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PASIPHAEID SHRIMPS FROM THE EASTERN NORTH ATLANTIC AND THE CARIBBEAN SEA, WITH THE DESCRIPTION OF A NEW SPECIES OF *PASIPHAE* (CRUSTACEA: DECAPODA: PASIPHAEIDAE)

by

N. IWASAKI

Iwasaki, N.: Pasiphaeid shrimps from the eastern North Atlantic and the Caribbean Sea, with the description of a new species of *Pasiphaea* (Crustacea: Decapoda: Pasiphaeidae).

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Key words: Crustacea Decapoda; Pasiphaeidae; *Pasiphaea*; *Parapasiphae*; new species; North Atlantic, Caribbean Sea.

Seven species of Pasiphaeid shrimps including a new species from the eastern North Atlantic and the Caribbean Sea are described.

N. Iwasaki, Usa Marine Biological Institute, Kochi University, Usa-Inoshiri, Kochi 781-11, Japan.

INTRODUCTION

The Rijksmuseum van Natuurlijke Historie, Leiden has a collection of interesting pasiphaeid shrimp specimens from the eastern North Atlantic and the Caribbean Sea. This collection was submitted to me for study. In this paper, seven species are described, of which one is new to science. Table 1 shows the sampling data of the collection.

The following abbreviations are used throughout this paper: RMNH, Rijksmuseum van Natuurlijke Historie, Leiden; USNM, National Museum of Natural History, Smithsonian Institution, Washington, D.C.; MCZ, Museum of Comparative Zoology, Harvard University, Cambridge; cl. carapace length.

I am grateful to F.A. Chace, Jr. of the National Museum of Natural History, Smithsonian Institution, Washington for critically reading the manuscript and for helpful comments. I would like to thank C.H.J.M. Fransen of the Rijksmu-

Table 1. List of sampling data in the eastern North Atlantic and the Caribbean Sea.

Cruise	Station	Location	Date	Sampling depth(m)	Wire out (m)	Wire angle	Bottom depth(m)	Gear	
Cancap	I.135	33°15'N,	27 Mar. 1976		200		370	Ringtrawl	
	I.136	33°14'N,	27 Mar. 1976		250	30-80°	400	Ringtrawl	
	I.137	33°14'N,	27 Mar. 1976		300	40-70°	500	Ringtrawl	
	I.151	33°38'N,	28 Mar. 1976			20°	100	Ringtrawl	
	II.058	27°58'N,	28 Aug. 1977		500			5m beamtrawl	
	III.119	20°22'N,	28 Oct. 1978		1000			5m beamtrawl	
	VI.112	16°47'N,	16-17 June 1976	1450-2500				5m beamtrawl	
	VII.023	14°53'N,	22 Aug. 1986	524				1.2m Agassiz trawl	
Pillsbury	P-342	9°03.6'N,	9-10 July 1966	280-300	600		1153-1376	10f IKMT	
	P-464	11°32.4'N,	29-30 July 1966	0-300	600		1876	10f IKMT	
	P-578	19°55.8'N,	22 May 1967	0-3000	6000		4407	10f IKMT	
	P-1146	20°09.1'N,	14 Jan. 1970	1190-1611			1190-1611	40f Otter trawl	
	P-1174	20°42.0'N,	29 June 1970	800-1100	3300		1463-2305	10f IKMT	
	P-1197	17°34.3'N,	3 July 1970	1490-1504	3700		1409-1504	41f Otter trawl	
	P-1236	18°05.5'N,	7-8 July 1970	400	1000		1911-1975	10f IKMT	
	P-1246	18°40.5'N,	7-8 July 1970	4856-4956	7500		4856-4956	40f Otter trawl	
	P-1247	18°28'N,	11 July 1970	1000	3000		3347-3904	10f IKMT	
	P-1248	18°25'N,	12-13 July 1970	900	2250		1449-1682	6f IKMT	
	P-1268	17°53.5'N,	13 July 1970	110-1200	3000		2386-4169	10f IKMT	
	P-1269	18°N'	17 July 1970	1000-2100	3000		2158-3329	10f IKMT	
	P-1289	18°07.2'N,	18 July 1970	480-490	1500		1637-2441	10f IKMT	
	P-1355	14°35'N,	70°37.9'W	31 Jan. 1971	450-576	500-1960		450-576	41f Otter trawl
			81°32'W						
Gerda	G-709	26°26.5'N,	22 July 1965	724	2400		724	10f Otter trawl	

seum van Natuurlijke Historie, Leiden for allowing me to study the present specimens, and A.B. Johnston of the Museum of Comparative Zoology, Harvard University for the loan of types of *Pasiphaea poeyi*.

LIST OF THE SPECIES

Pasiphaea hoplocerca Chace, 1940

Pasiphaea hoplocerca Chace, 1940 : 124, text-figs. 4, 5; Figueira, 1957 : 23, text-fig. 1C, pl. 1, fig. 1.

