

To Dr. F. A. Chace Jr.  
with my best regards.  
Y. Hanamura

Deep-Sea Shrimps (Crustacea: Decapoda) Collected  
by the R.V. "Soela" from Southern Australia

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## Deep-Sea Shrimps (Crustacea: Decapoda) Collected by the R.V. "Soela" from Southern Australia

Yukio Hanamura

**Abstract.** Fourteen species of deep-sea shrimps belonging to seven families are reported from the eastern, southeastern and western coasts off Tasmania, southern Australia. Among them, *Pasiphaea australis* (Pasiphaeidae) is new to science, and *Hymenodora gracilis* and *Nematocarcinus sigmoides* are new to the known Australian fauna.

Systematic studies on deep-sea shrimps of Australia have chiefly been made by Bate (1888), Schmitt (1926), and Kensley *et al.* (1987), and the last of which is the most important and comprehensive reference on the deep-sea shrimp fauna excluding the sergestids in southeastern Australian waters. On the other hand, Griffiths and Brandt (1983a, b) discussed the general distribution of meso-pelagic shrimps in the Tasman Sea. Due to these reports, our knowledge has been greatly increased in the eastern subtropical waters off Australia. The contribution to the deep-sea shrimp fauna in the other Australian areas is still very scant and fragmentary.

The Division of Fisheries of the CSIRO Marine Laboratory, Australia, has carried out surveys of the deep-sea fauna of eastern, southeastern and western Tasmanian waters, southern Australia. The author was able to examine shrimps from some of these collections through the courtesy of Drs. A. J. Bruce and Peter Last. This paper reports 14 species representing seven families of penaeoid and caridean shrimps. Of these, *Pasiphaea australis* was recognized as a new species. Two species, *Hymenodora gracilis* and *Nematocarcinus sigmoides* have not been recorded before from Australian waters.

Specimens including the type series are deposited in the Northern Territory Museum of Arts and Sciences, Darwin, and some specimens are in the Division of Fisheries, CSIRO Marine Laboratory, Hobart. In addition to the Australian institutions, one male and one female paratypes are deposited in the National Science Museum, Tokyo, and one female paratype is in the National Museum of Natural History, Smithsonian Institution.

Carapace length (cl) was determined by measu-

ring from the orbital margin to the posteromedian margin. The number and size ranges of ovigerous females are not included in the female totals. The sampling position data of the R. V. "Soela" are given on Table 1.

### Family Aristeidae

#### Genus *Aristaeomorpha* Wood-Mason *Aristaeomorpha foliacea* (Risso, 1827)

*Penaeus foliaceus* Risso, 1827, p. 69, pl. 2, fig. 6. (not seen.)

*Aristeus rostridentata* Bate, 1881, p. 189; 1888, p. 317, pl. 51.

*Aristaeomorpha Giglioliana* Wood-Mason, 1892, pl. 2, fig. 2.

*Aristaeomorpha mediterranea* Adensamer, 1898, p. 627, fig. on p. 627.

*Aristeus japonicus* Yokoya, 1933, p. 3, fig. 1.

*Aristaeomorpha foliacea*: Crosnier, 1978, p. 54, figs. 23, 24; 1984, p. 21; 1985, p. 861; Grey *et al.*, 1983, p. 36, pl. 1; Yu & Chan, 1986, p. 43, fig. on p. 43; Hayashi *in* Baba *et al.*, 1986, p. 51, fig. 11; Kensley *et al.*, 1987, p. 279.

*Material examined.* CSIRO SO4-84-15, 1 young (cl 19.7 mm).

*Remarks.* A complete synonymic list of the species may be found in Crosnier (1978).

*Distribution.* Atlantic; Indo-West Pacific. Previously known from Australia, except the northern coast (Schmitt, 1926; Grey *et al.*, 1983; Kensley *et al.*, 1987)

### Family Penaeidae

#### Genus *Funchalia* Johnson *Funchalia woodwardi* Johnson, 1867

(Fig. 1)

*Funchalia woodwardi* Johnson, 1867, p. 895, Gordon &

Table 1. Data of R.V. "Soela" Stations.

