1 ♂, 1 ♀, USNM 24782; Type locality : Saint Thomas, 36.6-42.0 m). — SCHMITT, 1935 : 151. — CHACE, 1972 : 104.

MATERIAL. — BRAZIL, ATOL DAS ROCAS : 3°51.1′ S, 33°50.1′ W, 27 m, rocks, calcareous algae and other algae, 1 ♂, 1 ♀, *Calypso* St. 8, 17.11.61. — PERNAMBUCO : 8°23′ S, 34°42′ W, 51 m, sand, 1 ovig. ♀, *Calypso* St. 24. — BAHIA : 18°00′ S, 38°18′ W, 48 m, bryozoans, calcareous algae and sponges, 1 ♂, *Calypso* St. 77, 28.11.61.

SIZE. — Ovigerous female, 3.5+6.5 mm; major chela, 5:2 mm; minor chela missing. Largest male, 3+5.5 mm; major chela, 4.5:2 mm; minor chela, 1.5 mm.

COLOR. — Not recorded.

REMARKS. — As shown in fig. 29, 30, this species is closely related to *S. longicarpus* (Herrick) and *S. brooksi* Coutière, treated above. It differs from both in the basal antennal spine being considerably shorter than the antennal scale, in the more conspicuously twisted major chela, and in the distinctly convex posterior margin of the telson. From *S. brooksi* it differs further by the presence of a sharp oblique tooth on the dorsal tubercle of the major chela, and from *S. longicarpus* by the more nearly equilateral shape of the ocular spines and rostrum, and by the smaller number of teeth on the free margin of the lateral branch of the uropod.

HABITAT. — From 27 to 51 m deep. Sand; bryozoans; calcareous algae and sponges; rocks, calcareous algae and other algae.

GEOGRAPHICAL DISTRIBUTION. — Saint Thomas; Atol das Rocas and Pernambuco to the south of Bahia.

Synalpheus townsendi Coutière, 1909

Synalpheus townsendi p.p. Coutière, 1909 : 32, fig. 14 (Syntypes : 11 spec., USNM 38392; Type locality : Gulf of Mexico, south of Cape San Blas, Florida, 29°14′00″ N, 85°29′15″ W, 46 m; Other localities : North Carolina, 27.4-29.2 m; Florida : Key West, Anclote, Straits of Florida, 102.4 m and west coast, 22.8-51.2 m; Gulf of Mexico, 43.9-58.5 m; off Cape Catoche, Yucatan, 43.9-49.4 m; Saint Thomas, 36.6-42.0 m; Puerto Rico : Mayaguez Harbor, 7.3-11.0 m, Culebra, 27.4-27.9 m, and Vieques, 27.4-29.2 m; Bermudas; Bahia, Brazil). — ZIMMER, 1916 : 381 (Saint Thomas; Saint John; Tortugas). — HAY and SHORE, 1918 : 384, text-fig. 7, pl. 26, fig. 1 (off Beaufort, North Carolina, 24.7 m, and in sponge, 29.2 m). — VERRILL, 1922 : 100, pl. 47, fig. 3-3 *d* (Bermuda). — PEARSE and WILLIAMS, 1951 : 143 (reefs off the Carolinas, 12.8-14.6 m). — BANNER, 1953 : 44. — WASS, 1953 : 3 (Alligator Harbor area, Florida); 1955 : 144. — MENZEL, 1956 : 42 (Apalache Bay region, Florida, rock, 25-37 ‰). — HULINGS, 1961 : 217 (Panama City, Florida). — WELLS, 1961 : 248

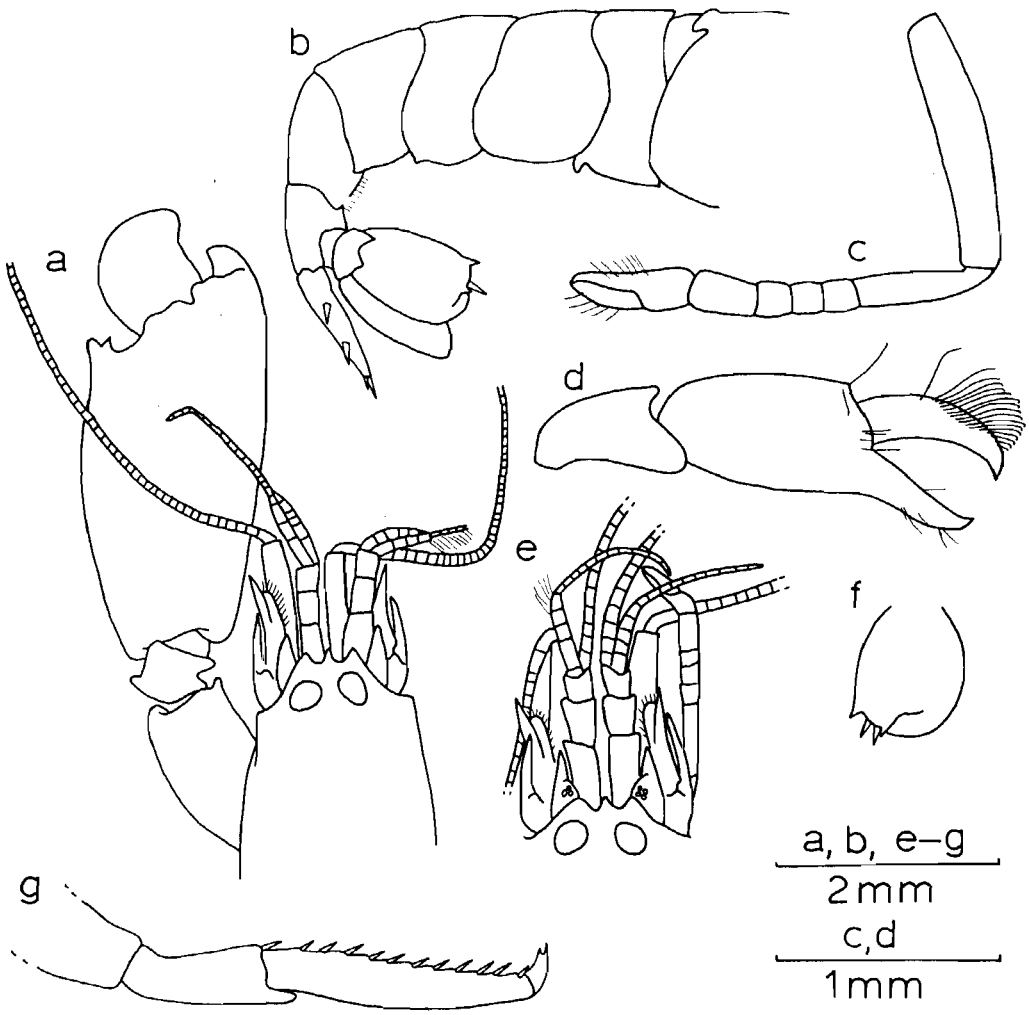

FIG. 29. — Synalpheus sanctithomae *Coutière, male from* Calypso *St. 77 :* a, *anterior region and major cheliped, dorsal view;* b, *posterior region, lateral view;* c, *second pereiopod;* d, *minor chela and carpus, lateral surface. Male from* Calypso *St. 8 :* e, *anterior region and second pereiopod, dorsal view;* f, *lateral branch of uropod, dorsal view;* g, *distal portion of third pereiopod.*

(Beaufort, North Carolina, oyster beds. — BULLIS and THOMPSON, 1965 : 8 (Gulf of Mexico, between 29°25′ N, 84°56′ W and 25°13′ N, 80°10′ W, 14.6 to 73.1-91.4 m). — WILLIAMS, 1965 : 72, fig. 58 (Carolinas; Obregon, Mexico). — CERAME-VIVAS and GRAY, 1966 : 263 (North Carolina). — ROUSE, 1970 : 138 (Everglades, Florida, 1.5-2.1 m, marl, shell rubble, hard sediment, some in *Ircinia strobilina*, 20-26 °C, 30-37 ‰). — CHACE, 1972 : 104 (Tortola; Guana Island; Virgin Gorda; Barbuda; Saint Christopher; Antigua Island; Dominica; Carriacou Island; Tobago; Isla de Cozumel; Bahia de la Ascensión; Bahia del Espiritu Santo; various habitats, especially on turtle-grass flats with clumps of *Porites* and *Pocillopora* as well as in algae, largest lots apparently from eroded dead coral. — KIRBY-SMITH and GRAY, 1977 : 8 (Beaufort, North Carolina, mud flats). — GORE, SCOTTO and BECKER, 1978 : 225 (Saint Lucie, Walton Rocks and Fort Pierce, Florida, intertidal zone, in *Phragmatopoma*).

Synalpheus townsendi productus Coutière, 1909 : 33, fig. 15 (Holotype : 1 spec. [without major chela], USNM 9798; Type locality : Gulf of Mexico, 43.9-58.5 m).

Synalpheus townsendi townsendi, CHACE, 1956 : 147 (Los Roques, 32.9 m, sand). — COELHO and RAMOS, 1972 : 150.

MATERIAL. — USA, NORTH CAROLINA : South of Cape Hatteras, 35°01′ N, 75°25′ W, 54.5 m, 21.2 °C, 1 ovig. ♀ (DML 544), **M.J.C.-V.** coll. 11.9.62; off Cape Lookout, 91.4 m, 2 spec. (IMS 1896), **M.J.C.-V.** coll. October 1963; *ibid.*, 34°12′ N, 76°15′ W, 45.7 m,

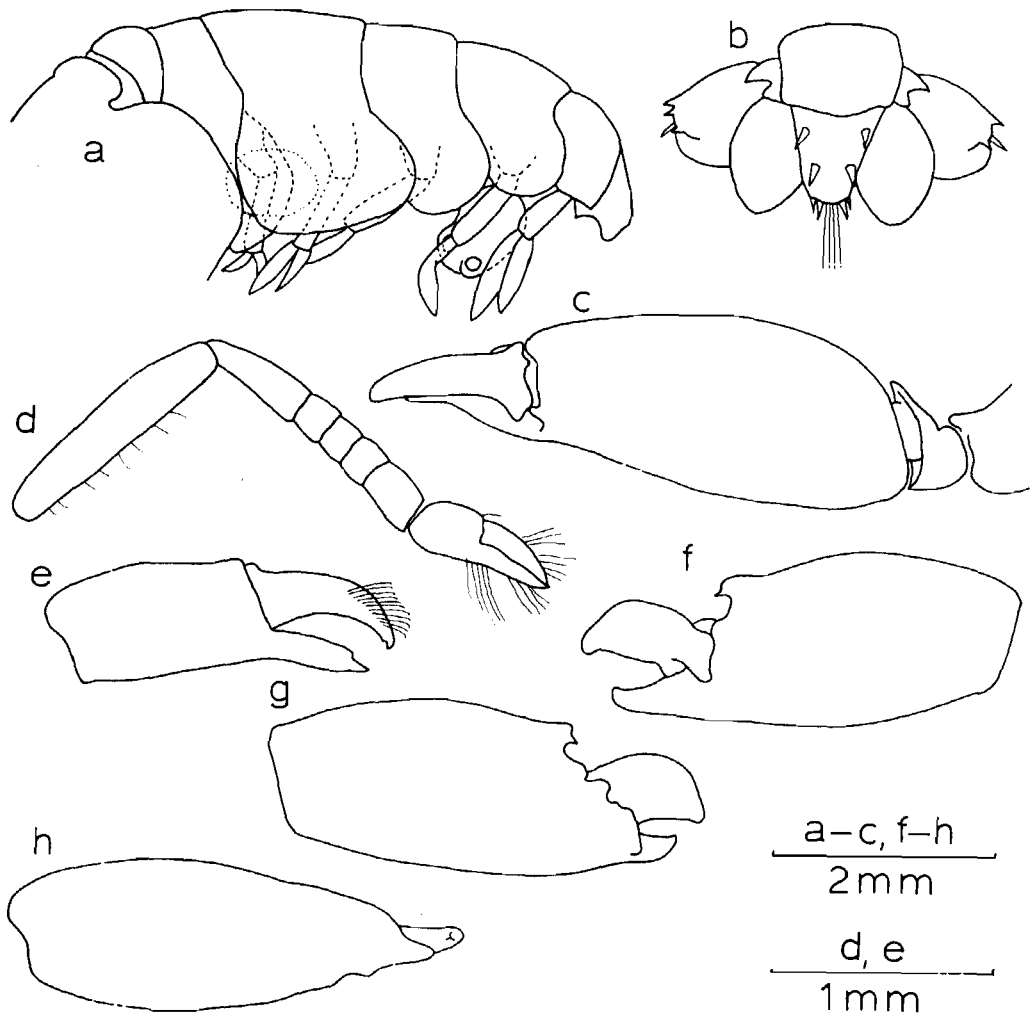

FIG. 30. — Synalpheus sanctithomae *Coutière, ovigerous female from* Calypso *St. 24 :* a, *abdomen, lateral view;* b, *telson and uropods, dorsal view;* c, *major chela and carpus, dorsal surface;* d, *second pereiopod. Female from* Calypso *St. 8 :* e, *minor chela, mesial surface;* f, *major chela, lateral surface;* g, *same, mesial surface;* h, *same, ventral surface.*

1 ovig. ♀ (IMS 1915), **M.J.C.-V.** coll. June 1963; 34°08.0′ N, 76°10.5′ W, 100 m (IMS 2231), **My.** coll. 12.3.66 ; 34°06.4′ N, 76°15.0′ W, 85 m, 1 spec. (DML 264), *Eastward,* **Ve.** coll. 27.6.66; 34°04.5′ N, 76°25.5′ W, 20 m, 6 spec. (IMS 2543), **R.V.B.** coll. 24.11.65 ; 33°54.6′ N, 76°28.2′ W, 64 m, 1 spec. (DML 265), *Eastward,* **I.E.G.** coll. 21.5.65. — SOUTH CAROLINA : 33°22′ N, 77°33′ W, 64.4 km SW of Cape Fear, 31.1-42.0 m, from sponge, 3 spec. (1 ovig. ♀) (IMS 884), **A.F.C.** coll. 9.2.50. — FLORIDA : Gulf Coast, 45.7 m, 11 spec., Syntypes (USNM 38392), *Albatross* St. 2373, 7.2.1885; *ibid.,* 43.9-58.5 m, 1 spec. (without major chela), Holotype of *S. townsendi productus* Coutière (USNM 9798), *Albatross* St. 2406, 15.3.1885; *ibid.,* 29°22′ N, 85°28′ W, 27.4 m, 3 spec. (2 ovig. ♀) (USNM 96271), *Oregon,* 30.10.53. — BRAZIL, ATOL DAS ROCAS : 14 m, rocks, 1 ovig. ♀, *Calypso* St. 4, 17.11.61; 3°51.1′ S, 33°50.1′ W, 27 m, rocks, calcareous algae and other algae, 1 spec., *Calypso* St. 8, 17.11.61. — PERNAMBUCO : 8°22′ S, 34°44′ W, 38-52 m, sand and mud, 1 spec., *Calypso* St. 25, 21.11.61; 8°23′ S, 34°42′ W, 51 m, sand, 1 ovig. ♀, *Calypso* St. 24, 21.11.61. — ALAGOAS : 9°40′ S, 35°18′ W, 47-54 m, calcareous algae, 1 spec., *Calypso* St. 31, 22.11.61. — BAHIA : 1 spec. (USNM 41618), Hartt Explorations, **R.Ra.** coll. 1875-77 ;