Material. — Sta. Cancap VII. 023; S of Santiago, Cape Verde Is., 1 ♀, cl. 10.8 mm (RMNH D37407). Sta. Pillsbury P-1247; off Jamaica, 3 ♀♀, cl. 4.7-6.8 mm (USNM). Sta. Pillsbury P-1248; off Dominican Rep., 1 ♀, cl. 8.8 mm (RMNH D37408). Sta. Pillsbury P-1289; off Dominican Rep., 1 ♂, cl. 28.7 mm; 4 ♀♀, cl. 7.4-10.6 mm (USNM).

Remarks. — In young specimens a dorsal carina on the carapace is obscure (< cl. 9.8 mm) and abdominal spines on the fourth, fifth and sixth abdominal somites are indistinct (< cl. 8.8 mm).

The species is distributed in the North Atlantic: off Morocco (Abbes & Casanova, 1973; Burukovsky, 1980), off Madeira (Figueira, 1957), off Canary Is. (Foxton, 1970) and off Bermuda (Chace, 1940). This is the first record of *Pasiphaea hoplocerca* from the Caribbean Sea.

Pasiphaea multidentata Esmark, 1866

Pasiphaea multidentata Esmark, 1866: 259; Sivertsen & Holthuis, 1956: 27, figs. 19-21; Figueira, 1957: 24, text-fig. 1A, B, pl. 1, fig. 2; Elofsson, 1961: 44, figs. 1b-d, f, g, j, 2d-i, tabs 1, 2 (larvae); Zariquiey Alvarez, 1968: 73, figs. 8a, 10a, 31; Smaldon, 1979: 28, fig. 7.

Pasiphaë norvegica M. Sars, 1866: 260.

Pasiphaë (Phye) sicula Riggio, 1896: 41, pl. 1, fig. 2a, b.

Pasiphaë tarda; Kemp, 1910: 39, pl. 4, figs. 8-11.

Pasiphaea principalis; Williamson, 1960: 337, figs. 2g-i (larvae; according to Williamson, 1961).

Material. — Sta. Cancap II. 058; W of Cape Yubi, Morocco, 1 ♀, cl. 21.5 mm (RMNH D37409). Sta. Cancap III. 119; SW of Cape Blanc, off Mauritania, 2 ♀♀, cl. 30.4 and 35.2 mm (RMNH D37410).

Remarks. — The number of spines on the ventral margin of the merus of the first and second pereopods and on the ventral margin of the basis of the second pereopod increases with age (Figueira, 1957). In this collection the largest specimen (cl. 35.2 mm) has 13 and 14 spines on the merus of the first pair of

pereopods, 25 and 28 spines on the merus of the second pair of pereopods and 12 and 13 spines on the basis of the second pair of pereopods.

The species is distributed in the North Atlantic, from the coasts of Norway to off the Sahara and to the south of Greenland, from the Gulf of St. Lawrence to off Massachusetts, and in the Mediterranean (Sivertsen & Holthuis, 1956; Burukovsky, 1982).

***Pasiphaea nishiei* spec. nov.**

(figs. 1, 2)

Material. — Types: Sta. Pillsbury P-1197; off Jamaica. 1 ♂, 28.1 mm, holotype (USNM). Sta. Pillsbury P-342; Gulf of Darien, Panama, 1 ♀, cl. 28.9 mm, allotype (USNM). Sta. Pillsbury P-342; Gulf of Darien, Panama, 1 ovigerous ♀, cl. 25.3 mm, paratype, (RMNH D 37410). Sta. Pillsbury P-1174; S of Great Inagua, 2 ovigerous ♀♀, cl. 25.6 and 27.1 mm; 1 ♀, cl. 15.3 mm, paratype, (RMNH D 39114).

Non-types: Sta. Pillsbury P-578; SE of I. Cozumel, 1 ♀, cl. 21.5 mm (USNM). Sta. Pillsbury P-1146; Windward Passage, 1 ♀, cl. 22.8 mm (RMNH D 39115). Sta. Pillsbury P-1236; off Jamaica, 2 ♀♀, cl. 8.5 and 9.0 mm (USNM). Sta. Pillsbury P-1247; off Jamaica, 1 ♀, cl. 7.4 mm (RMNH D 39116). Sta. Pillsbury P-1268; off Saltrou, Haiti, 3 ♀♀, cl. 8.8-12.8 mm (RMNH D 39117). Sta. Pillsbury P-1269; off Saltrou, Haiti, 2 ♀♀, cl. 8.1 and 8.8 mm (USNM). Sta. Pillsbury P-1289; off Dominican Rep., 30 ♀♀, cl. 6.03-14.8 mm; 1 specimen (abdomen missing), cl. 7.91 mm (USNM). Sta. Pillsbury P-1355; N of Old Providence I., 1 specimen (abdomen missing), cl. 26.2 mm (RMNH D39118). Sta. Gerda G-709; S of Bahama I., 1 ♀, cl. 13.97 mm (USNM).

Description. — Rostrum strong, pointed, directed obliquely upward, overreaching anterior margin of carapace. Carapace not carinate. Branchiostegal spine strong.

Mandible with 11-toothed incisor process, palp absent. First maxilla with proximal endite, strongly toothed distal endite and simple endopod armed with three setae. Second maxilla with simple endopod and large scaphognathite. First maxilliped reduced to large elongate lamina, not articulated distally. Endopod of second maxilliped simple, five-segmented, without epipod or exopod. Third maxilliped overreaching antennal scale, with three-segmented endopod and well developed exopod.