Station	Date	Lat.	Long.	Tr. Depth	Gear
SO2-84-70	4/5/84	38°13.5'S	149°42.5'E	464-472 m	Engels Trawl
SO3-84-62	22/6/84	42°42.0'S	148°24.0'E	345-350 m	Engels 152 Pelagic Trawl
SO3-84-77	25/6/84	42°42.8'S	148°22.2'E	454-512 m	Beam Trawl
SO4-84-15	18/8/84	42°42.3'S	148°24.5'E	260-291 m	Engels Trawl
SO2-85-4	24/3/85	42°40.4'S	148°25.9'E	460 m	Engels Trawl
SO2-85-121	12/4/85	43°56.9'S	150°21.0'E	990 m	Engels Trawl
SO2-85-124	12/4/85	43°55.4'S	150°28.4'E	36-45 m	Engels Trawl
SO2-85-127	13/4/85	43°58.4'S	150°26.5'E	unknown uncertain gear failure	
SO2-85-128	13/4/85	43°57.0'S	150°13.5'E	600 m	Engels Trawl
SO2-85-129	13/4/85	43°55.9'S	150°16.8'E	1000-1500 m	Engels Trawl
SO2-85-130	13/4/85	43°58.4'S	150°07.7'E	200-600 m	Engels Trawl
SO2-85-131	14/4/85	44°00.4'S	150°08.8'E	1000-1500 m	Engels Trawl
SO2-85-132	14/4/85	44°01.4'S	150°04.6'E	400-500 m	Engels Trawl
SO2-85-134	18/4/85	43°58.5'S	150°26.1'E	1600 m	Engels Trawl
SO2-85-135	18/4/85	43°53.4'S	150°07.2'E	992-1000 m	Engels Trawl
SO3-86-32	16/5/86	41°48.0'S	144°26.0'E	1404-1376 m	Engels Trawl
SO2-86-38	17/5/86	42°22.4'S	144°37.9'E	1380-1440 m	Engels Trawl
SO3-86-40	18/5/86	42°11.3'S	144°35.5'E	1384-1416 m	Engels Trawl
SO3-86-41	18/5/86	41°53.6'S	144°24.6'E	1368-1388 m	Scampi Net
SO3-86-54	24/5/86	41°53.1'S	144°24.3'E		

Ingle, 1956, p. 478; Monod, 1972, p. 7; Grippa, 1976, p. 118, figs. 1, 2; 1987, p. 78, figs. 1d, 2c, 3b, g, 4d; Holthuis, 1977, p. 44, pl. 7, fig. a; Kensley, 1977, p. 29, fig. 8a, b; Macpherson, 1983, p. 69; Kensley *et al.*, 1987, p. 282.

*Material examined.* CSIRO SO-86-32, 1 ♂ (cl 35.2 mm).

*Additional material.* BMNH 1925/8/18, 32-33, Stn. 530, off Cape Town, 135 fms: 2 ♀♀ (cl 35.9 & 36.7 mm); BMNH 1956/5/11, 8-9, 59°12'N, 10°09'W, 21 July 1955: 1 ♂ (cl 35.4 mm), 1 ♀ (cl 37.9 mm).

*Description.* Body covered with fine hairs. Rostrum with 11-13 dorsal spines, ventral margin unarmed.

Carapace dorsally carinated nearly whole length, except on posterior one eighth. Orbital margin nearly vertical posteriorly. Antennal spine small, carina extending posteriorly to just anterior of hepatic spine. Branchiostegal spine supported by short carina. Hepatic spine small, with marked carina extending to posterolateral margin of carapace.

Abdomen with fourth to sixth somites carinated dorsally except on posterior two thirds of fourth somite. Sixth somite ending in posteromedian

spine, 2.33-2.42 times as long as fifth somite. Lateral carinae on posterior three somites, slightly arched. Sixth somite with additional infra-lateral carina, nearly parallel to ventral margin. Telson grooved dorsally, nearly as long as sixth somite, with several minute lateral spines posteriorly.

Antennal scale 0.59-0.62 times as long as carapace, 3.27-3.45 times as long as wide, distolateral spine not overreaching distal margin of lamella.

Third maxilliped with dactylus distinctly flattened in males, being 0.61-0.73 times as long as penultimate segment, while in females nearly sub-lanceolate, 0.86-0.88 times as long as penultimate, exopod long, about 0.4 times as long as carapace both in male and females. Epipods on first three pereopods.

*Remarks.* By the kind cooperation of Dr. R. W. Ingle, I have been able to examine single male and female specimens from British waters and two females from off southern Africa. Comparing the male specimen of Tasmanian waters with that from British waters, no essential difference is observed in external morphology, and also between the females of southern Africa and British waters.