12°56.0' S, 38°33.2' W, 27 m, mud and stones, 2 spec. (1 ovig. ♀), *Calypso* St. 63, 26.11.61; 12°56.4' S, 38°34.3' W, 44-60 m, sand, stones, shells and broken shells, 4 spec. (2 ovig. ♀), *Calypso* St. 58, 24.11.61; 13°03' S, 38°24' W, 63 m, muddy sand, 1 spec., *Calypso* St. 52, 24.11.61; 15°37' S, 38°44' W, 39 m, corals, calcareous algae and other algae, 5 spec. (1 ovig. ♀), *Calypso* St. 69, 27.11.61; Abrolhos, between Ilha de Santa Bárbara and Siriba, 2-5 m, sand and calcareous algae, 2 spec., *Calypso* St. 85, 28.11.61; 18°06' S, 38°42' W, 37 m, rocks and calcareous algae, 3 spec., *Calypso* St. 81, 28.11.61; 18°09' S, 38°30' W, 50 m, rocks, calcareous algae and corals, 2 spec., *Calypso* St. 80, 28.11.61; 18°18' S, 38°53' W, 38 m, mud, 3 spec., *Calypso* St. 89, 29.11.61. — Espírito Santo : 19°14' S, 39°19' W, 38 m, mud, 1 spec., *Calypso* St. 91, 29.11.61. — Rio de Janeiro : 21°22' S, 40°43' W, 25 m, sand and algae, 4 spec., *Calypso* St. 98, 1.12.61.

Size. — Largest ovigerous female, 4.5+7 mm; major chela, 4.5:1.5 mm; minor chela missing. Smallest ovigerous female, 4+6 mm; major chela, 3.5:1 mm; minor chela, 2:0.5 mm.

Color. — « ... In life, body and legs a light pellucid pinkish red, the large chela, pink changing to green on the fingers » (Hay and Shore, 1918 : 384).

Remarks. — The small differences indicated by Coutière (1909 : 32, fig. 15) for *S. townsendi productus* overlap with the variability of the typical species. On the other hand, *S. townsendi scaphoceris* Coutière (1910 : 486, fig. 2), with which Ray's material of *S. townsendi* (1974 : 175, fig. 168-175) seems to agree, as well as several new Brazilian samples, should be considered a distinct species. The present material of *S. townsendi* differs from the form *scaphoceris* (*cf.* Coutière, 1909 : 32, fig. 14, 15) as follows : Rostrum narrower, beginning closer to frontal margin of carapace, with ventral projection between eyes less developed, and reaching to about tip of stylocerite; blade of antennal scale narrower, 4.1 to 6.2 times longer than wide; major chela with sharp narrow tooth on distal margin of palm and movable finger more strongly arched dorsally; posterior margin of telson less convex, distolateral spine overreaching this margin; maximum size reached by ovigerous females smaller; color pattern indicated by Hay and Shore (*see* above) distinct.

Habitat. — Intertidal zone to 100 m deep. Mud; sand; on turtle-grass flats with clumps of the corals *Porites* and *Pocillopora;* from algae; in sponges, including *Ircinia strobilina;* marl and shells; broken shells; oyster beds; in *Phragmatopoma* worm reefs; calcareous algae; in corals; rocks. Measured water temperatures, 20 to 26 °C; salinities, 25 to 37 ‰.

Geographical Distribution. — Bermudas; Carolinas; east Florida to Dry Tortugas; Florida Gulf Coast; Quintana Roo, Yucatan Peninsula; Puerto Rico to Tobago; Los Roques Archipelago; Atol das Rocas and Pernambuco to the State of Rio de Janeiro. East Pacific from the Gulf of California.

Thunor rathbunae (Schmitt, 1924)

Crangon rathbunae Schmitt, 1924 *c* : 74, pl. 1 (Holotype : Ovig. ♀; Type locality : Needhams Point, Barbados; Other localities : Okra reef, coral rock and coral heads, Barbados).

Thunor rathbunae, Armstrong, 1949 : 13, fig. 3, 4 A-J, L (Piedra Prieta reef, Dominican Republic, in cavities and fragments of dead coral). — Holthuis, 1955 : 92, fig. a. — Chace, 1972 : 104, fig. 39 (Florida Reef, Key West, Florida; Virgin Gorda; Antigua Island; Saint Lucia Island; Babia de la Ascensión; Bahia del Espíritu Santo; post specimens apparently living in cavities of dead coral, 0.3-0.9 to 3 m).

Material. — Brazil, Bahia : Abrolhos, between Ilha de Santa Bárbara and Siriba, 2-5 m, sand and calcareous algae, 1 ♂, *Calypso* St. 85, 28.11.61.

Size. — Single male, 4+6.5 mm; major chela, 4.5:1.3 mm; minor chela, 3.5:0.5 mm.

Color. — Not recorded.

Habitat. — From 0.3-0.9 to 3-5 m deep. Sand and calcareous algae; coral rock; coral heads.

Geographical Distribution. — Key West, Florida; Quintana Roo, Yucatan Peninsula; Dominican Republic; Virgin Gorda; Antigua Island; Saint Lucia Island; Barbados; south of Bahia.

Family **OGYRIDIDAE**

Ogyrides occidentalis (Ortmann, 1893)

(fig. 31-33)

Ogyris occidentalis Ortmann, 1893 : 46, pl. 3 fig. 4-4 *n* (Type locality : Mouth of Rio Tocantins, Pará, Brazil). — Coutière, 1899 : 48, fig. 39, 131, 157, 166, 196, 203, 304, 333, 375. — Cary and Spaulding, 1909 : 11 (Cameroon, Louisiana, among algae). — De Man, 1911 : 135. — Balss, 1913 : 107 (Luderitz Bay, South-West Africa); 1916 : 20 (Accra, Ghana; Victoria, Cameroon; Cabinda, Cabinda; Mucula and Quissembo, Angola). — Monod, 1927 : 594.

Ogyrides yaquiensis Armstrong, 1949 : 3, fig. 1 (Holotype : ♀, AMNH 9564; Type locality : Near mouth of Rio Yaqui del Sur, Barahona Harbor, Santo Domingo, Dominican Republic, 0.3-0.9 m, on grass bank). — Tabb and Manning, 1961 : 597 (Florida Bay); 1962 : 62. — Rouse, 1970 : 139 (Everglades, Florida, marl, shells, peat, rock, 1.2 m, 20-24 °C, 14-35 ‰). — Chace, 1972 : 106. — Grizzle, 1974 : 134 (Indian River region, Florida, mud and silt, 24.8 ‰) *(syn. n.)*.

Ogyrides occidentalis, Barnard, 1950 : 728. — Holthuis, 1951 : 123. — Forneris, 1969 : 88 (Baia do Flamengo, São Paulo, 3 to 32 m, 19.4-27 °C, 35.05-35.24 ‰). — Chace, 1972 : 106.

Ogyrides limicola Williams, 1955 : 57, fig. 1 (Holotype : Ovig. ♀, USNM 96675; Type locality : Entrance to Far Creek, Engelhard, Hyde County, North Carolina, 0.3-2.4 m; Other localities : Carteret County, Hyde County and Onslow County, North Carolina); 1965 : 74, fig. 60 (Accomac County and James River, Virginia; Lake Portchartrain, Louisiana; plankton tow or mud bottom, surface to 4.6 m, 9 to 31 ‰); 1972 : 145 (North Carolina). — Wass, 1965 : 41 (York River, Virginia, 32.5 ‰). — Chace, 1972 : 106. — Van Engel and Sandifer, 1972 : 156 (Chesapeake Bay, Virginia, 9 m). — Sandifer, 1973 : 241 (larvae in Chesapeake Bay, 11.0-28.5 °C, 5.14-25 ‰); 1974 : 241; 1975 : 269. — Goy, 1976 : 28 (larvae in Chesapeake Bay). — Camp, Whiting and Martin, 1977 : 27 (Hutchinson Island, Florida, 8.4 m, 22.6-25.4 °C, 35.0-37.0 ‰) *(syn. n.)*.

Material. — USA, Virginia : Eastern shore of Northampton County, 1 ovig. ♀, « Holotype » of *O. alphaerostris* (Kingsley) (real holotype of this species probably lost) (USNM 63452), Union Collection; York River, 3.0-15.2 m, mud, 15 ♂, 92 ♀ and other ± 50 spec. (USNM 107801), **R.W.** coll. November 1960-February 1961; Chesapeake Bay 37°27′ N, 76°20′ W, 10 m, mud, 7 spec., *John De Wolf II* St. 343, **M.L.C.** coll. 18.4.78; *ibid.*, 37°4′35″ N, 76°1′45″ W, 10 m, mud, 7 spec., *John De Wolf II* St. 338, **M.L.C.** coll. 18.4.78. — North Carolina : Hyde County, Mouth of Far Creek, at Engelhard, 1 ovig. ♀, Holotype of *O. limicola* Williams (USNM 96675), **A.B.W.** coll. 15.7.54; *ibid.*, 3 samples (3 ovig. ♀, 5 spec.), Paratypes of *O. limicola* (USNM 96676, 96677, MCZ 126673), **A.B.W.** coll. 13.5.53 to 15.7.54; *ibid.*, 2 samples (5 ovig. ♀) (MCZ 126672, 126674), **A.B.W.** coll. 16.9.53, 17.5.54; *ibid.*, West side of Wysocking Bay, 3 spec., Paratypes of *O. limicola* (USNM 96678), **A.B.W.** coll. 13.5.53; Carteret County, mouth of Far Creek at Engelhard, 3 spec., Topotypes of *O. limicola* (IMS), **A.B.W.** coll. 21.9.54; *ibid.*, Williston, near bridge, 1 ovig. ♀ (IMS), **A.B.W.** coll. 1.9.54; Adams Creek, near Mouth of Joaquim and Cedar Creeks, 1 spec., Paratype of *O. limicola* (USNM 96681), **A.B.W.** coll. 28.8.52; *ibid.*, 1 ovig. ♀ (MCZ 126671), **A.B.W.** coll. 28.5.53; *ibid.*, mouth of Cedar Creek, 3.7 m, 1 spec. (IMS), **A.B.W.** coll. 13.2.53; *ibid.*, Broad Creek, 1 spec. (IMS 1618), **A.B.W.** coll. 13.6.59; *ibid.*, Newport River narrows, 2 spec., Paratypes of *O. limicola* (MCZ), **A.B.W.** coll. 4.5.53; *ibid.*, Newport River, above Cross Rock, mud, 5 spec. (DML 621), **L.M.** coll. 9.7.63; *ibid.*, port at Mouth of White Oak River, 1 spec., Paratype of *O. limicola* (USNM 96680), **A.B.W.** coll. 29.9.52; *ibid.*, Morehead City, pier at « Institute of Fisheries Research », plankton tows, 14 samples (60 spec.) (IMS 703 to 1422), **A.B.W., E.E.D., G.S.P., G.W.B., H.J.P., L.W.E.F., S.D.M.** and **W.J.B.** coll. 7.4.58 to 23.7.59; Onslow County, Hall Creek, 1 ovig. ♀, Paratype of *O. limicola* (USNM 96679), **A.B.W.** coll. 16.6.72; Brunswick County, West coast of Cape Fear River, at Southport, plankton tow, 3 spec. (IMS), **E.E.D.**, and **L.W.E.F.** coll. 12.12.55. — South Carolina : Charleston, mouth of Saint Pierre River, 1 spec. (AMNH 9206), 11.10.35. — West coast of Florida : Florida Bay, Conchie Channel, 1 ♀ (USNM), **D.C.T.** and **R.B.M.** coll. 10.06.59. — Louisiana : Mississippi Sound, Biloxi Bay, mud, 1 ♂ (USNM 1022472), **R.A.W.** coll. 6.1.59; Lake Pontchartrain, 3.2. km South of draw bridge, 30°10′ N, 89°54′ W, 3.7 m, 13-13.5 °C, 6.3-6.7 ‰, 3 samples (11 spec.) (IMS), **R.M.D.** coll. 17-18.2.55; beach near Calcasieu, 2 spec. (USNM 38366), **M.H.S.** coll. 19.11.06. — Dominican Republic : Santo Domingo, Barahona Harbor, weed bank in NW corner of Neiba Bay, 0.8-3.0 m, 1 ♀, Holotype of *O. yaquiensis* Armstrong (AMNH 9564), coll. 6.7.33; *ibid.*, 0.8-3.0 m, 44 spec. (AMNH 9565), 4 spec. (AMNH 9566), Paratypes of *O. yaquiensis*, coll. 6.7.33. — Brazil, Rio de Janeiro : Baia de Mangaratiba, Praia da Ribeira, close to shore, mud, 5 spec. (MNRJ 14-959), **A.L.C.** and **Ar.** coll. 6.2.59; 23°08′ S, 43°46′ W, 40 m, coarse sand, 15.72 °C, 1 spec. (IOUSP-CO366), *Besnard* St. 1475, 8.3.71. — São Paulo : Ubatuba, Enseada do Flamengo, 1 to 20 m, mud, sand and shell fragments, 9 samples (1 young spec., 2 ♂, 5 non-ovig. ♀, 3 ovig. ♀) (MZUSP 1 to 8), **L.F.** coll. 10.10.61 to 16.7.62; 23°32′ S, 45°06′ W,