All pereopods with well developed exopods, but no epipod. First pereopod reaching with fingers and $\frac{1}{3}$ palm beyond antennal scale, fingers toothed, tip curved, palm armed with two spines on inner margin, merus unarmed. Second pereopod longer than first pereopod, extending with fingers and $\frac{1}{2}$ palm beyond antennal scale, fingers slender and toothed, merus armed with a spine on distal half of ventral margin. Third pereopod slender, end of propodus overreaching carpus-propodus articulation of second pereopod, dactylus missing. Fourth pereopod short, overreaching basis of second pereopod. Fifth pereopod

pod longer than fourth pereopod, reaching $\frac{3}{10}$ merus of second pereopod, dactylus laterally broad and rounded distally.

First pleopod in male and female with broadly ovate endopod, small lobe bearing some hooks. Second pleopod in male with appendix interna longer



Fig. 1. *Pasiphaea nishiei* spec. nov. a, carapace of ♀ in lateral view; b, mandible of same; c, first maxilla of same; d, second maxilla of same; e, first maxilliped of same; f, endopod of first pleopod of same; g, appendices interna and masculina of second pleopod of ♂. Scales 1 mm.

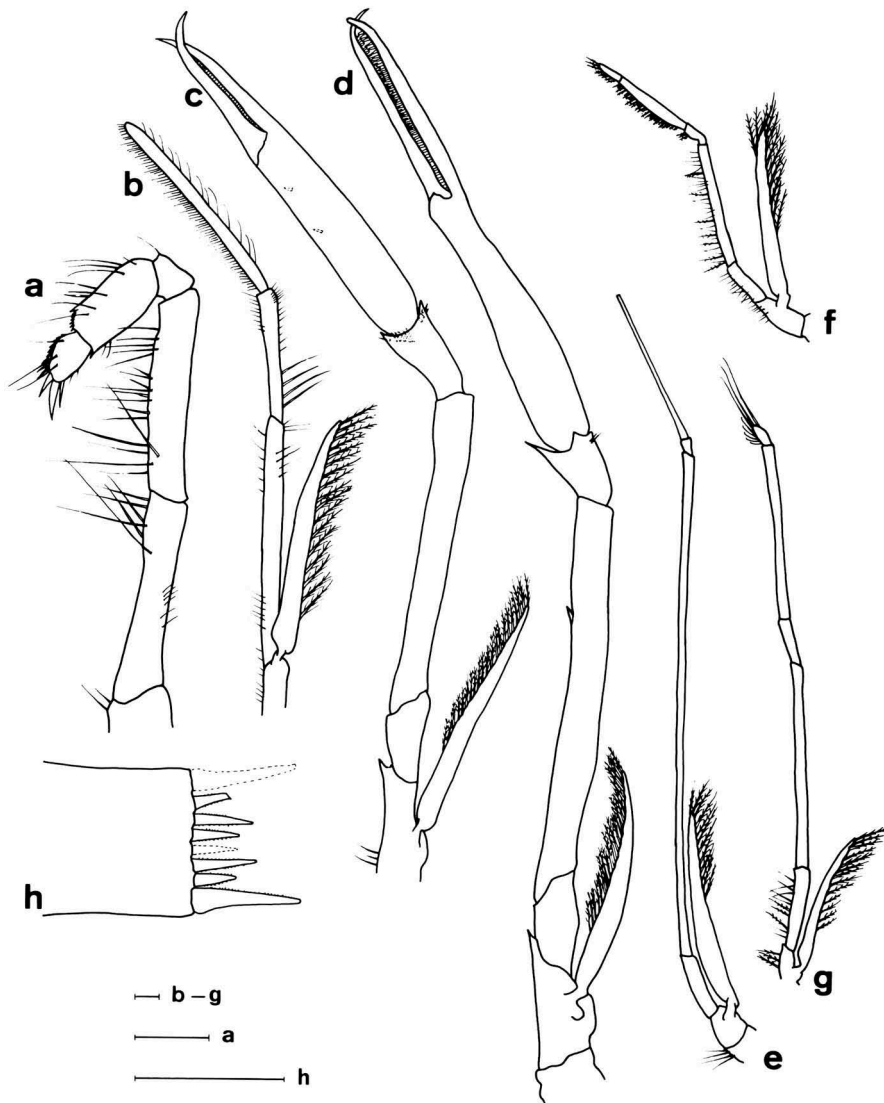


Fig. 2. *Pasiphaea nishiei* spec. nov., ♀. a, second maxilliped; b, third maxilliped; c, first pereopod; d, second pereopod; e, third pereopod; f, fourth pereopod; g, fifth pereopod; h, tip of telson in dorsal view. Scales 1 mm.

than appendix masculina, bearing some hooks distally; appendix masculina bearing setae. Second to fourth abdominal somites carinate dorsally, fifth somite smooth dorsally, sixth somite dorsally sulcate. Telson dorsally sulcate, truncated in tip with four pairs of terminal spines, outermost pair largest. Uro-

pod elongate, exopod 1.3 times the length of endopod, endopod 4 times as long as broad.