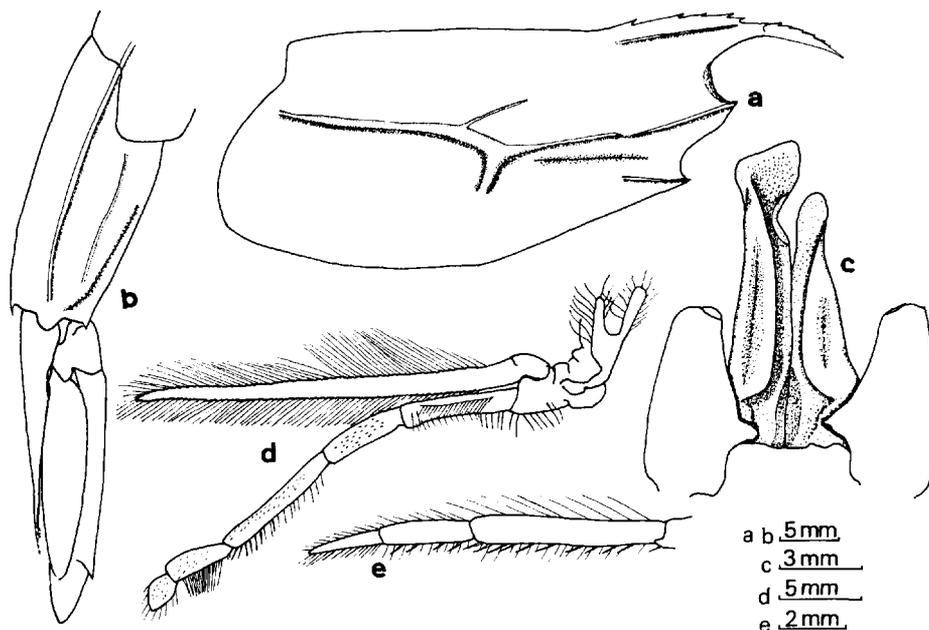


Fig. 1. *Funchalia woodwardi* Johnson. Male, cl 35.2 mm, from southern Australia (a-d), and ♀ (BMNH, 1956/5/11, 8-9), cl 37.9 mm, from British waters (e). a, Carapace; b, 6th abdominal somite and telson; c, petasma; d, 3rd maxilliped; e, distal part of 3rd maxilliped.

*Funchalia woodwardi* shows considerable sexual dimorphism in the dactylus of the third maxilliped. A similar phenomenon has been observed in *F. taaningi* and *F. villosa* by some workers (Burkenroad, 1936; Grippa, 1987; Hanamura, pers. observ.). This dimorphism seemed to be typical of the genus as in some other penaeoid shrimps, but the biological significance has not yet been discussed.

**Distribution.** Atlantic; Indo-West Pacific. Known in Australia from eastern coast (Kensley *et al.*, 1987).

Family Oplophoridae

Genus *Acanthephyra* A. Milne Edwards

*Acanthephyra pelagica* (Risso, 1816)

*Alpheus Pelagicus* Risso, 1816, p. 91, pl. 2, fig. 7. (not seen.)

*Ephyra Haeckelii* von Martens, 1868, p. 52, pl. 1, fig. 7.

*Acanthephyra Agassizii* Smith, 1884, p. 372 (part), pl. 8, fig. 1.

*Acanthephyra sica* Bate, 1888, p. 739, pl. 125, fig. 1.

*Acanthephyra Agassizii mediterranea* Riggio, 1900, p. 20.

*Acanthephyra rectirostris* Riggio, 1900, p. 20.

*Acanthephyra purpurea* var. *mediterranea*: Riggio, 1905, p. 35, pl. 2, figs. 12-15, pl. 3, fig. 18.

*Acanthephyra purpurea* var. *multispina* Coutière, 1905b, p. 10.

*Acanthephyra parva multidentis* Coutière, 1905b, p. 17, fig. 5, nos. 1, 2.

*Acanthephyra multispina*: Coutière, 1906, p. 18, fig. 7c, d.

*Acanthephyra pelagica*: Macpherson, 1983, p. 51; 1984, p. 58; Froggia & Giannini, 1984, p. 58; Wasmer, 1986, p. 41, figs. 7, 8; Kensley *et al.*, 1987, p. 284.

**Material examined.** CSIRO SO2-85-129, 1 ♂ (cl 22.2 mm); SO2-85-130, 1 ♂ (cl 24.4 mm), 2 ♀♀ (cl 14.7 & 15.8 mm), 2 ovig. ♀♀ (cl 19.9 & 27.4 mm); CSIRO SO2-85-131, 1 ♂ (cl 9.7 mm), 1 ♀ (cl 19.8 mm), 1 young (cl 9.2 mm); SO2-85-132, 5 ♂♂ (cl 15.3-22.4 mm), 4 ♀♀ (cl 9.8-19.8 mm), 2 ovig. ♀♀ (cl 26.2 & 24.9 mm); CSIRO SO2-85-135, 4 ♂♂ (cl 16.0-24.5 mm), 1 ♀ (cl 16.0 mm), 2 ovig. ♀♀ (cl 21.9 & 22.4 mm), 1 young (cl 9.0 mm); CSIRO SO3-86-40, 1 ovig. ♀ (cl 23.0 mm).

**Description.** Rostrum overreaching antennal scale, with nine to 11 dorsal and four to six ventral spines. Carapace weakly ridged dorsally nearly in whole length. Branchiostegal spine supported

by short carina.

Abdomen with dorsal carinae on second to sixth somites, posterior three somites with median dorsal spine. Sixth somite 1.61–1.75 times as long as fifth, 1.98–2.16 times as long as high, weak lateral ridge on anterior two thirds. Telson dorsally grooved, 1.27–1.58 times as long as sixth somite, with seven to ten, commonly nine, dorso-lateral spines on each side.

Antennal scale 0.83–0.87 times as long as carapace, about four times of width. Stylocerite not reaching end of first segment of antennular peduncle.

Appendix masculina 1.40 times as long as appendix interna.

*Remarks.* In adult specimens of southern Australia, the carapace is bluntly ridged dorsally, but not sharply carinated. Wasmer (1986) observed a similar condition of carapace in some specimens collected from the Pacific sector of the Southern Ocean. In smaller specimens of the present series, the dorsal margin of the carapace is usually rounded. It therefore appears that this carina tends to increase its height with growth.