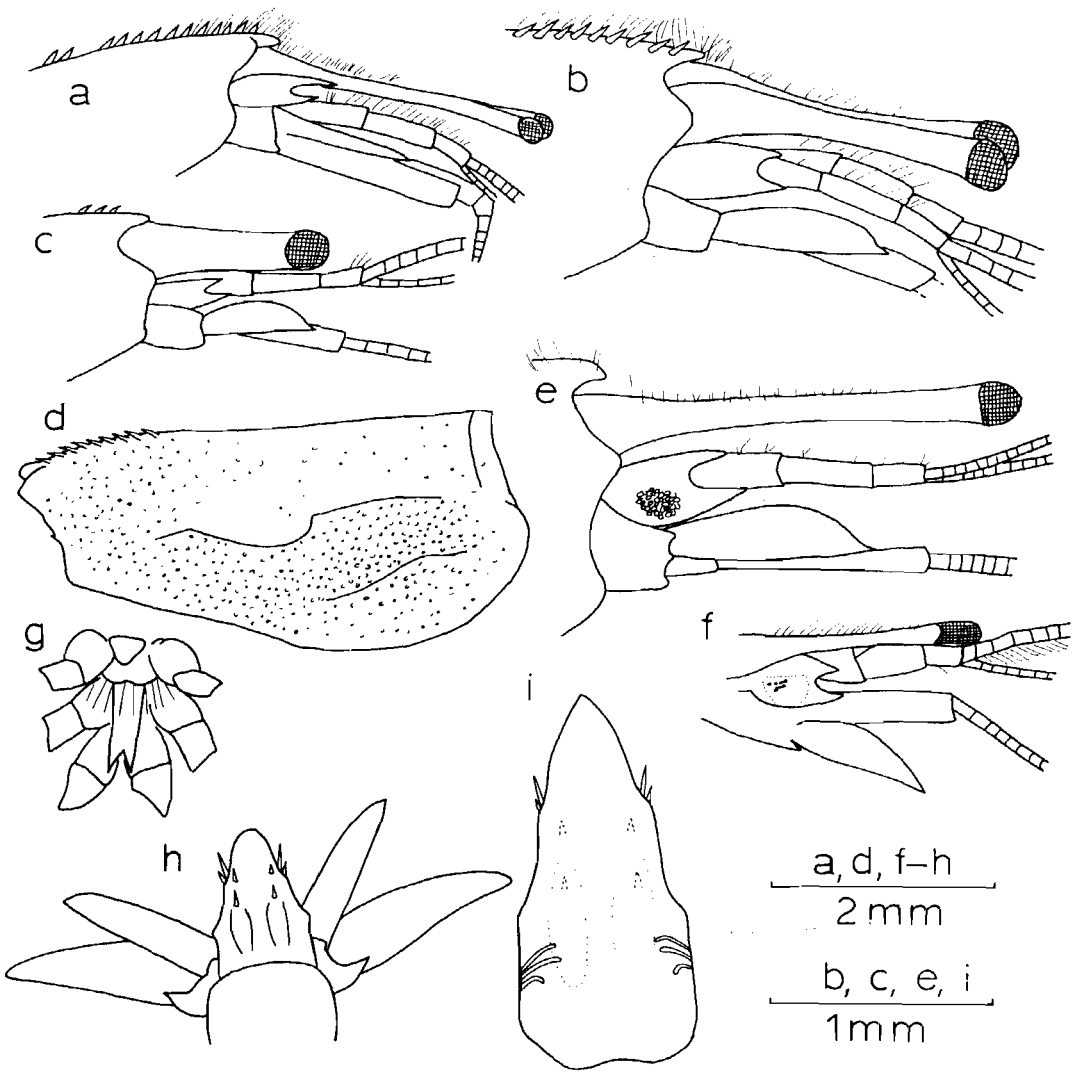

FIG. 31. — Ogyrides occidentalis *(Ortmann), topotype :* a, *anterior region, lateral view. Specimen from North Carolina (DML 621) :* b, *anterior region, lateral view. Young specimen from Ubatuba, São Paulo (MZUSP 7) :* c, *anterior region, lateral view. Several specimens from Ubatuba (MZUSP) :* d, *carapace, lateral view;* e, *anterior region, lateral view;* f, *eye stalk, antennule and antenna, lateral view;* g, *third to fifth abdominal somites, ventral view;* h, *telson and uropods, dorsal view;* i, *telson, ventral view.*

18 m, mud, 1 spec., *Calypso* St. 128, 10.12.61; 23°41.5' S, 45°17' W, 15.5 m, sand, 1 spec. (IOUSP-C1002), *Emília;* 23°42' S, 45°14' W, 18-20 m, mud, 2 spec. (1 ovig. ♀), *Calypso* St. 131, 10.12.61; 23°43.3' S, 45°24.3' W, 25.5 m, mud, 1 spec. (IOUSP-C1051), *Emília;* 23°50' S, 45°52' W, 22 m, 3 samples (4 spec.) (IOUSP-CO391), *Besnard* St. 1615, 15.12.71; 23°51' S, 45°41' W, 25-26 m, mud, 21.12 °C, 4 samples (22 spec.) (IOUSP-CO249), *Besnard* St. 1163, 11.8.70; 23°56.5' S, 46°05.5' W, 18 m, sand, 2 spec. (IOUSP-C1014), *Emília;* 23°57' S, 45°57' W, 25 m, 3 samples (9 spec.) (IOUSP-CO330), *Besnard* St. 1327; 23°58.5' S, 46°22.7' W, 5 m, mud, 21.0 °C, 1 spec. (IOUSP-C1028), *Emília;* Ilha de Santo Amaro, Praia do Perequê, ± 10 m, among commercial shrimps at market, 1 ovig. ♀, **M.L.C.** coll. 10.9.76; Ilha da Moela, 22 m, sand and mud, several spec. (IOUSP), *Emília,* 20.10.67; Baia de Santos, 1 ovig. ♀ (MZUSP 21), **L.R.T.** coll. May 1964; 24°02' S, 46°20' W, 14 m, sand, several spec. (IOUSP-C1019), *Emília;* 24°03.0' S, 45°54.1' W, 33 m, sand, 23.3 °C, 3 spec. (IOUSP-C1060), *Emília;* 24°04' S, 46°19.5' W, 19.5 m, sand, 3 spec.

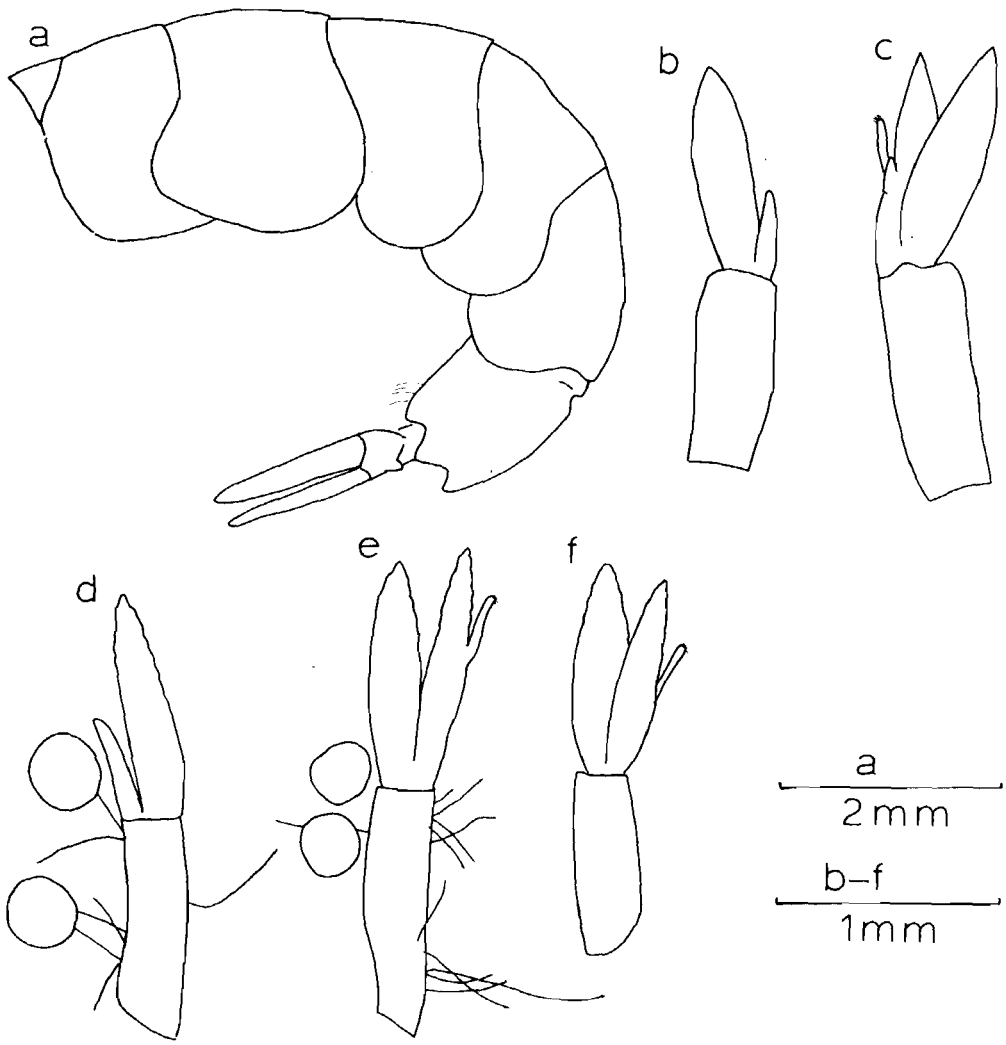

FIG. 32. — Ogyrides occidentalis *(Ortmann), male from Ubatuba, São Paulo (MZUSP)* : a, *posterior region, lateral view (telson removed to show ridge at base of uropod);* b, *first pleopod;* c, *second pleopod. Ovigerous female from Ubatuba (MZUSP)* : d, *first pleopod;* e, *second pleopod;* f, *fifth pleopod.*

(IOUSP-C1018), *Emília,* 23.7.70; 24°5.5′ S, 46°10.5′ W, 30 m, sand, several spec. (IOUSP-C1016), *Emília;* 24°07.5′ S, 46°29′ W, 17 m, sand, 5 spec. (IOUSP-C1046), *Emília;* 24°20.5′ S, 46°59′ W, 7.5 m, mud, several spec. (IOUSP-C1085), *Emília;* 24°21′ S, 46°38′ W, 25 m, sand, 20.63 °C, several spec. (IOUSP-CO254), *Besnard* St. 1170, 13.8.70; 24°25′ S, 46°59′ W, 12 m, mud, 8 spec. (IOUSP-C1084), *Emília;* 24°34.5′ S, 47°10.5′ W, 10.5 m, sand, 1 spec. (IOUSP-C1083), *Emília;* 24°40′ S, 47°16′ W, 19 m, 7 samples (several spec.) (IOUSP-CO384), *Besnard* St. 1599, 13.12.71; 24°41′ S, 47°17′ W, 19 m, sand, 1 spec. (IOUSP-C1068), *Emília;* 24°51′ S, 47°29′ W, 22 m, fine sand, 25.81 °C, 4 samples (several spec.) (IOUSP-CO356), *Besnard* St. 1458, 5.3.71; 24°51′ S, 47°29′ W, 21 m, sand, 2 samples (17 spec.) (IOUSP-C1082), *Emília;* 24°55′ S, 47°37′ W, 19 m, sand, 2 samples (5 spec.) (IOUSP-C1081), *Emília;* 24°58.5′ S, 47°48.5′ W, 12 m, sand, several spec. (IOUSP-C1077), *Emília;* 25°00′ S, 47°07′ W, 21 m, sand, 20.41 °C, 1 ovig. ♀ (IOUSP-CO255), *Besnard* St. 1171; 25°00.5′ S, 47°44′ W, 17 m, sand, 5 spec. (IOUSP-C1079), *Emília;* 25°03.5′ S, 47°51′ W, 12 m, sand, 3 samples (several spec.) (IOUSP-C1076), *Emília;* 25°04.5′ S, 47°48.5′ W, 15-15.5 m, sand, 1 spec. (IOUSP-C1080), *Emília;* Cananéia, 1 ovig. ♀ (MZUSP 32), 1.2.67; *ibid.,* 0.30 to

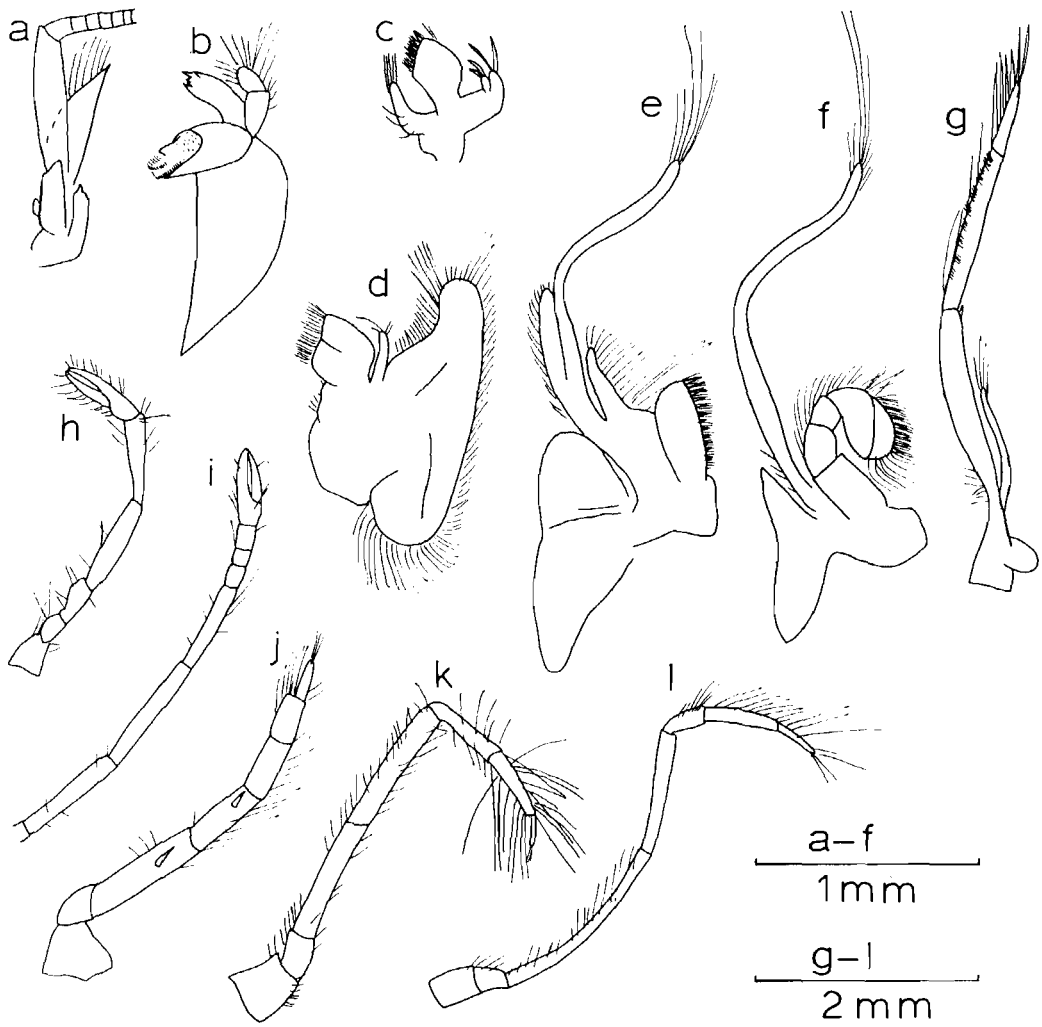

FIG. 33. — Ogyrides occidentalis *(Ortmann), specimen from Ubatuba, São Paulo (MZUSP) :* a, *antenna, ventral view;* b, *mandible;* c, *first maxilla;* d, *second maxilla;* e, *first maxilliped;* f, *second maxilliped;* g, *third maxilliped;* h, *first pereiopod;* i, *second pereiopod;* j, *third pereiopod;* k, *fourth pereiopod;* l, *fifth pereiopod.*