Type locality.—Off Jamaica, the Caribbean Sea, 17°34'3"N, 76°3'3"W; 1490-1504 meters.

Etymology.—The name "nishiei" is chosen to honour Professor Masayuki Nishie, a linguist and cultural anthropologist, of the Waseda University, Tokyo in thanks for introducing me to an exciting world of learning. The countries of the Caribbean Sea are one of this investigative fields.

Remarks.—This species is related to *Pasiphaea cristata* Bate, 1888, but is easily distinguished from that species by the following characters; the rostrum of *P. cristata* rises from the postfrontal region and is not extending beyond the anterior margin of carapace, and the merus of the second pereopod is armed with a spine on the proximal half of ventral margin.

In two specimens the rostrum is triangular and just reaching the anterior margin of the carapace.

The ovigerous female is 25.3 mm in cl. and has 192 eggs. The dimensions of the eggs are 1.51 to 1.64 mm × 1.16 to 1.29 mm.

***Pasiphaea poeyi* Chace, 1939**
(figs. 3, 4)

Pasiphaea poeyi Chace, 1939 : 31.

Material.—Sta. Pillsbury P-1355; N of Old Providence I., 1 ovigerous ♀, cl. 22.6 mm; 1 ♀, cl. 22.8 mm; 1 ♂, cl. 19.2 mm (USNM). Harvard-Havana Exp. Atlantis. Sta. 2963-D; Bahia de Cochinos, Santa Clara Province, Cuba, 1 ♂, holotype, MCZ 10237. Sta. 2990-A; Nicholas Channel, N of Santa Clara Province, Cuba, 1 ovigerous ♀, paratype, MCZ. Sta. 2995; off Bahia Cardenas, Matangas Province, Cuba, 1 ♀, paratype, MCZ.

Description.—Rostrum strong, triangular, not extending beyond anterior margin of carapace. Carapace not carinate. Branchiostegal spine strong.

Mandible with nine-toothed incisor process, palp absent. First maxilla with proximal endite, strongly toothed distal endite and simple endopod armed with four setae. Second maxilla with simple endopod and large scaphognathite. First maxilliped reduced to large elongate lamina, not articulated distally. Endopod of second maxilliped simple, five-segmented, without epipod or exopod. Third maxilliped not overreaching antennal scale, with three-segmented endopod and well developed exopods.

All pereopods with well developed exopods, but no epipods. First pereopod extending with fingers beyond third maxilliped, fingers toothed, tip curved, palm armed with two spines on inner margin, merus unarmed. Second pereopod

pod longer than first pereopod, extending with fingers beyond third maxilliped, fingers slender and toothed, merus armed with a spine on proximal third of ventral margin. Third pereopod slender, not overreaching merus-carpus articulation of second pereopod, dactylus missing. Fourth pereopod short, not overreaching basis of second pereopod. Fifth pereopod longer than fourth