Chace (1986) suggested the possibility of nomenclatural confusion between *A. pelagica* (Risso, 1916) and *A. haeckelii* (von Martens, 1868).

*Distribution.* Atlantic Ocean; Indo-Pacific; Antarctic waters. Known in Australia from off southern and eastern coasts (Kensley *et al.*, 1987; Iwasaki & Nemoto, 1987).

*Acantheephyra quadrispinosa* Kemp, 1939

*Acantheephyra batei*: Stebbing, 1905, p. 107, pl. 24, fig. B. (not Faxon.)

*Acantheephyra quadrispinosa* Kemp, 1939, p. 576; Chace, 1986, p. 26, figs. 3h, 4t, 5t, 78, 10c, 14; Wasmer, 1986, p. 39, fig. 5; Kikuchi & Nemoto, 1986, p. 56; Iwasaki & Nemoto, 1987, p. 18; Kensley *et al.*, 1987, p. 284.

*Material examined.* SO2-85-128, 2 ♂♂ (cl 13.6 & 14.7 mm); SO-85-129, 1 ♂ (cl 12.3 mm), 2 ♀♀ (cl 9.2 & 16.0 mm); SO2-85-131, 3 ♂♂ (cl 13.9–14.0 mm), 6 ♀♀ (cl 7.9–15.2 mm); SO2-85-132, 3 ♀♀ (cl 9.2–16.0 mm); SO2-85-135, 1 ♀ (cl 15.3 mm).

*Distribution.* Eastern South Atlantic; Indo-Pacific from southern Africa to North America. Previously known in Australia from off southern and eastern coasts (Griffiths & Brandt, 1983a, b; Kensley *et al.*, 1987; Iwasaki & Nemoto, 1987).

Genus *Hymenodora* Smith  
*Hymenodora gracilis* Smith, 1887

(Fig. 2)

*Hymenodora gracilis* Smith, 1887, p. 680, pl. 12, fig. 6; Crosnier & Forest, 1973, p. 83, fig. 25a; Wasmer, 1986, p. 49, fig. 10b, c; Kikuchi & Nemoto, 1986, p. 57; Iwasaki & Nemoto, 1987, p. 20; Crosnier, 1987, p. 698.

*Material examined.* SO2-85-135, 1 ♂ (cl 15.0 mm).

*Description.* Integument soft.

Rostrum overreaching end of cornea, directed upwards at apex, armed with five dorsal spines, none on ventral margin. Carapace rounded dorsally, without groove extending upwards from middle of hepatic groove.

Abdomen rounded dorsally, without postero-medial spine on any somite. Sixth somite 1.85 times as long as fifth.

Cornea narrower than eye stalk, ocular tubercle distinct.

Antennal scale 0.47 times as long as carapace, 3.50 times as long as wide, distolateral spine extending beyond distal margin of lamella, with truncate apex.

*Distribution.* Atlantic; Indo-Pacific from southern Africa to west coasts of North and South America; Antarctic Ocean. First record from Australia.

Genus *Notostomus* A. Milne Edwards  
*Notostomus auriculatus* Barnard, 1950

(Fig. 3)

*Notostomus longirostris*: Balss, 1925, p. 268. (not Bate.)  
*Notostomus auriculatus* Barnard, 1950, p. 670, fig. 124h, i; Macpherson, 1984, p. 51, figs. 6b, 7b, 8c, d.  
*Notostomus* cf. *westergreni*: Richardson & Yaldwyn, 1958, p. 31, fig. 16.  
*Notostomus* cf. *crosnieri*: Kensley *et al.*, 1987, p. 286.  
Not *Notostomus auriculatus*: Crosnier & Forest, 1973, p. 52, figs. 14, 16c (= *N. crosnieri* Macpherson, 1984).

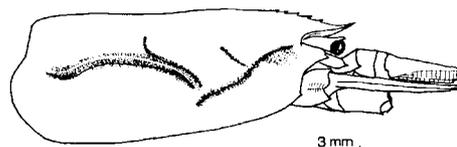


Fig. 2. *Hymenodora gracilis* Smith. Female, cl 15.0 mm.

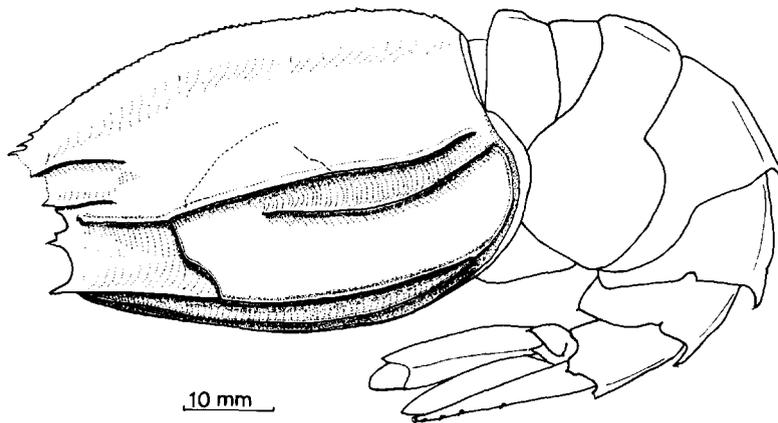


Fig. 3. *Notostomus auriculatus* Barnard. Female, cl 43.4 mm.