8-10 m, 23.15-26.90 °C, 14.47-20.10 ‰, 7 samples (several spec.) (IOUSP), 31.1.73; *ibid.*, Mar de Cananéia, 0.30-0.40 to 0.80-1.6 m, 20.52-28.90 °C, 03.07-29.00 ‰, 31 samples (several spec.) (IOUSP), C.J. and M.I. coll. 21.2.73 to 3.4.75; *ibid.*, Baia do Trapandé, 0.30 to 1.20-1.70 m, mud, 18.32-31 °C, 11.95-29.00 ‰, 111 samples (several spec.) (IOUSP), C.J., M.I. and Li. coll. 22.2.73 to 3.4.75; 25°08.5' S, 47°54.5' W, 8.5 m, sand and mud, 2 spec. (IOUSP-C1070), *Emília;* 25°11' S, 47°54' W, 17 m, sand, 1 spec. (IOUSP-C1072), *Emília.* — PARANÁ : 25°30' S, 48°29' W, 22 m, mud, 3 samples (several spec.) (IOUSP-CO378), *Besnard* St. 1587, 11.12.71. — SANTA CATARINA : 29°13' S, 49°35' W, 19 m, sand, 23.21 °C, 35.28 ‰, 1 ovig. ♀ (IOUSP-CO459), *Besnard* St. 1704, 6.4.72. — RIO GRANDE DO SUL : 32°20' S, 51°22' W, 52 m, mud and sand, 19.45 °C, 35.90 ‰, 2 spec. (1 with ovig. parasite in branchial chamber) (IOUSP-CO420), *Besnard* St. 1662, 21.1.72.

SIZE. — Largest ovigerous female, 5+11.5 mm. Largest male, 4.5+10 mm. Smallest ovigerous female, 3.5+7.5 mm.

COLOR. — Agrees with that described by WILLIAMS (1955 : 58; 1965 : 75).

REMARKS. — Due to an unrecognized variability of morphological characters and to some imperfections in the original illustrations of the Brazilian species *O. occidentalis* (ORTMANN, 1893, pl. 3, fig. 4-4 *n*) (incorrect proportion between ischium and merus of third pereiopod, supposedly form of distal margin of antennal scale and absence of spines and ridges on telson) two other species have subsequently been recognized in the West Atlantic : *O. yaquiensis* Armstrong — for the West Indies and southern Florida — and *O. limicola* Williams — for the Gulf of Mexico and southeastern United States. These three species should be considered synonymous, as their diagnostic characters are not constant. The following variations apply to Brazilian specimens as well as to the material examined from the North Atlantic : Dorsal midline of carapace with 3-13 spines (fig. 31 *a-d*); eye-stalks reaching approximately end of antennular peduncle or overreaching it by up to about two and one-half times length of cornea (fig. 31 *a, b, e, f*), but in younger specimens they may be considerably shorter (fig. 31 *c*); antennal peduncle slightly shorter, equal in length or slightly longer than antennular peduncle (fig. 31 *a-c, e, f*); both spines of stylocerite always distinctly shorter than basal antennular segment, although relative lengths vary (fig. 31 *a-c, e, f*); lateral and ventral spine of basal antennal segment may be inconspicuous or absent (fig. 31 *a-c, e, f*, 33 *a*).

A pleurobranch is absent from the third maxilliped. Further morphological details of *O. occidentalis* are illustrated in fig. 31-33. Some Brazilian specimens have a distinct spine on the anterior margin of the carapace, at the base of the antennal peduncle (fig. 31 *d*), as in West African *O. rarispina* Holthuis and *O. saldanhae* Barnard (this species was based on material previously identified as *O. occidentalis* by STEBBING, 1914, p. 32). Both African species seem to differ from *O. occidentalis* by the longer spines of the stylocerite, which are almost as long as or overreach the basal antennular segment, and by the five-segment carpus of the second pereiopod — in *O. occidentalis* there are four segments (fig. 33 *i*) — but this may not be a clearcut difference, as BARNARD (1950 : 726, fig. 35 *d*) stresses that the first division is inconspicuous in his specimens of *O. saldanhae*. The latter species differs further by the presence of a longitudinal dorsal carina on the fifth and sixth abdominal segments (HOLTHUIS, 1952 : 49).

The true status of the remaining specimens from West Africa identified as *O. occidentalis* is uncertain; those from South-West Africa (BALSS, 1913 : 107) may belong to *O. saldanhae* (BARNARD, 1947 : 387), and those from Angola Cabinda, Cameroon and Ghana (BALSS, 1916 : 20) possibly belong to *O. rarispina* (HOLTHUIS, 1951 : 124).

HABITAT. — From 0-0.30 to 52 m deep. Mud; mud and silt; marl; fine sand; coarse sand; broken shells; grass bank; among algae; rock with some peat. This species seems restricted to estuarine environments, where it has also been captured in plankton tows near the surface. Measured water temperatures, 11.0 to 31 °C; salinities, 03.07 to 37.0 ‰.

GEOGRAPHICAL DISTRIBUTION. — Known with certainty only in the West Atlantic : Virginia to South Carolina; east Florida; Florida Gulf coast; Louisiana; Dominican Republic; Pará and the State of Rio de Janeiro to Rio Grande do Sul.

Family **HIPPOLYTIDAE**

Exhippolysmata oplophoroides
(Hollhuis, 1948)

Hippolysmata (Exhippolysmata) oplophoroides Holthuis, 1948 : 1106, fig. 2, 3 (Syntypes : 2 ♀; Type locality : Mouth of the Suriname River, near De Resolutie, Surinam, mud, 27 °C); 1950 : 35 (near Coppename Point, mouth of the Suriname River); 1959 : 112, text fig. 17 (Surinam, 5 to 27 m, mud or mud and shells, 15.89 ‰; Guyana; French Guiana). — LUNZ, 1955 : 2 (Cape Fear, North Carolina; Kiawah Island, South Carolina; Georgia; Texas; Brazil). — MISTAKIDIS and NEIVA, 1964 : 472 (Santos and Santa Catarina, Brazil). — WILLIAMS, 1965 : 85, fig. 69 (Carolinas). — FAUSTO FILHO, 1967 : 12 (Praia de Mucuripe, Ceará; Praia dos Touros, Rio Grande do Norte). — COELHO and RAMOS, 1968 : 8 (opposite Cabo Orange and Cabo do Norte, Amapá, 23 and 45 m, mud; mouth of Rio Jaboatão, Pernambuco, 16 m, mud and sand); 1972 : 153 (Pará). — ABREU, 1975 : 22 (Ubatuba, São Paulo, 10-15 m, 34.10-35.30 ‰).
Exhippolysmata opophoroides, GRAHAM, 1955 : 40, pl. 5 fig. 13 (Guyana).
Hippolysmata oplothoroides, LINDNER, 1957 : 2.
Hippolysmata oplophoroides, HOLTHUIS and ROSA, 1965 : 13. — FORNERIS, 1969 : 89 (Baia do Flamengo, São Paulo, 20 m). — IWAI, 1973 : 55, photo 7 (between Cabo de São Tomé, Rio de Janeiro, and Cabo de Santa Marta, Santa Catarina, less than 20 m, mud).
Exhippolysmata oplophoroides, CHACE, 1972 : 110. — COELHO, PONTO and KOENING, 1975 : 386 (Amapá).

MATERIAL. — USA, NORTH CAROLINA : Brunswick County, Cape Fear River, 1 spec. (IMS), **S.R., R.C.** and **F.J.S.** coll. 13.7.76; *ibid.*, 6.4 km south of South-

port, 1 ovig. ♀ (IMS), **F.J.S.**, **D.F.** and **F.R.** coll. 16.9.76. – SURINAM : Mouth of Demerara River, 1 ♂, 5 ♀ (3 ovig.) (USNM 99530), **M.J.L.** coll. 2.5.56; 6°22′ to 6°04′ N, 55°28′ to 54°51′ W, 5.5 to 25.6 m, mud and shells, 5 samples (46 spec.) (USNM), *Coquette*, 11.5.57 to 6.6.57. — BRAZIL, AMAPÁ : East of Ilha de Maracá, 02°32′ N, 49°49′ W, 20.1 m, 2 ♀ (1 ovig.) (USNM 168471), *Oregon II*, 25.5.76; 02°08.0′ N, 49°27.5′ W, several spec. (MNRJ); 00°33.0′ N, 47°56.0′ W (MNRJ). — CEARÁ : Fortaleza, Praia de Mucuripe, 2 ovig. ♀ (USNM 262588), **J.F.-F.** coll. — ESPÍRITO SANTO : Beach 3.2 km SW of Anchieta, 0-6 m, sand, 1 ovig. ♀, *Calypso* St. 93, 30.11.61. — RIO DE JANEIRO : Barra de Itabapoana, together with commercial shrimps, 1 ovig. ♀ (MNRJ), 1.11.73; 22°16′ S, 41°20′ W, 19-22 m, sand, 22.46 °C, 2 spec. (IOUSP-CO281), *Besnard* St. 1253, 30.11.70. — SÃO PAULO : Ubatuba, 1 ♂, 4 ovig. ♀ (MZUSP 30), **J.L.F.** coll. July 1970; *ibid.*, 15 m, 4 ovig. ♀ (USNM 141456), **J.A.** coll. 10.4.72; *ibid.*, Praia de Iperoigue, together with commercial shrimps, 2 samples (14 ♂, 31 ovig. ♀, 1 non-ovig. ♀), **M.L.C.** coll. 15.7.76 and 5.1.77; *ibid.*, Praia da Fortaleza, below 10 m, sand, together with commercial shrimps, 2 ♂, 6 ovig. ♀, **M.L.C.** coll. 17.4.76; 23°41.5′ S, 45°17′ W, 15.5 m, sand, 1 spec. (IOUSP-C1002), *Emília;* 23°51′ S, 46°07′ W, 9 m, mud, several spec. (IOUSP-C1013), *Emília;* Ilha de Santo Amaro, Praia de Perequê, below 10 m, together with commercial shrimps, 3 samples (10 ovig. ♀), **M.L.C.** coll. 25.8.76 to 5.12.76; Baía de Santos, 1 ovig. ♀ (USNM 92852), **Ca.** coll. 12.2.50; *ibid.*, 20 m, 10 ovig. ♀ (USNM 108165), **G.S.N.** coll. May 1962; *ibid.*, several spec. (IOUSP-C1095), *Emília*, 28.7.70; 24°02′ S, 46°20′ W, 14 m, sand, 1 ovig. ♀ (IOUSP-C1019), *Emília;* 24°02′ S, 46°26′ W, 10 m, sand and mud, 21.4 °C, 4 ovig. ♀ (IOUSP-C1047), *Emília;* 24°02.1′ S, 46°24.3′ W, 13.5 m, sand, 20.4 °C, 3 spec. (2 ovig. ♀) (IOUSP-C1025), *Emília;* 24°02.5′ S, 46°18.2′ W, 19 m, mud, 1 spec. (IOUSP-C1066), *Emília;* 24°02.5′ S, 46°22′ W, 15 m, soft mud, 7 spec. (4 ovig. ♀) (IOUSP-C1088), *Emília;* 24°04′ S, 46°14.8′ W, 20 m, mud, 20.9 °C, 3 spec. (2 ovig. ♀) (IOUSP-C1021), *Emília;* 24°05.5′ S, 46°24′ W, 19 m, mud, 16.7 °C, 3 ovig. ♀ (IOUSP-C1029), *Emília;* 24°07.5′ S, 46°29′ W, 17 m, sand, 20.3 °C, 6 spec. (IOUSP-C1046), *Emília;* Peruíbe, several spec. (IOUSP), 11.4.78; 24°25′ S, 46°59′ W, 12 m, mud, 7 spec. (IOUSP-C1084), *Emília;* 24°26′ S, 46°21.1′ W, 15 m, mud, 2 ovig. ♀ (IOUSP-C1023), *Emília;* Cananéia, 1 spec. (IOUSP-C2107), *Itapocoroy*, 15.5.71. — PARANÁ : Paranaguá, 2 spec. (USNM 262587), **H.J.** coll. — RIO GRANDE DO SUL : 30°49′ S, 50°28′ W, 20 m, fine sand, 22.51 °C, 34.59‰, 6 spec. (3 ovig. ♀) (IOUSP-CO483), *Besnard* St. 1724, 10.4.72; 31°27′ S, 51°05′ W, 16 m, sand, 22.17 °C, 33.78‰, 5 spec. (IOUSP-CO494), *Besnard* St. 1732, 12.4.72; 31°45′ S, 51°26′ W, 15 m, mud and clay, 23.90 °C, 33.78‰, 2 young spec. (IOUSP-CO424), *Besnard* St. 1669, 22.1.72; 31°45′ S, 51°26′ W, 16 m, fine sand and mud, 21.95 °C, 33.43‰, 2 samples (2 ovig. ♀, 5 spec.) (IOUSP-CO496), *Besnard* St. 1733, 12.4.72; 32°05′ S, 51°55′ W, 13 m, fine sand, 24.72 °C, 33.27‰, 1 ovig. ♀ (IOUSP-CO418), *Besnard* St. 1661, 20.1.72; 32°58′ S, 52°30′ W, 13 m, fine sand and mud, 20.40 °C, 33.03‰, 4 spec. (2 ovig. ♀) (IOUSP-CO509), *Besnard* St. 1746, 20.4.72; 33°21′ S, 52°49′ W, 14 m, fine sand, 20.05 °C, 33.13‰, 18 spec. (1 ovig. ♀) (IOUSP-CO507), *Besnard* St. 1745, 19.4.72; 33°41′ S, 53°08′ W, 19-23 m, mud and clay, 24.28 °C, 1 ovig. ♀ (IOUSP-CO117), *Besnard* St. 573, 13.3.69. — URUGUAY : 33°45′ S, 53°17′ W, 15 m, calcareous sand, 1 ovig. ♀ (IOUSP), *Besnard* St. 1737, 18.4.72.