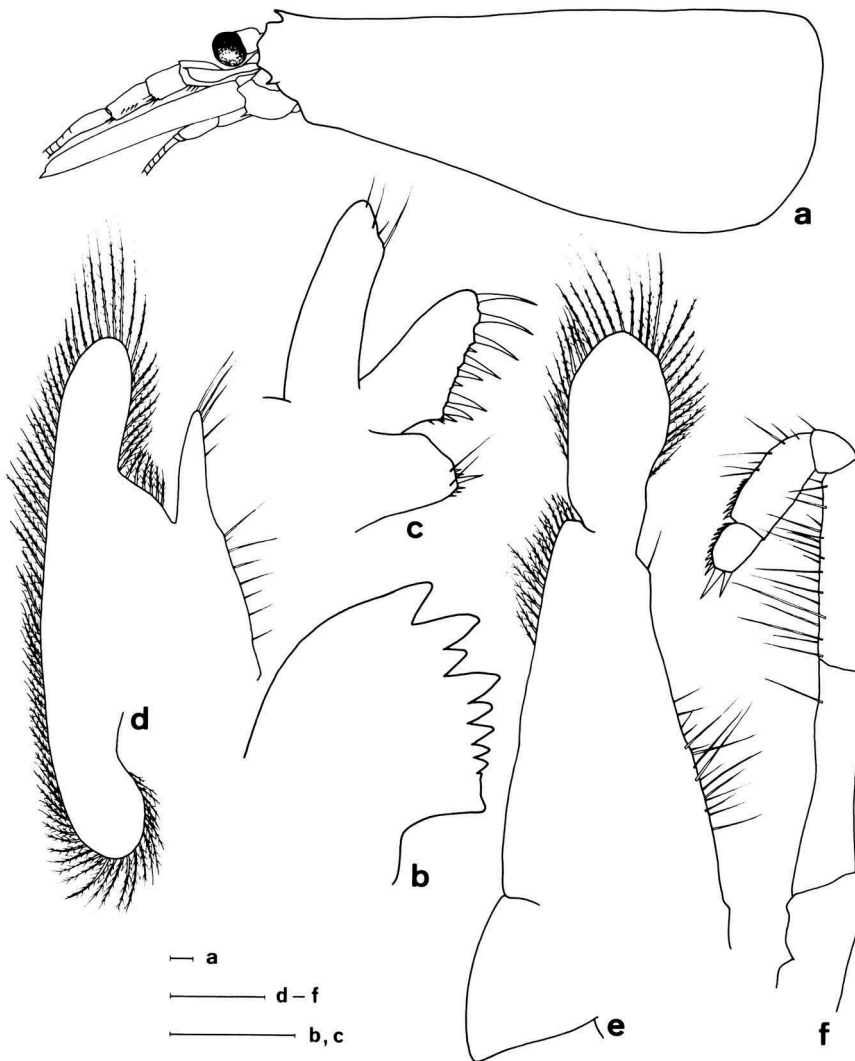


Fig. 3. *Pasiphaea poeyi*, ovigerous ♀. a, carapace in lateral view; b, mandible; c, first maxilla; d, second maxilla; e, first maxilliped; f, second maxilliped. Scales 1 mm.

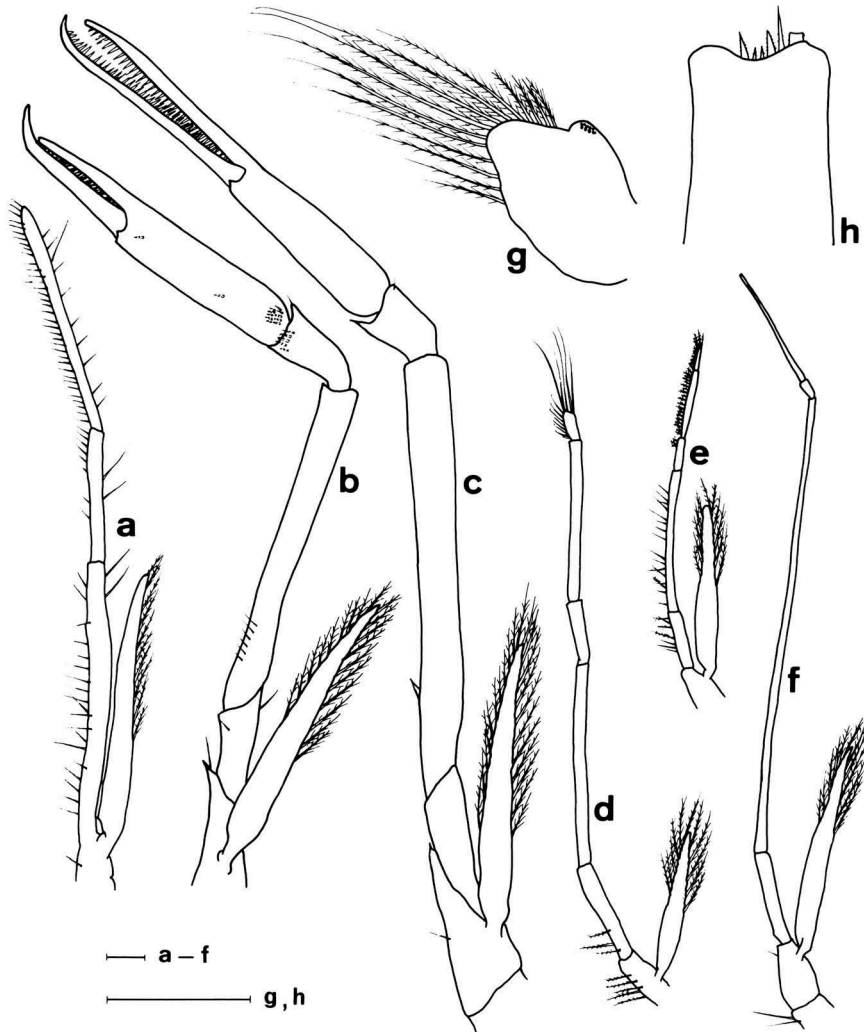


Fig. 4. *Pasiphaea poeyi*, ovigerous ♀. a, third maxilliped; b, first pereopod; c, second pereopod; d, third pereopod; e, fourth pereopod; f, fifth pereopod; g, endopod of first pleopod; h, tip of telson in dorsal view. Scales 1 mm.

pereopod, reaching $\frac{3}{5}$ merus of third pereopod, dactylus laterally broad and rounded distally.

First pleopod in male and female with broadly ovate endopod, small lobe bearing some hooks. Second pleopod in male with longer appendix interna

bearing some hooks distally and with appendix masculina bearing setae. First to sixth abdominal somites not carinate dorsally, without abdominal spine. Telson 0.65 times the length of sixth abdominal somite, dorsally sulcate, tip nearly truncated with terminal spines. Uropod elongate, exopod 1.3 times the length of endopod, endopod 4.3 times as long as broad.

Remarks. — The types of *Pasiphaea poeyi* were compared with the present specimens, but differ from the latter in the following characters; the endopod of the first maxilla of the type specimens armed with a seta (holotype) or three setae (paratype); the endopod of the second maxilla of those armed with a long seta.

In the type specimens the tip of the telson is armed with five pairs of terminal spines.

The ovigerous female is 22.6 mm in cl. and has 84 eggs. The dimensions of the eggs are 1.33 to 1.45 × 0.88 to 1.05 mm.