*Material examined.* SO2-85-129, 1 ♂ (cl ca. 31 mm), 1 ♀ (cl ca. 32 mm); SO2-85-130, 1 ♂ (cl 38.9 mm); SO2-85-131, 3 ♀♀ (cl 20.1-27.7 mm), 1 young (cl 15.4 mm); SO2-85-135, 1 young (cl ca. 8.5 mm); SO3-86-41, 1 ♀ (cl 43.4 mm).

*Description.* Rostrum longer than carapace, two lateral rostral carinae distinct from basal part to distal one third, extending posteriorly over anterior extremity of gastroorbital carina. Carapace finely dentate on dorsal margin, sharply changing to large teeth above orbital margin, with five lateral carinae on posterior half. Gastroorbital carina ending with abrupt slope anteriorly, posterior extremity not curving strongly dorsad. Subhepatic and infra-subhepatic carinae joining in posterior part, then extending dorsally as one carina.

Branchiostegal spine reaching or slightly overreaching end of basal segment of antennal peduncle.

First abdominal somite with dorsal carina, not dentate anteriorly. Second somite without posteromedian spine. Pleuron of fifth somite with spine at posteroventral margin, deep oblique grooves on anterior part of third to fifth pleura. Sixth somite 1.45-1.54 times as long as fifth. Telson 2.23-2.57 times as long as sixth somite, armed with four or five minute dorsolateral spines on each side.

Antennal scale 0.45-0.54 times as long as carapace, 3.33-3.49 times as long as wide.

Third maxilliped overreaching end of antennal scale, distal segment 2.06-2.67 times as long as penultimate.

*Remarks.* The southern Australian specimens have 1) the gastroorbital carina ending into an abrupt slope at the anterior extremity, 2) the subhepatic carina joining to the infra-subhepatic carina in the posterior portion of the carapace, 3) the first abdominal somite without a spine on anterodorsal portion, 4) the second abdominal somite without spine on posterodorsal portion, and 5) the telson armed with four or five dorsolateral spines on each side. These characters appear to fit with the description and figures of *N. auriculatus* given by Barnard (1950) and Macpherson (1984), and they also agree well with the description of *N. cf. crosnieri* given by Kensley *et al.* (1987).

In the smallest specimen of the present series (cl ca. 8.5 mm), the subhepatic and infra-subhepatic carinae are not fused posteriorly, and the subhepatic carina terminates posteriorly anterior to the posterior extremity of the infra-subhepatic carina. This seems to indicate that the subhepatic carina is connected with the infra-subhepatic carina by the extension of the former carina with growth. While in *N. crosnieri*, the subhepatic carina extends posteriorly far beyond the end of the infra-subhepatic carina (Carosnier & Forest, 1973, fig. 14; Macpherson, 1984, fig. 7). The latter may suggest that the connection of the two carinae, if any, might be performed by the upward extension of the infra-subhepatic carina. I therefore believe that the differences shown by Macpherson between *N. auriculatus* and *N. crosnieri* are of specific nature, and the southern Australian specimens should be referable to *N. auriculatus*.

*Distribution.* Southeastern Atlantic; South Africa, North of New Amsterdam (32°53'S, 83°01'E); New Zealand. Australia (Kensley *et al.*, 1987).

Genus *Oplophorus* H. Milne Edwards  
*Oplophorus novaezeelandiae* de Man, 1931

*Hoplophorus novaezeelandiae* de Man, 1931, p. 369, figs. 1-20.

*Oplophorus novaezeelandiae*: Crosnier & Forest, 1973, p. 26, fig. 5; Macpherson, 1983, p. 50; Wasmer, 1986, p. 37, fig. 3a-c; Iwasaki & Nemoto, 1987, p. 16; Kensley *et al.*, 1987, p. 289.

*Material examined.* SO3-84-62, 2 ♂♂ (cl 13.4 & 13.9 mm); 5 ♀♀ (cl 10.0-16.3 mm); SO4-84-15, 2 ♂♂ (cl 12.0 & 14.5 mm), 1 ♀ (cl 10.9 mm); SO2-85-4, 4 ♂♂ (cl 12.8-22.3 mm), 1 ♀ (cl 13.8 mm), 3 ovig. ♀♀ (cl 15.5-17.5 mm); SO2-85-127, 15 ♂♂ (cl 12.8-20.6 mm), 3 ♀♀ (cl 15.0-17.8 mm); SO2-85-128, 1 ♀ (cl 13.0 mm); SO2-85-129, 5 ♂♂ (cl 11.5-19.2 mm), 2 ♀♀ (cl 11.6 & 22.6 mm), 1 ovig. ♀ (cl 18.6 mm); SO2-85-130, 6 ♂♂ (cl 14.3-21.9 mm), 2 ♀♀ (cl 15.7 & 17.5 mm); SO2-85-131, 6 ♂♂ (cl 13.2-22.0 mm), 1 ♀ (cl 13.7 mm), 4 ovig. ♀♀ (cl 17.1-17.9 mm); SO2-85-132, 5 ♂♂ (cl 12.4-21.6 mm), 2 ♀♀ (cl 16.5 & 16.7 mm), 1 ovig. ♀ (cl 18.9 mm); SO2-85-135, 1 ♂ (cl 20.0 mm), 3 ovig. ♀♀ (cl 16.2-17.8 mm).