SIZE. — Largest ovigerous female, 26+16.5+42 mm. Largest male 23+14+40 mm. Smallest ovigerous female 16.5+8.5+23.5 mm.

COLOR. — Agrees with HOLTHUIS' account (1959 : 114), which is also summarized by WILLIAMS (1965 : 86).

REMARKS. — Rostrum with 10-14 teeth on basal crest, 1-6 along dorsal margin and 9-14 along ventral margin. Epipods small on third maxilliped and first two pereiopods, larger on third and fourth pereiopods. Slightly unequal second pereiopods with 12-15 carpal and 6-12 meral articles each. Mandible with two dorsal and four larger ventral teeth. Appendix masculina two-thirds as long as appendix interna in large non-ovigerous specimens; sometimes also present, but variously reduced, in ovigerous specimens.

HABITAT. — From 5 to 45 m deep. Mud; mud and clay; mud and shells; sand; calcareous sand. Measured water temperatures, 16.7 to 27 °C; salinities, 15.89 to 35.30‰.

GEOGRAPHICAL DISTRIBUTION. — Carolinas; Georgia; Texas; Guyana to Amapá, Pará; Ceará to Pernambuco; Espirito Santo to the north of Uruguay.

Merhippolyte americana
Holthuis, 1961

Systellapsis debilis, Boone, 1930 *b* (not *Acanthephyra debilis* A. Milne Edwards, 1881) : 135, pl. 46 (off Alligator Reef, Florida, 274.2 m).
Merhippolite americana Holthuis, 1961 : 1, fig. 1 (Holotype ♂, USNM 105274; Type locality : 20°59'30" N, 86°23'45" W, Yucatan Channel, 237.6 m, coral; Other localities : 34°39'15" N, 75°33'30" W, off Cape Lookout, North Carolina, 195.6 m, sand and pebbles).

Material. — Gulf of Mexico : Yucatan Channel, 20°59'30" N, 86°23'45" W, 237.6 m, 1 ♂, Holotype (USNM 105274), *Albatross* St. 2354, 22.1.1885. — Brazil, São Paulo : 23°36' S, 42°29' W, 172-174 m, gravel, 14.49 °C, 1 ♂, 1 ovig. ♀ (IOUSP-CO232), *Besnard* St. 1148, 9.8.70; 24°43' S, 45°10' W, 97-100 m, mud, 9 spec. (5 ovig. ♀), *Calypso* St. 138, 11.12.61. — Rio Grande do Sul : 30°42.7' S, 49°03.4' W, 186 m, mud, sand and shells, 15.80 °C, 35.65 ‰, 5 spec. (1 ovig. ♀) (IOUSP-CO535), *Besnard* St. 1856, 5.8.72; 31°02' S, 49°52' W, 135 m, live shells, 16.99 °C, 35.85 ‰, 1 spec. (IOUSP-CO480), *Besnard* St. 1722, 10.4.72; 31°08.6' S, 49°31.7' W, 253 m, mud, sand and shells, 15.36 °C, 35.53 ‰, 1 spec. (IOUSP-CO536), *Besnard* St. 1858, 6.8.72; 31°14' S, 49°35' W, 180 m, calcareous rock, 16.58 °C, 35.76 ‰, 1 spec. (IOUSP-CO479), *Besnard* St. 1721, 10.4.72; 33°17' S, 50°34' W, 166 m, fine sand and mud, 15.83 °C, 35.80 ‰, 2 samples (5 spec.) (IOUSP-CO414), *Besnard* St. 1656, 19.1.72; 33°38' S, 51°04' W, 176-229 m, sand and mud, 17.94 °C, 35.90 ‰, 2 samples (8 spec.) (IOUSP-CO413), *Besnard* St. 1655, 19.1.72. — Uruguay : 34°01' S, 51°32' W, 162 m, calcareous rock, 16.13 °C, 35.71 ‰, 1 spec. (IOUSP-CO504), *Besnard* St. 1742, 19.4.72; 34°06' S, 51°33' W, 139-145 m, gravel, 14.57 °C, 35.58 ‰, 7 spec. (3 ovig. ♀) (IOUSP-CO407), *Besnard* St. 1648, 17.1.72; 34°25' S, 51°49' W, 156 m, 4 ♂, 8 ♀ (6 ovig.) (part of MZUSP 39), *Besnard* St. 1646; 34°28' S, 51°50' W, 170 m, coarse sand, 16.82 °C, 35.81 ‰, 2 samples (3 ovig. ♀, 2 spec.) (IOUSP-CO503), *Besnard* St. 1740, 18.4.72; 34°34.5' S, 52°25.5' W, 80 m, fine sand, 10.65 °C, 34.07 ‰, 1 spec. (IOUSP-CO565), *Besnard* St. 1880, 15.8.72; 34°34.5' S, 52°25.5' W, 80 m, fine sand, 11.36 °C, 34.07 ‰, 1 spec. (IOUSP-CO566), *Besnard* St. 1881, 15.8.72. — Argentina, Buenos Aires : 35°10.0' S, 52°46.0' W, 90 m, fine sand, 8.14 °C, 33.16 ‰, 2 spec. (IOUSP-CO555), *Besnard* St. 1873, 13.8.72.

Size. — Largest ovigerous female, 10+6+20 mm. Largest male, 8+5+16.5 mm. Smallest ovigerous female, 6.5+5+15 mm.

Color. — Some of the specimens preserved in formalin still had traces of red chromatophores spread over body.

Remarks. — The rostrum was incomplete in the previous accounts; it ends in a bifid point, the lower spine being the larger; 4-5 spines are present along the proximal half of the upper margin, 5-6 spines along the lower margin. The second pleopod of the male has the appendix masculina slightly shorter than the appendix interna (*cf.* Holthuis, 1961 : 3, fig. 1 *p*).

Habitat. — From 80 to 274.2 m deep. Mud; fine sand; coarse sand; gravel; sand and pebbles; live shells; calcareous rock; coral. Measured water temperatures, 8.14 to 17.94 °C; salinities, 33.16 to 35.90 ‰.

Geographical distribution. — North Carolina; south Florida; Yucatan Channel; São Paulo; Rio Grande do Sul to the Province of Buenos Aires.

Trachycaris restricta
(A. Milne Edwards, 1878)

Hippolyte restrictus A. Milne Edwards, 1878 : 231 (Type locality : Cape Verde Islands). — Holthuis, 1947 : 22.
Platybema rugosus Bate, 1888 : 579, pl. 104, fig. 2 (Holotype : Ovig. ♀; Type locality : Saint Thomas, shallow water (according to p. 859). — Calman, 1906 : 33.
Platybema rugosum, Ortmann, 1893 : 47 (Mouth of the Tocantins River, Pará, 50-100 m). — Rathbun, 1902 : 113 (off Dry Tortugas, Florida, 47.5 m; Gulf of Mexico, 45.7-69.5 m; off Cape Catoche, Yucatan, 43.9 m; Mayaguez, Puerto Rico, coral reef; off Vieques, 29.2 m; off Saint Thomas, 36.6-42.0 m; off Culebra, 26.9-27.4 m). — Bouvier, 1918 : 6 (Cuba).
Trachycaris rugosus, Schmitt, 1924 *a* : 68 (Curaçao); 1924 *c* : 82 (English Harbor, Antigua); 1935 : 156, fig. 23 (Guanica Harbor and off Talloboa Bay, Puerto Rico). — Gurney, 1940 : 123, pl. 1-3 (larvae; Bermuda; Gulf of Guinea; Saint Helena Island). — Holthuis, 1947 : 16.
Trachycaris restrictus, Holthuis, 1949 : 233, fig. 2, 3 (Tenerife, Canary Islands, reef in shallow water). — Chace, 1972 : 142.
Trachycaris restricta, Holthuis, 1951 : 130, fig. 27 (São Vicente, Cabo Verde Islands, 40 m, bottom corals); 1955 : 104, fig. 71 *a*. — Coelho and Ramos, 1972 : 154 (reefs off Ceará; Ceará; Paraíba; Pernambuco; Bahia; Espirito Santo; 47-68 m, calcareous algae).

Material. — Brazil, Bahia : 12°56.4' S, 38°33.5' W, 18 m, sand and calcareous algae, 1 young spec., *Calypso* St. 57, 24.11.61; 16°46' S, 38°53' W, 27 m, mud, shells and shell fragments, 2 ovig. ♀, *Calypso*

St. 75, 27.11.61; 18°09' S, 38°20' W, 33 m, rocks and calcareous algae, 1 ovig. ♀, *Calypso* St. 79, 28.11.61; 18°09' S, 38°30' W, 50 m, rocks, calcareous algae and corals, 1 ♀, *Calypso* St. 80, 28.11.61.

SIZE. — Largest ovigerous female, 9+12 mm. Smallest ovigerous female, 7.5+10.5 mm.

COLOR. — Live specimens are bright red (HOLTHUIS, 1949 : 238).

REMARKS. — The rostrum, with 9-12 dorsal and 1-3 frontal teeth, and the form of the pleurae of the fourth to sixth abdominal somites are similar to the Canary Islands specimen (HOLTHUIS, 1951 : 130, fig. 27). The remaining characters agree with the Cabo Verde Islands specimen (HOLTHUIS, 1949 : 233, fig. 2, 3), except for the second pereiopod; in this, the second article of the carpus is about one-fourth longer than the first article, and the ischium is equal in length to the merus. In the specimen from *Calypso* St. 79 and in only one specimen from *Calypso* St. 75, the merus of the third pereiopod has two extra movable spines proximal to the posterodistal spine : the larger of these is situated proximal to the middle of the segment, whereas the smaller one is situated about half way between the proximal and distal spines, somewhat displaced towards the posterior margin. Two possible important features have not been previously indicated : The stylocerite has a third strong and sharp spine projecting obliquely over the dorsomedian region of the basal antennular segment, in addition to the two spines indicated by HOLTHUIS (1949 : 234, fig. 3 *a*); of the five pairs of marginal spines on the telson, one is fixed and situated on the posterior margin, whereas four are movable and situated on the lateral margins.

HABITAT. — From surface to 50-100 m deep. Mud, shells and broken shells; calcareous algae; sand, calcareous algae, corals and rocks; shallow reef corals; bottom corals.

GEOGRAPHICAL DISTRIBUTION. — Bermudas ; Dry Tortugas; Florida Gulf coast; Quintana Roo, Yucatan Peninsula; Cuba; Puerto Rico; Saint Thomas; Antigua Island; Curaçao; Pará to Espirito Santo. Saint Helena Island. East Atlantic from the Canary Islands, Cabo Verde Islands and Gulf of Guinea.

Family **PROCESSIDAE**

Processa bermudensis (Rankin, 1900)

Nika bermudensis Rankin, 1900 : 536, pl. 17 fig. 2, 2 *a*, 2 *b* (Syntypes : 3 spec.; Type locality : Harrington Sound, Bermuda, 1.8 m).

Processa canaliculata, p.p. RATHBUN, 1902 (not Leach, 1815) : 104 (Key West, Florida). — p.p. SCHMITT, 1935 : 169, fig. 32. — p.p. ? CHACE, 1937 *b* : 56. — MONOD, 1939 : 557 (Guadeloupe).

Processa canaliculata var. *bermudensis*, p.p. VERRILL, 1922 : 138, pl. 35 fig. 1-1 *g*, pl. 41, fig. 4 (Bermuda).

Processa bermudensis, GURNEY, 1936 : 624, pl. 5, fig. 44-52, pl. 6, fig. 53-62 (larvae), pl. 7, fig. 63-68 (larvae) (Bermudas); 1937 : 87. — LEBOUR, 1941 : 401, fig. 28-33 (Bermuda). — HOLTHUIS, 1959 : 120. — WILLIAMS, 1965 : 86, fig. 70 (Bogue Sound, North Carolina). — MANNING and CHACE, 1971 : 15, fig. 6, 7 (Bermuda, grass flats, some at night. Florida : Biscayne Bay; Key West; Dry Tortugas, from *Halimeda;* Egmont Key; Cedar Key. Cuba : Cabanas, mud, shell, and grass bottom; Cardenas Bay. La Parguera, Puerto Rico, *Thalassia* flats, at night). — CHACE, 1972 : 143. — RAY, 1974 : 199 (Isla de Lobos reef, Veracruz, 7.6 and 13.7 m).

Processa ?bermudensis, O'GOWER and WACASEY, 1967 : 209 (Virginia Key, Florida).

Processa sp. Rouse, 1970 : 140 (Everglades, Florida).

MATERIAL. — USA, NORTH CAROLINA : 34°27.0' N, 76°02.0' W, 41 m, sand and shells, 24.1 °C, 3 spec. (DML 2102), J.D. coll. 28.6.65. — BRAZIL, BAHIA : 13°02.0' S, 38°32.5' W, 31 m, mud, 1 ovig. ♀, *Calypso* St. 56, 24.11.61. — RIO DE JANEIRO : 23°04' S, 44°14' W, 45 m, mud, 1 ovig. ♀, *Calypso* St. 114, 8.12.61.

SIZE. — Both ovigerous females, 6+11 mm.

COLOR. — Recorded by LEBOUR (1941) and MANNING and CHACE (1971 : 18).

REMARKS. — Some characters resemble *P. vicina* Manning and Chace (1971 : 34, fig. 19, 20) : Rostrum slightly deflexed at apex; antennular peduncle extending by two distal segments and 1/2-1/3 of proximal segment beyond rostrum; third maxilliped overreaching antennal scale by length of distal segment or by distal and one-third of penultimate segment; merus of left second pereiopod with five articles. Identification of the new material as *P. bermudensis* (Rankin) is assured by cornea width distinctly less than length of stalk and cornea combined and by second pereiopods strongly unequal, right one with two ischial, 10 meral and 25 carpal articles, left one with five meral and 15 carpal articles. Other than

above, the new material differs from MANNING and CHACE'S description of *P. bermudensis* (1971 : 15, fig. 6, 7) only in minor proportions and relative lengths of segments : Distal antennular segment four-fifths length of penultimate segment; first pereiopods slightly shorter than antennal scale; propodus of left first pereiopod 3.5-4 times longer than dactyl; third pereiopod overreaching antennal scale by dactyl and half of propodus.

HABITAT. — From 1.8 to 45 m deep. Grass flats, including *Thalassia;* mud; sand and shells; from the green calcareous algae *Halimeda.* Measured water temperature, 24.1 °C.

GEOGRAPHICAL DISTRIBUTION. — Bermudas; North Carolina; southeast Florida to Dry Tortugas; West Florida and Veracruz, Gulf of Mexico; Cuba; Puerto Rico; Guadeloupe; Bahia; State of Rio de Janeiro.