***Pasiphaea princeps* Smith, 1884**
(figs. 5, 6)

Pasiphaë princeps Smith, 1884 : 381, pl. 5 fig. 2.

Not *Pasiphaea princeps*; Rathbun, 1904 : 23 (= *P. tarda* Kröyer, 1845).

Not *Pasiphaë princeps*; Kemp, 1910 : 42, pl. 4 figs. 1-7 (= *P. tarda*).

Material. — Sta. Cancap VI. 112; S of Santo Antão, Cape Verde Is., 1 ♀, cl. 63.7 mm, (RMNH D39119).

Description. — Rostrum short and aimed straight forward, slightly extending beyond anterior margin of carapace. Carapace not carinate, branchiostegal sinus deep. Branchiostegal spine present.

Eye well developed, cornea rounded. Antennal scale armed on outer margin with large blunt tooth.

Mandible without palp. First maxilla with proximal endite, strongly 12-toothed distal endite and endopod armed with one long seta and several short setae. Second maxilla with simple endopod armed with several setae and large scaphognathite. First maxilliped reduced to large elongate lamina, not articulated distally. Endopod of second maxilliped simple, five-segmented, without epipod or exopod. Third maxilliped exceeding end of antennal scale, with three-segmented endopod and well developed exopod.

All pereopods with well developed exopods, but no epipods. First pereopod reaching with fingers and ½ palm beyond antennal scale, fingers toothed, merus, ischium and basis unarmed. Second pereopod longer than first pereopod,

finger elongate and toothed, tip damaged, merus armed with five spines on ventral margin, ischium and basis unarmed. Third pereopod damaged. Fourth pereopod short, not reaching ischium-basis articulation of second pereopod.

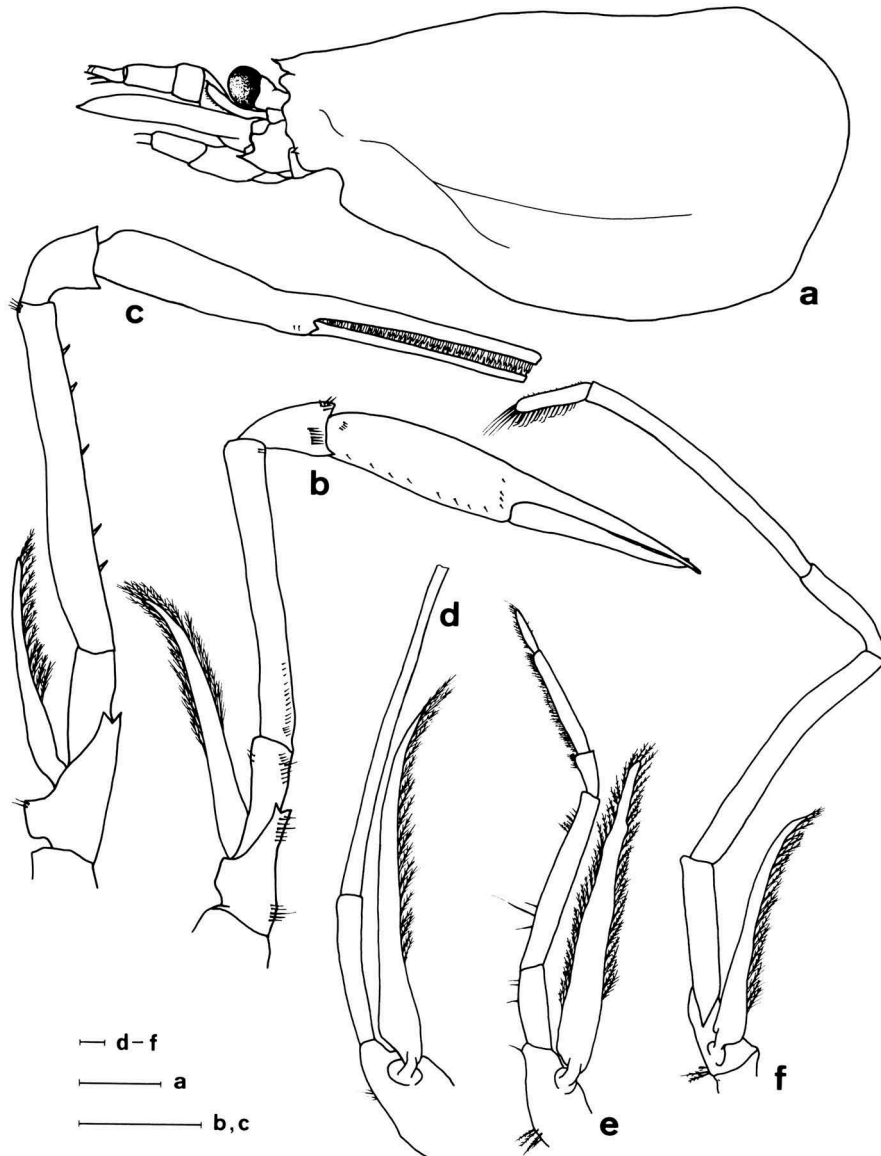


Fig. 5. *Pasiphaea princeps*, ♀. a, carapace in lateral view; b, first pereopod; c, second pereopod; d, third pereopod; e, fourth pereopod; f, fifth pereopod. Scales: a-c = 1 cm; d-f = 1 mm.