*Distribution.* Southeastern Atlantic; Indo-Pacific from southern Africa to off Chile; Southern Oceans. Known from Australia except for northern waters (Hayashi & Miyake, 1969; Kensley *et al.*, 1987; Iwasaki & Nemoto, 1987).

*Oplophorus spinosus* (Brullé, 1839)

*Palaemon spinosus* Brullé, 1839, p. 18, fig. on p. 3. (not seen.)

*Oplophorus grimaldii* Coutière, 1905a, p. 1114; 1905 b, p. 1, fig. 1.

*Oplophorus spinosus*: Crosnier & Forest, 1973, p. 25;

Hanamura, 1983, p. 73; Macpherson, 1984, p. 50; Hayashi *in* Baba *et al.*, 1986, p. 89, fig. 49; Kikuchi & Nemoto, 1986, p. 58; Crosnier, 1987, p. 699; Kensley *et al.*, 1987, p. 289.

*Material examined.* SO2-84-70, 1 ♂ (cl 16.5 mm), 2 ♀♀ (cl 14.1 & 16.8 mm), 1 ovig. ♀ (cl 16.5 mm).

*Distribution.* Atlantic; Indo-Pacific from southern Africa to eastern extremity of Pacific. Known in Australia from off east coast (Griffiths & Brandt, 1983a, b; Kensley *et al.*, 1987).

Family Nematocarcinidae  
Genus *Nematocarcinus* Bate

*Nematocarcinus sigmoides* Macpherson, 1984

(Fig. 4)

*Nematocarcinus lanceops*: Stebbing, 1914, p. 44; Calman, 1925, p. 15. (not Bate, 1988.)

*Nematocarcinus longirostris*: Barnard, 1950, p. 671, fig. 125a-k; Kensley, 1968, p. 317; ?Zarenkov, 1968, p. 148; ?Ledoyer, 1979, p. 142. (not Bate, 1988.)

*Nematocarcinus sigmoides* Macpherson, 1984, p. 63, figs. 10-12.

*Material examined.* SO-86-38, 1 ♀ (cl 27.5 mm), 8 ovig. ♀♀ (cl 26.4-36.7 mm); SO3-86-40, 3 ovig. ♀♀ (cl 29.0-30.7 mm); SO3-86-54, 1 ovig. ♀ (cl 30.6 mm).

*Description.* Rostrum longer than carapace, armed with at least 26 close-set dorsal teeth, including five or six spines placed clearly behind orbital margin, ventral margin with less than five sparsely placed spines. Cervical groove feeble. Branchial sulcus rather marked.

Abdomen rounded dorsally, third somite slightly produced posteriorly. Sixth somite about two times as long as fifth, slightly more than two times as long as high. Pleuron of fourth somite rounded posteroventrally, and of fifth with small posteroventral spine. Telson nearly as long as sixth

Table 2. Percentage length of each segment of pereopods of *Nematocarcinus sigmoides* (female cl 30.4 mm) taken from southern Australia.

Pereopods	Ischium	Merus	Carpus	Propodus	Dactylus
1st	22.1	22.8	40.3	10.9	3.9
2nd	21.1	31.6	38.9	6.4	2.0
3rd*	44.9	55.1	—	—	—
4th	18.1	33.1	43.3	2.5	3.0
5th	18.1	32.1	46.4	2.6	0.8

\* Only ischium and merus were considered.

Deep-Sea Shrimps from Southern Australia

somite, armed with six to eight pairs of dorso-lateral spines.

Antennal scale 0.72-0.77 times as long as

carapace, distolateral spine barely reaching end of distal margin of lamella. Third maxilliped reaching distal fourth of antennal scale, distal