Processa brasiliensis sp. n.

(fig. 34, 35)

HOLOTYPE. — Ovig. ♀, MNHN Na 3602; 8°15′ S, 34°42′ W, off Pernambuco, 33 m, calcareous algae and corals, *Calypso* St. 22, 21.11.61.

PARATYPES. — BRAZIL, ATOL DAS ROCAS : 3°51.1′ S, 33°50.1′ W, 27 m, rocks, calcareous algae and other algae, 1 ♂, *Calypso* St. 8, 17.11.61. — BAHIA : 15°37′ S, 38°44′ W, 39 m, calcareous algae, corals and other algae, 1 ♀, *Calypso* St. 69, 27.11.61; 18°00′ S, 38°18′ W, 48 m, bryozoans, calcareous algae and sponges, 2 ♀ (1 ovig.), *Calypso* St. 77, 28.11.61; 18°09′ S, 38°30′ W, 50 m, rocks, calcareous algae and corals, 2 ♀ (1 ovig.), *Calypso* St. 80, 28.11.61.

DESCRIPTION. — Rostrum (fig. 34 *a*) straight dorsally, not reaching to distal margin of cornea; apex bifid, lower tooth over twice as long as upper one, bifurcation obscured by several long setae; lower margin of rostrum convex proximally, slightly concave distally. Lower orbital angle conspicuous, rounded or broadly angled. Antennal spine long and sharp. Lower anterior angle of carapace rounded, lined with fine setae.

Abdomen (fig. 34 *b*) smooth, ventral margins of pleurae lined with fine setae. Abdominal sternites unarmed except for median spine pointing backwards at posterior margin of sixth somite. Pleura of first four somites rounded; of fifth approximately right-angled posterolaterally, convex or almost straight ventrally. Sixth abdominal somite more than 1.5 times longer than fifth, sharply angled posterolaterally; lobe above articulation of uropod unarmed.

Telson (fig. 34 *c*) over twice as long as fifth abdominal somite, about 1.5 times as long as sixth somite; length over three times greatest width. Anterior pair of dorsal spines of telson set at one-fifth distance from proximal margin, posterior spines at three-fifths from this margin. Transversal row of setae present midway between anterior margin of telson and anterior pair of dorsal spines. Longitudinal groove, largest in posterior half and fringed by setae, present on dorsal midline of telson. Apex of telson rounded or righ-angled, a sharp median point being absent; it is flanked by two pairs of lateral spines, inner of which three to four times longer than outer pair, and one pair of mesial spiniform setae, about twice as long as lateral spines.

Eye (fig. 34 *a*) moderately large; cornea width about four-fifths length of stalk and cornea combined, about twice greatest width of antennal scale.

Antennular peduncle (fig. 34 *d*) extending beyond rostrum by distal two segments and about one-third of proximal segment. Proximal segment half again as long as distal segments combined, ultimate segment slightly more than two-thirds as long as penultimate segment. Ventral carina on basal segment with small spine set slightly beyond midlength of segment. Stylocerite obtusely rounded laterally, inner margin projecting farther than outer, unarmed. Dorsolateral flagellum of antennule about equal in length to carapace, thickened setigerous portion consisting of 13-20 articles and amounting to four-fifths of length of peduncle, slender distal portion consisting of 6-10 articles; ventromesial flagellum about three times longer than carapace.

Antennal scale (fig. 34 *e*) extending slightly beyond antennular peduncle, length of scale slightly over six times greatest breadth; lateral margin straight, distal spine not overreaching truncate distal end of blade. Antennal peduncle reaching about to one-third or half of length of second antennular segment. Basal segment of antenna lacking ventrolateral spine. Antennal flagellum over four times carapace length.

Third maxilliped (fig. 35 *a*) overreaching antennal scale by distal and two-thirds to three-fourths of penultimate segment; ultimate segment with some short spines on surface, apex acute; penultimate segment slightly shorter than ultimate, with one pair

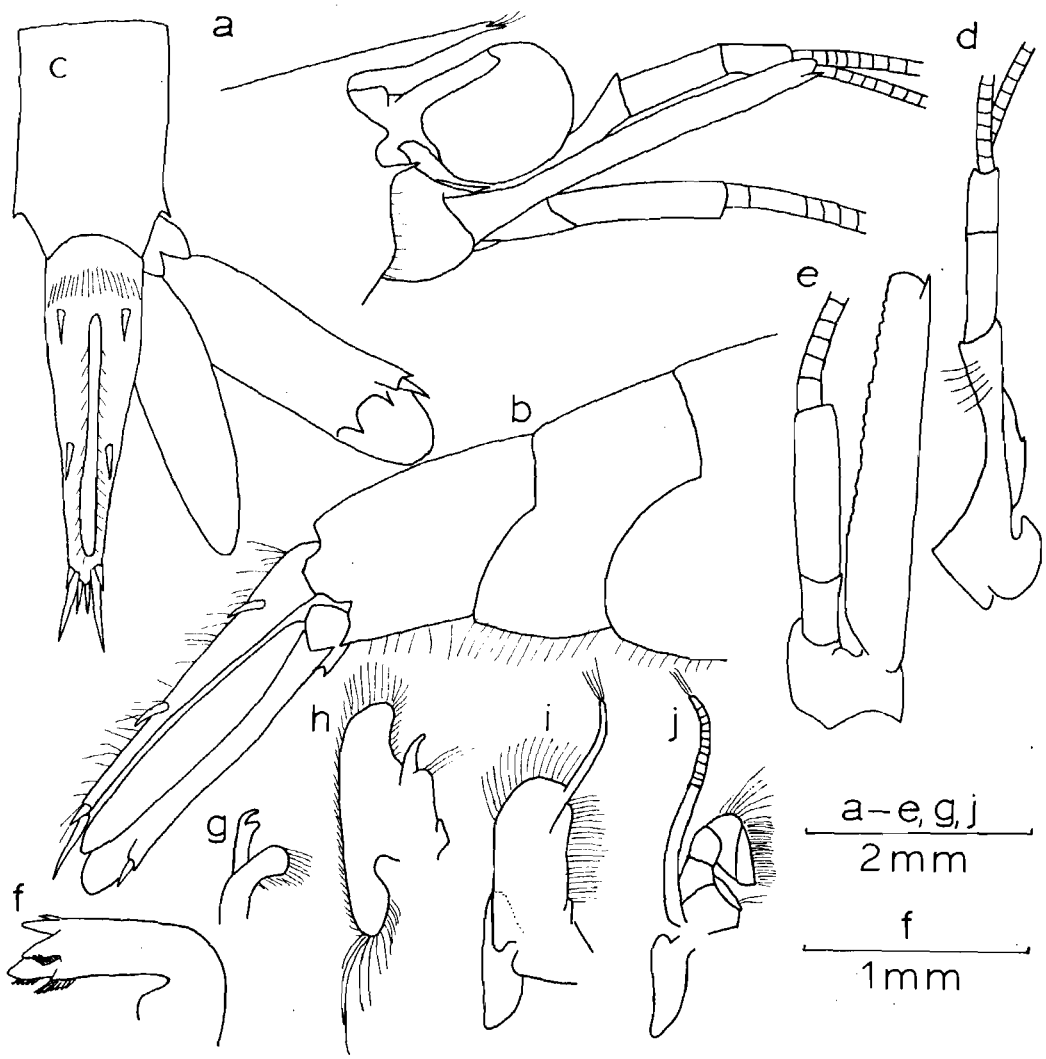

FIG. 34. — Processa brasiliensis *sp. n., female paralype from* Calypso *St. 77 :* a, *anterior region, lateral view;* b, *posterior region, lateral view;* c, *telson and uropod, dorsal view;* d, *antennule, dorsolateral view ;* e, *antenna, dorsal view ;* f, *mandible;* g, *first maxilla;* h, *second maxilla;* i, *first maxilliped;* j, *second maxilliped.*

of distal spines; antepenultimate segment longer than combined length of distal segments, exopod well developed. Mandible (fig. 34 *f*, 35 *m*) with longitudinal series of 12-19 spines on posterior margin and diagonal series of 6-13 spines on lateral surface. Other mouth parts as figured (fig. 34 *g-j*).

First right pereiopod (fig. 35 *b*) chelate, overreaching antennal scale by about length of fingers; palm about twice as long as fingers; carpus slightly less than three-fourths length of palm; merus over three times longer than carpus, one-tenth again as long as combined length of chela and carpus.

Left first pereiopod (fig. 35 *c*) with simple dactyl, overreaching antennal scale by dactyl and about one-third length of propodus; dactyl slightly less than one-third length of propodus; carpus three-fifths length of propodus; merus almost three times longer than carpus, subequal to combined length of carpus and propodus.

No arthrobranches present at base of first pereiopods.

Right second pereiopod (fig. 35 *d*) longer than left, overreaching antennal scale by chela, carpus, and sometimes by up to five distal articles of merus;

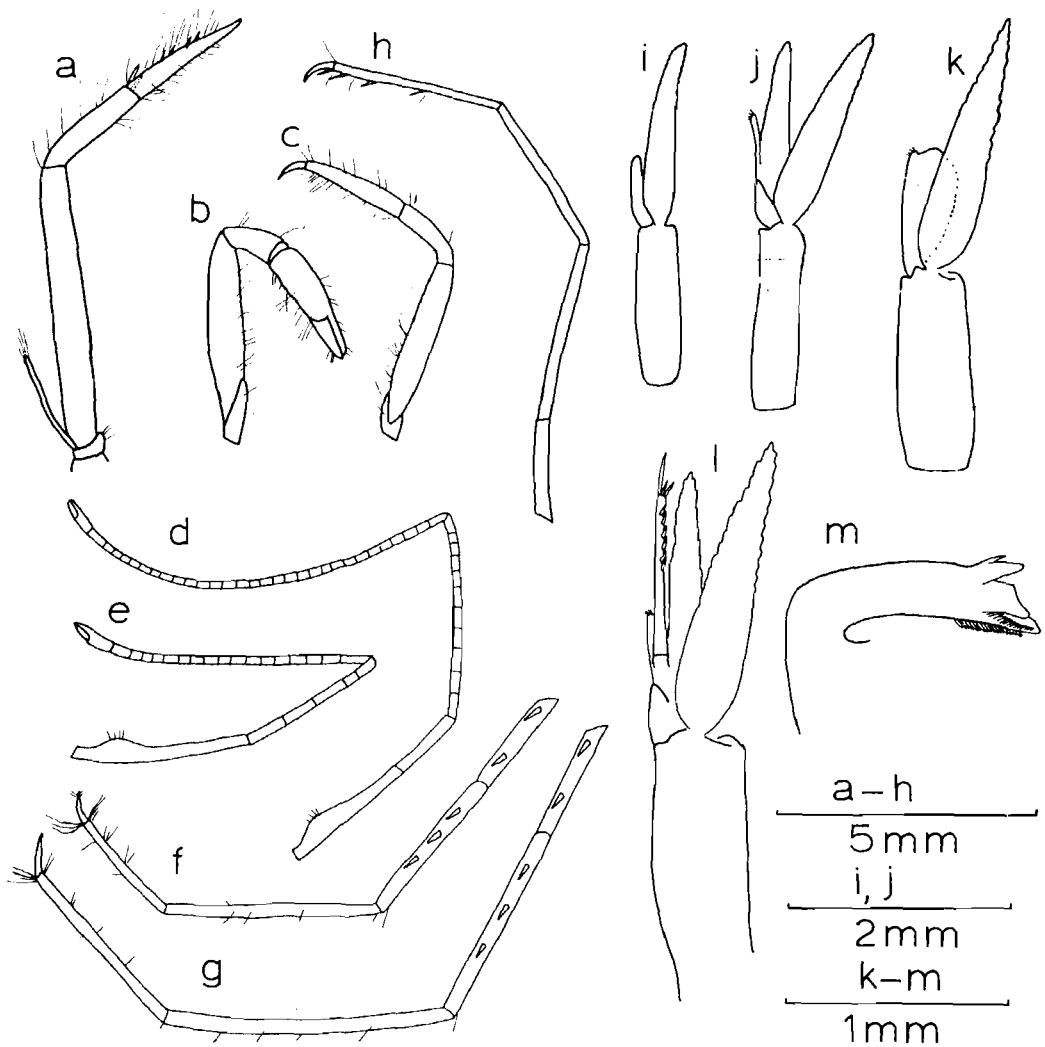

FIG. 35. — Processa brasiliensis *sp. n., female paratype from* Calypso *St. 77 :* a, *third maxilliped;* b, *right first pereiopod;* c, *left first pereiopod;* d, *right second pereiopod;* e, *left second pereiopod;* f, *third pereiopod;* g, *fourth pereiopod;* h, *fifth pereiopod;* i, *first pleopod;* j, *second pleopod. Male paratype from* Calypso *St. 8 :* k, *first pleopod;* l, *second pleopod. Ovigerous female paratype from* Calypso *St. 80 :* m, *mandible.*

ischium with two, merus with 10-14 and carpus with 26-33 articles; fingers slightly shorter than palm; carpus 9-11 times, and merus 5-6 times, longer than chela; ischium equal in lenght or longer than merus.

Second left pereiopod (fig. 35 *e*) with merocarpal articulation reaching from end of basal antennular segment to end of antennal scale; ischium usually undivided but sometimes with two articles, merus with five and carpus with 17-19 articles; fingers about two-thirds length of palm; carpus 5.5-6.5 times, and merus 3-3.5 times, longer than chela; ischium one-fourth again as long as merus.

Third pereiopod (fig. 35 *f*) overreaching antennal scale by dactyl, propodus and about one-third of carpus; dactyl slender, simple, with subapical setae; propodus four times longer than dactyl, unarmed, surface ornamented with scattered short setae, longer tufts at apex; carpus unarmed, almost twice as long as propodus, with scattered short setae on surface; merus about one-third again as long as propodus, with 3-4 movable spines on lateral surface; ischium about three-fifth as long as merus, with two movable spines on lateral surface; combined length of propodus and carpus one-tenth again as long as that of merus and ischium.

Fourth pereiopod (fig. 35 *g*) overreaching antennal

scale by dactyl, propodus and about half of carpus; dactyl slender, simple, with or without subapical tufts of setae; propodus five times longer than dactyl, unarmed, ornamented with few short setae on surface and longer distal tufts; carpus unarmed, about one-third again as long as propodus, ornamented with few surface setae; merus about one-tenth again as long as propodus, with 3-4 movable spines on lateral surface; ischium about half as long as merus, with two movable spines on lateral surface; combined length of propodus and carpus almost 1.5 times combined length of merus and ischium.