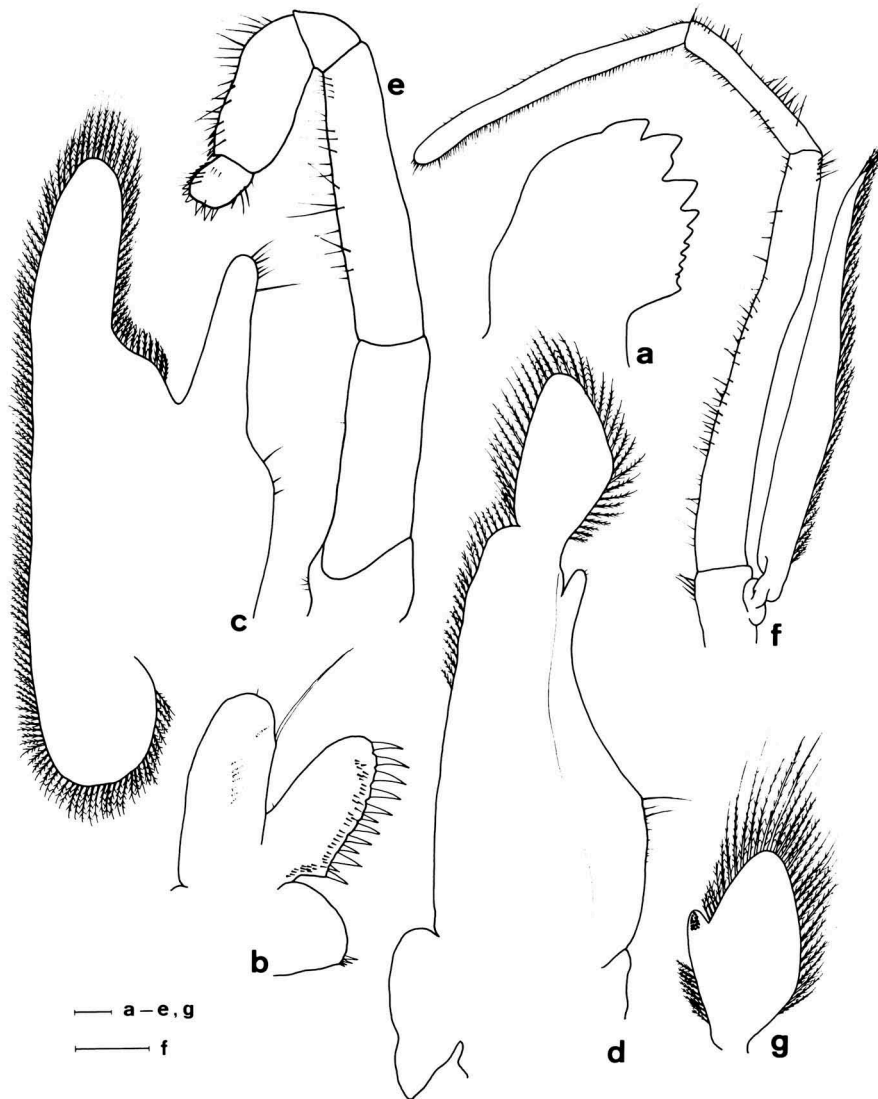


Fig. 6. *Pasiphaea princeps*, ♀. a, mandible; b, first maxilla; c, second maxilla; d, first maxilliped; e, second maxilliped; f, third maxilliped; g, endopod of first pleopod. Scales: a-e, g = 1 mm; f = 5 mm.

Fifth pereopod longer than fourth pereopod, overreaching $\frac{1}{3}$ merus of second pereopod.

First pleopod with broadly ovate endopod, small lobe bearing some hooks. All abdominal somites unarmed, second to sixth somites carinate dorsally. Telson dorsally sulcate, tip damaged. Endopod of uropod 3.8 times as long as broad.

Remarks. — *Pasiphaea princeps*, *P. principalis* Sund, 1913, and *P. tarda* Kröyer, 1845, have been confused. Sund (1913) considered these *Pasiphaea* to represent three distinct species. On the other hand Sivertsen & Holthuis (1956) concluded that they were synonyms for one species, *P. tarda*. I agree with Sivertsen & Holthuis in that *P. principalis* can be synonymized with *P. tarda*, but I believe that *P. princeps* can be distinguished from *P. tarda* by the following differences:

1. The carapace is not carinate in *P. princeps*, while dorsally carinate in *P. tarda*.
2. The merus of the first pereopod is without a spine in *P. princeps*, while it has 2-8 spines in *P. tarda* (Butler, 1980).
3. The merus of the second pereopod has five spines in *P. princeps*, while 14-21 spines in *P. tarda* (Butler, 1980).
4. The ischium of the second pereopod is without a spine in *P. princeps*, while it has 0 or 1 spine in *P. tarda* (Butler, 1980).
5. The basis of the second pereopod is without a spine in *P. princeps*, while 2-7 spines are present in *P. tarda* (Butler, 1980).
6. The carapace length of the ovigerous female is 75 mm in *P. princeps* (Smith, 1884), while 39 and 41.5 mm in *P. tarda* (Matthews & Pinnoi, 1973).