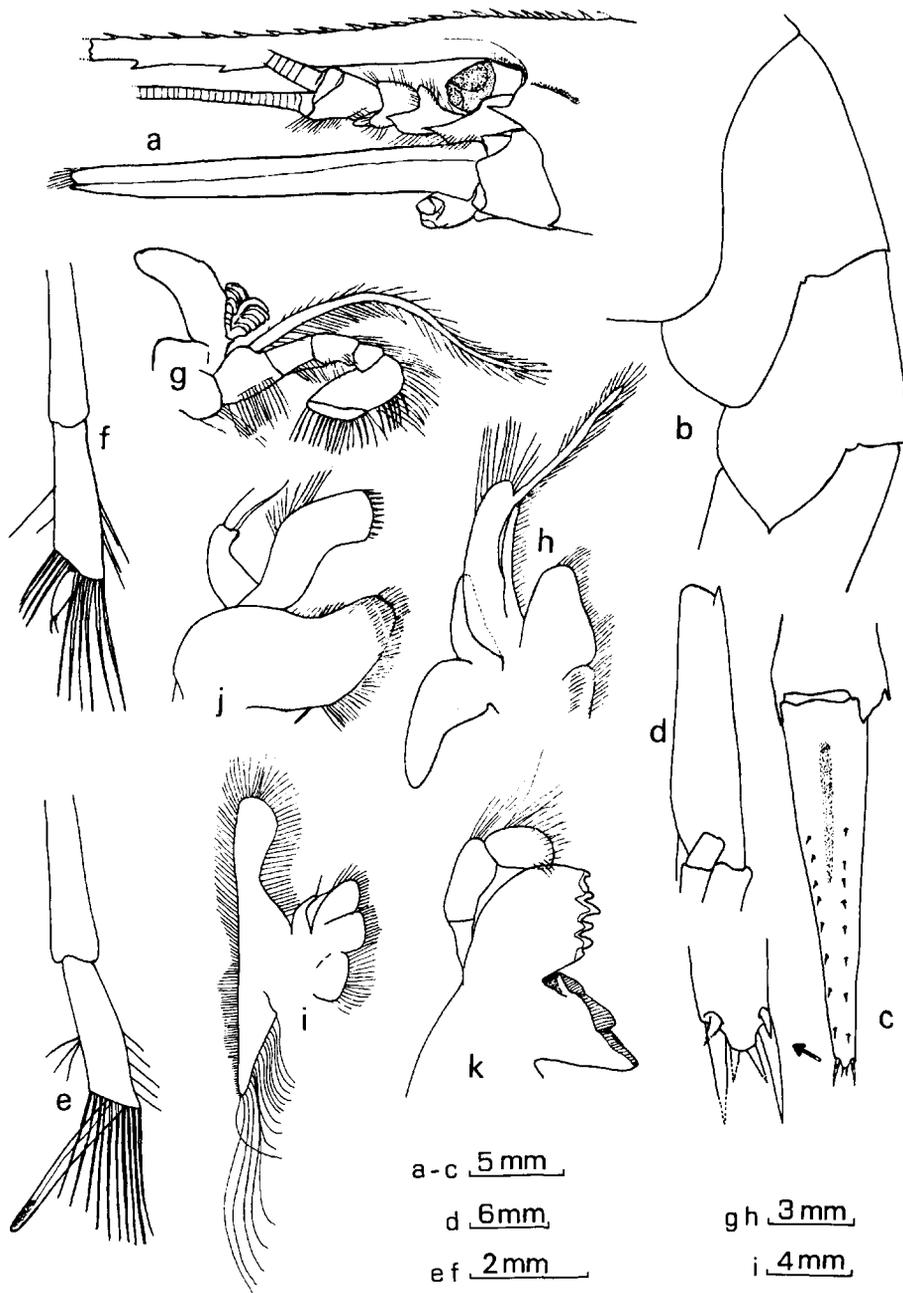


Fig. 4. *Nematocarcinus sigmoides* Macpherson. Ovig. ♀, cl 30.1 mm (a, b) and ovig. ♀, cl 30.7 mm (c-k). a, Anterior part of body (eye damaged); b, 4th and 5th abdominal somites; c, telson; d, antennal scale; e, distal part of 4th pereiopod; f, distal part of 5th pereiopod; g, 2nd maxilliped; h, 1st maxilliped; i, 2nd maxilla; j, 1st maxilla; k, mandible.

segment sub-lanceolate, being 0.72–0.77 times as long as penultimate segment. First pereopod slightly overreaching distal margin of antennal scale; ischium with two spines on mid length of posterior margin in addition to one distal spine; merus with one spine near distal part of posterior margin; carpus with one spine near distal end; chela about 0.3 times as long as palm. Second pereopod with merus overreaching third maxilliped; ischium with one spine near distal end of posterior margin; merus with two spines on proximal half of posterior margin; carpus slender, somewhat fragile, unarmed; chela about three times as long as palm. Third pereopod with merus overreaching distal margin of antennal scale by nearly one fifth of merus. Fourth pereopod with merus overreaching slightly distal margin of antennal scale. Ischia of third and fourth pereopods not reaching anterolateral margin of carapace. Fifth pereopod with merus reaching end of antennal scale.

Proportions of segments in each pereopod in a female with cl 30.4 mm is shown on Table 2.

Exopods on first four pereopods, that on fourth rudimentary.