Fifth pereiopod (fig. 35 *h*) overreaching antennal scale by dactyl and half to four-fifth of propodus; dactyl slender, simple, apex with or without a subapical tuft of short setae; propodus about four times longer than dactyl, ornamented with few scattered short setae on surface and 4-7 spines on flexor margin; carpus unarmed, subequal in length to propodus; merus unarmed, slightly longer than propodus; ischium unarmed, slightly over half as long as merus; combined length of propodus and carpus greater than that of merus and ischium.

First two pleopods of female as illustrated (fig. 35 *i, j*). Endopod of first male pleopod (fig. 35 *k*) with apex rounded, retinacular lobe distinct. Appendix masculina of second male pleopod (fig. 35 *l*) extending almost to extremity of endopod, with longitudinal row of six spinules on mesial surface, and with three distal spinules, one of which is about twice as long as the other two.

Outer branch of uropod (fig. 34 *a*) with lateral margin ending in sharp, triangular projection, and with stronger mesial movable spine; dorsal surface over transversal suture marked with two sharp triangular lobes directed posteriorly.

SIZE. — Largest undamaged ovigerous female, 7+13 mm. Smallest ovigerous female, 6.5+12.5 mm. Only male, 4+8.5 mm.

COLOR. — Not recorded.

REMARKS. — *P. brasiliensis* sp. n. is closely related to West African *P. borboronica* Holthuis (1951 : 43, fig. 9), but the latter differs as follows : Rostrum with lower margin less sinuous and lower distal tooth only slightly longer than upper tooth; antennal spine on carapace shorter; pleura of fifth abdominal somite with concave ventral margin; sixth abdominal somite less than 1.5 times as long as fifth, and ending posterolaterally in a minute point; telson with posterior margin ending in sharp median point and with posterior pair of dorsal spines set at midlength of telson; stylocerite with lateral angle of anterior margin produced into minute tooth; basal antennular segment equal to combined length of second and third segments; outer margin of antennal scale slightly sinuous; first right pereiopod with fingers two-thirds as long as palm, and carpus equal in length to latter; arthrobranch present at base of first legs; right second pereiopod with nine meral articles; left second pereiopod with merocarpal articulation failing to reach end of first antennular segment, and with four meral articles; merus of third and fourth pereiopod with six movable spines on lateral surface; dactyl of fourth pereiopod one-third as long as propodus; propodus of fifth pereiopod with three spines on flexor margin; appendix masculina of second pleopod reaching only two-thirds to three-fourths of length of endopod. The study of further East and West Atlantic material will probably diminish these differences, as in the case of other species with distant counterparts (e.g. *P. hemphilli* Manning and Chace, treated below).

HABITAT. — From 27 to 50 m deep. Calcareous algae and corals; rocks, calcareous algae and other algae; bryozoans, calcareous algae and sponges.

The related species *P. borboronica* Holthuis was found on muddy or sandy bottoms, at depths of 50 to 86 m (HOLTHUIS, 1951 : 47).

GEOGRAPHICAL DISTRIBUTION. — Atol das Rocas and Pernambuco to the south of Bahia.

Processa fimbriata
Manning and Chace, 1971

Processa canaliculata, p.p. RATHBUN, 1902 (not Leach, 1815) : 104 (off Vieques, 23 m, coral, and Boqueron Bay, Puerto Rico). — RICHARDSON, 1904 : 87 (06°59'30" S, 34°47'00" W, Paraiba, 36.6 m, shell fragments, as host to bopyrid isopod *Urobopyrus processae* Rich.). — PEARSE, 1934 : 119 (Dry Tortugas, Florida, in *Spheciospongia vesparia*). — p.p. SCHMITT, 1935 : 169.

Processa sp Pearse, 1950 : 150 (Bimini, in sponges *Ircinia strobilina* and *Aulospongus schoemus*).

Processa fimbriata Manning and Chace, 1971 : 19, fig. 8-10 (Holotype : ♂, USNM 134113; Type locality : Off East Key, Tortugas, Monroe County, Florida, 3 m; Other localities : Off New River, North Carolina. Cat Cay, 11 m, and Great Inagua Island, Bahamas. Tortugas : Loggerhead Key, weeds and rocks, loggerhead sponge and old coral rock with algae, 1-9 m; Bush Key, reef; White Shoal, from buoy; from stomach of *Lutjanus apodus*). — CHACE, 1972 : 143 (Saba Bank; Antigua Island; Guadeloupe; Dominica; Tobago Cays;

Tobago; Isla de Cozumel; Bahía de la Ascensión; Bahía del Espíritu Santo; most spec. on coral flats and among coral encrusted rocks from the littoral zone to 13 m). — COELHO and RAMOS, 1972 : 154. — RAY, 1974 : 199, fig. 196-200 (West Flower Garden reef, Texas, 30 m; Isla de Lobos reef, Veracruz, 7.6 m). — CAMP, WHITING and MARTIN, 1977 : 28 (Hutchinson Island, Florida, 8.4-11.2 m, 23.8-26.1 °C, 34.8-35.8 ‰). — GORE, SCOTTO and BECKER, 1978 : 225 (Between Fort Pierce and Saint Lucie, Florida, intertidal zone, associated with *Phragmatopoma*).

MATERIAL. — USA, FLORIDA : Dry Tortugas, off East Key, 3 m, 1 ♂, Holotype (USNM 134113), **W.L.S.** coll. 7.8.24. — BAHAMAS : Great Inagua Island, off Mathew Town, 1 ♀, Paratype (MCZ 10345), **R.A.M.** and **B.S.** coll. 1.8.38. — BRAZIL, ATOL DAS ROCAS : 14 m, rock, 1 spec., *Calypso* St. 4, 17.11.61. — PARAÍBA : 06°59'30" S, 34°47'00" W, 36.6 m, 1 spec., Paratype (USNM 23641), *Albatross*, 16.12.1887. — BAHIA : 15°37' S, 38°44' W, 39 m, calcareous algae, other algae and corals, 1 spec., *Calypso* St. 69, 27.11.61 : 18°09' S, 38°30' W, 50 m, rock, calcareous algae and corals, 1 ovig. ♀, *Calypso* St. 80, 28.11.61. — ESPÍRITO SANTO : Praia de Peracanga 0-0.5 m, at night, 21 spec. (3 ovig. ♀), **M.L.C.** coll. 10.1.78; *ibid.*, 1-2 m, on coral head, 1 spec., **M.L.C.** coll. 11.1.78; Praia de Meaípe, 0-0.5 m, at night, 2 spec., **M.L.C.** coll. 9.1.78; Anchieta, Praia do Ubu, 0-0.5 m, at night, 3 spec., **M.L.C.** coll. 8.1.78. — RIO DE JANEIRO : Ilha de Cabo Frio, Praia do Farol, 1-2 m, on *Pocillopora*, 1 ovig. ♀, **M.L.C.** coll. 14.1.77.

SIZE. — Largest ovigerous female, 6+14 mm. Smallest ovigerous female, 4.5+10 mm. Largest male, 4+9 mm.

COLOR. — Animals transparent, with irregular transversal bands of scattered red chromatophores throughout body. Eggs brown.

HABITAT. — Intertidal zone to 50 m deep. Broken shells; in sponges, including *Aulospongus schoemus*, *Spheciospongia vesparia* and *Ircinia strobilina;* from buoy; from stomach of *Luljanus apodus;* on *Phragmatopoma* worm reefs; calcareous algae, other algae and corals; on or among corals, including *Pocillopora;* rocks. Measured water temperatures, 23.8 to 26.1 °C; salinities, 34.8 to 35.8 ‰.

GEOGRAPHICAL DISTRIBUTION. — North Carolina; east Florida and Dry Tortugas; Texas and Veracruz, Gulf of Mexico; Quintana Roo, Yucatan Peninsula; Bimini to Great Inagua Island, Bahamas; Puerto Rico to Tobago; Atol das Rocas and Paraíba to the State of Rio de Janeiro.

Processa guyanae Holthuis, 1959

Processa guyanae Holthuis, 1959 : 115, fig. 18, 19 (Holotype : ♂, USNM; Type locality : 6°54' N, 56°14' W, NW of the Coppename River, Surinam, 49 m, shells and coral; Other localities : Several samples, between Coppename and Suriname rivers, 44-48 m, mud, shells and corals). — MANNING and CHACE, 1971 : 22. — CHACE, 1972 : 143. — FAUSTO-FILHO, 1975 : 79 (Ceará, 30 m, calcareous algae).

Processa tennipes Manning and Chace, 1971 : 31, fig. 17, 18 (Holotype : Ovig. ♀, USNM 97415; Type locality : 29°12' N, 84°22' W, Gulf coast of Florida, 31 m; Other localities : 35°08'30" N, 75°10' W, North Carolina, 90 m, grey sand; 28°44' N, 85°06' W, Gulf coast of Florida, 92 m, clay; 23°11'45" N, 82°17'54" W, north of Cuba, 331 m, fine brown sand). — CHACE, 1972 : 143 *(syn. n.)*.

MATERIAL. — USA, NORTH CAROLINA : 34°05.3' N, 73°14.5' W, 100 m, 4 spec. (DML 2346), *Eastward*, Ke. coll. 6.6.70. BRAZIL, RIO DE JANEIRO : 22°16' S, 40°50.5' W, 58-60 m, calcareous rock, 16.28 °C, several spec. (IOUSP-CO377), *Besnard* St. 1489, 11.3.71; 22°22' S, 41°07' W, 42 m, calcareous rock, 19.48 °C, 8 spec. (3 ovig. ♀) (IOUSP-CO279), *Besnard* St. 1252, 30.11.70; 22°24' S, 40°59' W, 57-62 m, gravel and coral, 15.52 °C, several spec. (IOUSP-CO221), *Besnard* St. 1138, 6.8.70; 22°33' S, 41°24' W, 46-47 m, sand, 17.14 °C, 4 spec. (2 ovig. ♀) (IOUSP-CO172), *Besnard* St. 1007, 24.5.70; 23°01' S, 41°58' W, 56 m, sand, 17.90 °C, 1 spec. (IOUSP), *Besnard* St: 1009, 25.5.70; 23°05'S, 42°47' W, 61-64 m, gravel, 17.33, 1 spec. ? (IOUSP-CO177), *Besnard* St. 1016, 26.5.70. — SÃO PAULO : 23°36' S, 42°29' W, 172-174 m, gravel, 14.49 °C, 6 spec. (2 ovig. ♀) (IOUSP-CO232), *Besnard* St. 1148, 9.8.70; 24°09' S, 44°59' W, 79-82 m, sand, 15.90 °C, 11 spec. (4 ovig. ♀) (IOUSP-CO191), *Besnard* St. 1029, 28.5.70; 24°43' S, 45°10' W, 97-100 m, mud, 4 spec. (2 ovig. ♀), *Calypso* St. 138), 11.12.61. — RIO GRANDE DO SUL : 30°28' S, 48°42' W, 150 m, sand, 1 spec. (IOUSP-CO468), *Besnard* St. 1711 extra, 7.4.72; 30°46' S, 49°07' W, 170-172 m, coarse sand and gravel, 16.37 °C, 35°76 ‰, 3 spec. (2 ovig. ♀) (IOUSP-CO441), *Besnard* St. 1684, 27.1.72. — URUGUAY : 34°06' S, 51°33' W, 139-145 m, gravel, 14.47 °C, 35.58 ‰, 8 spec. (1 ovig. ♀) (IOUSP-CO407), *Besnard* St. 1648, 17.1.72; 34°27.2' S, 51°50.0' W, 175 m, calcareous rock, 13.45 °C, 35.33 ‰, 6 spec. (IOUSP-CO568), *Besnard* St. 1883, 15.8.72; 34°28' S, 51°50' W, 170 m, coarse sand, 16.82 °C, 35.81 ‰, 5 spec. (3 ovig. ♀) (IOUSP-CO503), *Besnard* St. 1740, 18.4.72.

SIZE. — Largest ovigerous female, 12+23 mm, Largest male, 10+21.5 mm. Smallest ovigerous female, 9.5+16 mm.

TABLE IV. — *Comparison of morphological characters of the new South American material with original descriptions of* Processa tenuipes *Manning and Chace (1971 : 31) and* P. guyanae *Holthuis (1955 : 115).*

	Processa tenuipes *Manning and Chace*	*New South American material*	Processa guyanae *Holthuis*
shape of rostrum	convex dorsally, apex deflexed	intermediary between *P. tenuipes* and *P. guayanae*	straight
length of rostrum	shorter than eye	distinctly shorter or almost to end of eye	almost to end of eye
proportion length/width of telson	slightly more than 3 times greatest width	slightly more than 3 times greatest width	less than 3 times greatest width
length of distal antennular segment	less than half length of penultimate segment	slightly shorter than penultimate segment in ♂; about half of this in ♀	slightly shorter than penultimate segment in ♂; about half of this in ♀
length of antennal scale	about to end of antennular peduncle	distinctly longer than antennular peduncle	distinctly longer than antennular peduncle
length of distal antennal spine	not overreaching blade	not overreaching or slightly overreaching blade	slightly overreaching blade
length of distal segment of third maxilliped	shorter than penultimate segment	shorter or same length as penultimate segment	same length as penultimate segment
length of fingers of right first pereiopod	slightly over half length of palm	2/3 length of palm	2/3 length of palm
length of carpus of right first pereiopod	subequal to palm	slightly shorter than palm	slightly shorter than palm
length of left first pereiopod	overreaching antennal scale by dactyl and 1/3 of propodus	overreaching antennal scale only by dactyl	variable length
length of dactyl of first left pereiopod	about 1/4 of propodus	about 1/4 of propodus	1/3 of propodus
length of merus of first left pereiopod	longer than carpus, propodus and dactyl combined	longer than carpus, propodus and dactyl combined	twice length propodus
merocarpal articulation of second right pereiopod	overreaches eye	slightly shorter or slightly longer than antennal scale	overreachers antennal scale
number of articles of ischium + merus + carpus of second right pereiopod	4 + (18-28) + (48-69)	4 + (17-24) + (42-49)	3 + (18-20) + (44-47)
number of articles of ischium + merus + carpus of left second pereiopod	1 + (5-9) + (17-26)	1 + (5-8) + (17-21)	1 + (35 or more) + (17-18)
length of fingers of second pereiopods	subequal to palm	slightly shorter than palm	slightly shorter than palm
length of ischium of left second pereiopod	subequal to merus	subequal to merus	slightly shorter than merus
length of propodus of third perciopod	4 times as long as dactyl	3 to almost 4 times as long as dactyl	3 times as long as dactyl
length of carpus of third perciopod	slightly more than twice as long as propodus	slightly more than twice as long as propodus	almost twice as long as propodus
number of spines on merus of third pereiopod	4-6	5-6	6-7
combined length of ischium and merus of third pereiopod	shorter than combined length of propodus and carpus	shorter than combined length of propodus and carpus	equal to combined length of propodus and carpus
length of propodus of fourth pereiopod	4 times as long as dactyl	almost 4 times as long as dactyl	3 times as long as dactyl
length of propodus of fifth pereiopod	6-7 times as long as dactyl	5-6, less frequently 4.2-7 times as long as dactyl	4 times as long as dactyl
number of spines on propodus of fifth pereiopod	3-4	5-6	5-6
length of merus of fifth pereiopod	slightly shorter than carpus	slightly shorter or equal in length to carpus	slightly longer than carpus

COLOR. — Not recorded.