***Pasiphaea sivado* (Risso, 1816)**

Alpheus sivado Risso, 1816: 93, pl. 3, fig. 4.

Pasiphaea sivado; Milne Edwards, 1837: 426, pl. 22, fig. 3; Thiele, 1905: 467, figs. 50, 51; Pesta, 1914: 214, text-figs. 22, 23; Pesta, 1918: 64, figs. 19, 20; Williamson, 1960: 331, figs. 1, 2a-f (larvae); Zariquiey Alvarez, 1968: 70, figs. 6a, 30; Omori, 1976: 254, figs. 3-5, tabs. 1-4 (comparison with *Pasiphaea japonica* Omori, 1976); Kensley, 1977: 32, fig. 10A; Smaldon, 1979: 26, fig. 6.

Pasiphaë sivado; Wood-Mason, 1892: pl. 3, fig. 6; Wood-Mason & Alcock, 1893: 161, fig. 1; Kemp, 1910: 37, pl. 4, fig. 12.

Material. — Sta. Cancap I. 135; NW of Mazagan, Morocco, 1 ♀, cl. 10.1 mm; 1 specimen, cl. 4.0 mm (RMNH D 39120). Sta. Cancap I. 136; NW of Mazagan, Morocco, 2 ♀♀, cl. 10.3 and 12.15 mm (RMNH D 39121). Sta. Cancap I. 137; NW of Mazagan, Morocco, 2 ovigerous ♀♀, cl. 17.3 mm and 18.6 mm; 5 ♀♀, cl. 8.3-12.6 mm 1 ♂, cl. 15.0 mm. (RMNH D 39122); Sta. Cancap I. 151; N of Mazagan, Morocco, 1 ♀, cl. 11.6 mm (RMNH D 39123).

Remarks. — The number of ventral spines on the meri of the first and second pereopod are 1 to 6 (2 to 10 on a pair of legs) and 6 to 13 (11 to 24 on a pair of legs), respectively.

According to Omori (1976) who used the numbers of ventral spines on the meri of the first and second pereopods as one of characters to separate *Pasiphaea japonica* Omori, 1976 from a sibling species of *P. sivado*, the numbers of those in the Atlantic *P. sivado* are 3 to 11 on a pair of first pereopods and 11 to 30 on a pair of second pereopods.

P. sivado is known from the west coast of Norway to the Mediterranean and to the Atlantic coast of Morocco (Sund, 1913; Stephensen, 1923; Maurin, 1961). It also has been reported from the Indian coast of South Africa and off Somalia (Balss, 1925; Kensley, 1977). Although it has been reported from Japanese waters and the Red Sea (Balss, 1914; 1915; Yokoya, 1933; Calman, 1939), the Japanese *Pasiphaea* is *P. japonica* (Omori, 1976) and the Red Sea *Pasiphaea* is distinct from *P. sivado* (Iwasaki, manuscript). Moreover previous descriptions of *P. sivado* from the Andaman Sea and the Bay of Bengal (Wood-Mason & Alcock, 1893; Alcock, 1901) and their records of occurrence need re-examination (Omori, 1976).

Parapasiphae sulcatifrons Smith, 1884

Parapasiphae sulcatifrons Smith, 1884: 384, pl. 5, fig. 4, pl. 6, figs. 1-7; Hansen, 1908: 79; Kemp, 1910: 47, pl. 5, figs. 1-21; Stebbing, 1914: 33; Balss, 1925: 236 (according to Crosnier & Forest, 1973, in part), fig. 10, pl. 20; Stephensen, 1935: 65, figs. 23-25 (larvae); Chace, 1940: 126, fig. 6; Legendre, 1940: 233, fig. 41; Barnard, 1950: 649, fig. 122d.

Parapasiphae sulcatifrons; Pequegnat, 1970: 66; Crosnier & Forest, 1973: 142, fig. 41; Butler, 1980: 58, figs. on p. 58; Hanamura, 1983: 78; Iwasaki & Nemoto, 1987a: 31; Kensley et al, 1987: 293.

Pasiphae sulcatifrons; Williamson, 1915: 354, figs. 24-26 (larvae).

Material. — Sta. Pillsbury P-1174; S of Great Inagua, 1 ♀, cl. 27.4 mm (USNM).

Remarks. — The mandibular palp is two segmented. The second pereopod is armed with 6 to 7 spines on the basis, 2 spines on the ischium and 4 to 5 spines on the merus which is similar in Chace's figure (1940, text-fig. 6).

The species is widely distributed. It occurs in the North Atlantic from south of Iceland to the Gulf of Mexico and to off Morocco (Stephensen, 1923; Sivertsen & Holthuis, 1956; Pequegnat, 1970), the South Atlantic from off Congo to off South Africa (Balss, 1925; Kensley, 1981), the Indian Ocean (Hale, 1941; Iwasaki & Nemoto, 1987a), the North Pacific from off Kamchatka to off Japan and from British Columbia to off Baja California (Hanamura, 1979, 1983;

Butler, 1980; Iwasaki & Nemoto, 1987b) and the South Pacific, off Eastern Australia (Kensley et al., 1987).

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