REMARKS. — As the small differences contained in the original descriptions of *P. tenuipes* Manning and Chace and *P. guyanae* Holthuis are differently combined, not constant or represented as intermediary characters in the new South American material (Table IV), I have synonymized the two species.

HABITAT. — From 30 to 331 m deep. Mud; fine brown sand; grey sand; coarse sand, gravel; shells; calcareous algae; corals; calcareous rock. Measured water temperatures, 13.45 to 19.48 °C; salinities, 35.33 to 35.81 ‰.

GEOGRAPHICAL DISTRIBUTION. — North Carolina; Florida Gulf coast; north of Cuba; Surinam; Ceará and the State of Rio de Janeiro to Uruguay.

Processa hemphilli
Manning and Chace, 1971

Processa canaliculata, p.p. RATHBUN, 1902 (not Leach, 1815) : 104 (Marco, Florida, 1.8-5.5 m; 25°13′ N, 82°28′ W. Florida Gulf Coast, 31 m, broken shell).
Processa hemphilli Manning and Chace, 1971 : 23, fig. 11, 12 (Holotype : ♀, USNM 23386; Type locality : Marco, Collier County, Florida, 1.8-5.5 m). — CHACE, 1972 : 143. — SALOMAN, 1976 : 50 (Panama City Beach, Florida). — CAMP, WHITING and MARTIN, 1977 : 28 (Hutchinson Island, Florida, 8.4-11.2 m, 19.5-32.0 °C, 34.0-38.0 ‰). — SALOMAN and NAUGHTON, 1978 : 67.

MATERIAL. — USA, FLORIDA : Marco, 1.8-5.5 m, 1 ♀, Holotype (USNM 23386), 1 ovig. ♀, Paratype (USNM), H.H. coll. — BRAZIL, RIO DE JANEIRO : 23°08′ S, 43°46′ W, 1 spec. (IOUSP-CO366), *Besnard* St. 1475, 8.3.71. — SÃO PAULO : 23°32′ S, 45°06′ W, 18 m, mud, 1 spec., *Calypso* St. 128, 10.12.61; 23°40′ S, 44°54′ W, 40 m, 25.36 °C, 35.67 ‰, 2 samples (1 ovig. ♀, 3 spec.) (IOUSP-C1103), *Emília*, 14.4.71; 23°41′ S, 45°23′ W, 9 m, muddy sand, 8 spec. (3 ovig. ♀) (IOUSP-C1001), *Emília;* 23°41.5′ S, 45°17′ W, 15.5 m, sand, 4 spec. (IOUSP-C1002), *Emília;* Canal de São Sebastião, 15-20 m, 1 ♂, 1 ♀, 15.2.66; 23°50′ S, 45°52′ W, 22 m, 2 samples (several spec.) (IOUSP-CO391), *Besnard* St. 1615, 15.12.71; 23°51′ S, 45°41′ W, 25-26 m, mud, 21.12 °C, 2 samples (several spec.) (IOUSP-CO249), *Besnard* St. 1163, 11.8.70; 23°58.5′ S, 46°22.7′ W, 5 m, mud, 21 °C, 1 spec. (IOUSP-C1082), *Emília;* 24°10′ S, 46°30′ W, 22 m, several spec. (IOUSP-CO388), *Besnard* St. 1607, 14.12.71; 24°13.0′ S, 45°54.1′ W, 33 m, sand, 23.3 °C, several spec. (IOUSP-C1060), *Emília;* 24°14′ S, 46°45′ W, 15 m, sand, 2 samples (2 spec.) (IOUSP-C1086), *Emília;* 24°21′ S, 46°38′ W, 25 m, sand, 20.63 °C, several spec. (IOUSP-CO254), *Besnard* St. 1170, 13.8.70; 24°26′ S, 46°54′ W, 24 m, shells, 3 spec. (1 ovig. ♀) (IOUSP-CO385), *Besnard* St. 1600, 13.12.71; 24°29′ S, 46°26′ W, 43 m, shells, 2 samples (2 ovig. ♀, 6 spec.) (IOUSP-CO386), *Besnard* St. 1606, 13.12.71; 24°40′ S, 47°16′ W, 19 m, 4 samples (several spec.) (IOUSP-CO384), *Besnard* St. 1599, 13.12.71; 24°51′ S, 47°29′ W, 21 m, sand, several spec. (IOUSP-C1082), *Emília;* 24°51′ S, 47°29′ W, 22 m, fine sand, 25.81 °C, 3 samples (several spec.) (IOUSP-CO356), *Besnard* St. 1458, 5.3.71; 25°00′ S, 47°07′ W, 21 m, sand, 20.41 °C, 1 spec. (IOUSP-CO255), *Besnard* St. 1171, 14.8.70; 25°00.5′ S, 47°44′ W, 17 m, sand, 4 spec. (2 ovig. ♀) (IOUSP-C1079), *Emília;* 25°01′ S, 47°08′ W, 42 m, 1 spec. (3 ovig. ♀) (IOUSP-CO383), *Besnard* St. 1598, 12.12.71; 25°03.5′ S, 47°51′ W, 12 m, sand, 2 samples (several spec.) (IOUSP-CO176), *Emília;* 25°04.5′ S, 47°48.5′ W, 15-15.5 m, sand, several spec. (IOUSP-C1080), *Emília;* 25°08′ S, 47°13′ W, 43 m, fine sand, 24.54 °C, several spec. (IOUSP-CO354), *Besnard* St. 1457, 4.3.71; 25°11′ S, 47°54′ W, 17 m, sand, 1 spec. (IOUSP-C1072), *Emília.* — PARANÁ : 25°21′ S, 47°58′ W, 20 m, sand, several spec. (IOUSP-CO381), *Besnard* St. 1593, 12.12.71; 25°46′ S, 47°38′ W, 49 m, sand, 21.82 °C, 1 spec. (IOUSP-CO206), *Besnard* St. 1044, 1.6.70; 25°51′ S, 48°19′ W, 21-22 m, sand with algae, 19.77 °C, 9 spec. (1 ovig. ♀) (IOUSP-CO262), *Besnard* St. 1180, 15.8.70. — SANTA CATARINA : 26°02.5′ S, 47°41.5′ W, 45 m, shells, 2 samples (4 ovig. ♀, several spec.) (IOUSP-CO380), *Besnard* St. 1592, 12.12.71; 26°53′ S, 48°31′ W, 33-38 m, sand and mud, 19.58 °C, 8 spec. (4 ovig. ♀) (IOUSP-CO264), *Besnard* St. 1181, 16.8.70; 28°18′ S, 48°34′ W, 50 m, clay and non-living shells, 24.75 °C, several spec. (IOUSP-CO338), *Besnard* St. 1441, 1.3.71; 28°42′ S, 48°54′ W, 35-36 m, sand and mud, 17.49 °C, 2 samples (2 ovig. ♀) (IOUSP-CO274), *Besnard* St. 1189, 17.8.70; 28°49.5′ S, 49°15′ W, 34 m, mud, 24.68 °C, several spec. (IOUSP-CO334), *Besnard* St. 1434, 27.2.71; 29°13′ S, 49°35′ W, 19 m, sand, 23.21 °C, 35.28 ‰, 9 spec. (3 ovig. ♀) (IOUSP-CO459), *Besnard* St. 1704, 6.4.72; 29°13′ S, 49°35′ W, 20-21 m, fine sand, 24.01 °C, 35.72 ‰, 1 ♀ (part of MZUSP 45), *Besnard* St. 1699. — RIO GRANDE DO SUL : 29°23′ S, 49°16′ W, 45 m, mud, 23.45 °C, 35.40 ‰, 2 spec. (1 ovig. ♀) (IOUSP-CO460), *Besnard* St. 1705, 6.4.72; 29°24.0′ S, 49°10.0′ W, 55 m, mud and shells, 18.81 °C, 35.39 ‰, 2 samples (4 spec.) (IOUSP-CO524), *Besnard* St. 1843, 2.8.72; 29°39′ S, 48°41′ W, 122-124 m, mud and clay, 15.66 °C, 35.67 ‰, several spec. (IOUSP-CO451), *Besnard* St. 1696,

30.1.72; 29°51.8′ S, 49°37.6′ W, 45 m, sand and shells, 16.00 °C, 32.67 ‰, 1 spec. (IOUSP-CO528), *Besnard* St. 1851, 4.8.72; 30°15′ S, 50°09′ W, 22 m, fine sand and mud, 22.61 °C, 34.72 ‰, 3 samples (2 ovig. ♀, 18 spec.) (IOUSP-CO474), *Besnard* St. 1716, 8.4.72; *30°16′ S, 50°09′ W, 21 m, fine sand, 24.32 °C, 35.34 ‰*, 2 samples (4 ovig. ♀, 7 spec.) (IOUSP-CO443), *Besnard* St. 1687, 28.1.72; 30°16′ S, 50°09′ W, 24 m, mud and clay, 24.29 °C, 35.68 ‰, 1 spec. (IOUSP-CO445), *Besnard* St. 1688, 28.1.72; 30°27.0′ S, 49°47.0′ W, 72 m, mud and clay, 15.10 °C, 32.15 ‰, 2 spec. (1 ovig. ♀) (IOUSP-CO532), *Besnard* St. 1854, 5.8.72; 31°09′ S, 50°43′ W, 21 m, dark mud, 22.28 °C, 34.83 ‰, 12 spec. (1 ovig. ♀) (IOUSP-CO485), *Besnard* St. 1725, 10.4.72; 31°45′ S, 51°26′ W, 16 m, mud and fine sand, 21.95 °C, 33.43 ‰, 2 samples (2 ovig. ♀, 8 spec.) (IOUSP-CO496), *Besnard* St. 1733, 12.4.72; 32°20′ S, 50°17′ W, 154 m, 16.94 °C, 35.82 ‰, 2 spec. (IOUSP-CO499), *Besnard* St. 1736, 13.4.72; 33°45.5′ S, 53°16.5′ W, 16 m, sand and broken shells, 11.70 °C, 29.91 ‰, 1 spec. (IOUSP-CO573), *Besnard* St. 1886, 16.8.72. — URUGUAY : 34°01.5′ S, 52°44.0′ W, 27 m, calcareous sand, 10.87 °C, 33.08 ‰, 1 spec. (IOUSP-CO570), *Besnard* St. 1885, 16.8.72; 34°25.0′ S, 52°47.5′ W, 39 m, fine sand, 11.97 °C, 33.41 ‰, 3 spec. (IOUSP-CO564), *Besnard* St. 1879, 14.8.72. — ARGENTINA, BUENOS AIRES : 35°18.0′ S, 54°13.0′ W, 27 m, fine sand, 10.66 °C, 33.62 ‰, 2 samples (3 spec.) (IOUSP-CO550), *Besnard* St. 1867, 12.8.72.

SIZE. — Largest ovigerous female, 6+12 mm. Largest male, 5+11 mm. Smallest ovigerous female, 4+7.5 mm.

COLOR. Not recorded.

REMARKS. — Most of the slight distinctive features pointed out for *P. hemphilli* Manning and Chace (1971 : 25) with relation to the East Atlantic species *P. parva* Holthuis, as foreseen by those authors, are inconsistent. In the new material studied herein, the rostrum is similar to that of *P. parva* (NOUVEL and HOLTHUIS, 1957, fig. 136); the anterolateral margin of the stylocerite may be rounded, angled or, less frequently and sometimes only on one side *of the animal, produced into a minute point; the* second pereiopod has 1-2 ischial, 4-6 meral, and 11, occasionally 10, carpal articles; the merus of the third pereiopod has 3-5 spines, that of the fourth pereiopod six spines, on lateral surface; the propodus of the fifth pereiopod has 2-3 spines on flexor margin; the apex of the telson may be rounded, subacute, or produced into a sharp point.

P. hemphilli differs both from *P. parva* and the Indo-Pacific species *P. aequimana* (Paulson) by the shape of the antennal scale, in which the lateral spine falls short of a distally rounded blade (MANNING and CHACE, 1971 : 23, fig. 11 *i*), and by the shape of the endopod of the first male pleopod, in which the distal margin is broadly and uniformly rounded (*cf.* HOLTHUIS, 1951 : 49, fig. 8 *l;* NOUVEL et HOLTHUIS, 1957, fig. 145; LAGARDÈRE, 1971 : 121, fig. 286). *P. aequimana* differs further from *P. hemphilli* by the shape of the stylocerite, in which the anterior margin is transversal (DE MAN, 1922 : 45, pl. 4, fig. 19 *a*) instead of distinctly sinuous and slanting laterally (MANNING and CHACE, 1971 : 23, fig. 11 *h*), and by the absence of spines on the propodus of the fifth pereiopod (GURNEY, 1937, *apud* HOLTHUIS, 1951 : 50).

HABITAT. — From 1.8-5 to 154 m deep. Mud; mud and clay; sand; calcareous sand; sand with algae; broken shells; shells. Measured water temperatures, 10.66 to 32.0 °C; salinities, 29.91 to 38.0 ‰.

GEOGRAPHICAL DISTRIBUTION. — East and west coast of Florida; State of Rio de Janeiro to the Province of Buenos Aires.

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ADDENDUM : The following *Calypso* specimens have been deposited in the Museu de Zoologia da Universidade de São Paulo : *Alpheus amblyonyx*, St. 7, 3 spec. (MZUSP 4546); *A. cylindricus*, St. 1, 1 ♂ (MZUSP 4547); *Synalpheus hemphilli*, St. 84, 1 spec. (MZUSP 4548); *S. longicarpus*, St. 25, 3 spec. (MZUSP 4552); *S. sanctithomae*, St. 77, 1 ♂ (MZUSP 4549); *S. townsendi*, St. 69, 3 spec. (MZUSP 4550); *Trachycaris restricta*, St. 79, 1 ovig. ♀ (MZUSP 4551); *Processa bermudensis*, St. 114, 1 ovig. ♀ (MZUSP 4553); *P. brasilieusis*, St. 77, 2 ♀ (1 ovig.), paratypes (MZUSP 4554).