*Remarks.* *Nematocarcinus sigmoides* Macpherson, 1984, *N. longirostris* Bate, 1888, and *N. proximatus* Bate, 1888, are closely related, and the distinction among these three species is made by somewhat delicate characters. According to Macpherson (1984), *N. sigmoides* differs from *N. longirostris* in having 1) five to eight rather than nine to 11 teeth situated behind the orbital margin, 2) the cervical and branchial grooves not so marked as those in the latter species, 3) the relatively short third pereopod with ischium not overreaching the anterolateral margin of the carapace instead of that segment reaching ocular peduncle, 4) the relatively short first pereopod with the propodus not attaining the distal margin of the antennal scale instead of overreaching that margin, and 5) the ischium of the first pereopod with two or three ventral spines instead of four.

It is unfortunate that Macpherson (1984) did not mention the difference between *N. sigmoides* and *N. proximatus*. Barnard (1950) and Zarenkov (1968) seemed to believe that *N. proximatus* is a junior synonym of *N. longirostris*. According to current recognition, *N. sigmoides* is distinguished from *N. proximatus* by having five to eight post-

orbital dorsal rostral spines instead of nine, and nine to five ventral rostral spines instead of one or two in the latter (cf. Bate, 1888; Chace, 1986).

*Nematocarcinus longirostris* recorded by Ledoyer (1979) from the southwestern Indian Ocean agrees with *N. sigmoides* in the number of dorsal rostral spines placed behind the orbital margin, though the ventral margin is armed with seven spines.

The external features of the "Soela" specimens agree well with those of *N. sigmoides* and recorded here under this name.

*Distribution.* Southeastern Atlantic; Southern Africa. *N. sigmoides* has not been recorded before from Australian waters.

#### Family Pasiphaeidae

#### Genus *Pasiphaea* Savigny

#### *Pasiphaea barentsae* Kensley, Tranter et Griffin, 1987

*Pasiphaea barentsae* Kensley et al., 1987, p. 294, figs. 7–9.

*Material examined.* SO2-85–132, 1 young (cl ca. 12 mm); SO2-85–135, 1 ♀ (cl ca. 28 mm).

*Description.* Rostrum slightly overreaching anterior margin of carapace, directed obliquely upwards, anterior margin slightly concave. Carapace bluntly carinated dorsally on nearly whole length. Suprabranchial carina sharp, extending posteriorly to one fourth of lateral surface of carapace. Additional short carina present below suprabranchial carina. Branchiostegal spine placed on anterolateral margin of carapace.

Abdomen dorsally carinated except on first somite, without posterodorsal spine on any somite. Sixth somite 1.70 times as long as fifth somite. Telson slightly shorter than sixth somite, grooved dorsally, distal margin deeply notched, armed with seven pairs of marginal spines.

Antennular peduncle with stylocerite not reaching to end of basal segment of peduncle. Antennal scale about half as long as carapace, 3.75 times as long as wide.

First pereopod with merus armed with five or six spines (one spine in smaller specimen), ischium unarmed, basis unarmed except for terminal spine, fingers 0.67 times as long as palm. Second pereopod with merus armed with 12–15 spines, ischium armed with one or two spines, basis armed with three to seven spines except for terminal

spine, fingers 0.75 times as long as palm.

*Remarks.* The larger specimen is badly damaged and another material is still young, but their external characters are referable to this species. Minor differences observed between the present specimens and the original materials in some body proportions and structure of appendages are probably due to smaller body size of the "Soela" specimens.

*Distribution.* Previously recorded only from New South Wales, eastern Australia (Kensley *et al.*, 1987).

*Pasiphaea australis* n. sp.

(Figs. 5-7)

*Material examined.* Holotype, SO3-84-62, ovig. ♀ (cl 15.8 mm), R.V. "Soela" SO3-84-62, 22 June 1984, 42°42.0'S, 148°24.0'E, 345-350 m deep, Engels 152, Pelagic Trawl. Paratypes, 2 ♂♂ (cl 15.5 & 16.5 mm), 2 ♀♀ (cl 14.5 & 15.3 mm), 3 ovig. ♀♀ (cl 15.6-16.3 mm). Data as for holotype.

*Description.* Body compressed laterally.

Rostrum sharp, extending obliquely upwards, anterior margin nearly straight or gently concave, not reaching anterior end of carapace. Carapace rounded dorsally, weakly ridged just behind rostral spine. Anterodorsal margin of carapace rather advanced anteriorly. Branchiostegal spine placed just inside lateral margin, apex extending beyond that margin. Suprabranchial ridge well marked.

Abdomen rounded dorsally on all somites, without posteromedian spine. Sixth somite 1.61-1.78 times as long as fifth. Telson 0.60-0.68 times as long as sixth somite, dorsal margin somewhat flattened or weakly grooved, apex truncated, sometimes very slightly notched or very gently convex, distal marginal spines damaged in all specimens, but bearing at least eight spines.

Eye normal, cornea wider than stalk.

Antennular peduncle with first segment nearly as long as second and third segments combined, stylocerite not reaching end of first segment of peduncle. Antennal scale 0.42-0.44 times as long as carapace, 4.00-4.20 times as long as wide, distolateral spine extending beyond distal margin of lamella.

Third maxilliped reaching or slightly overreaching distal margin of antennal scale.

Mouthparts as in Fig. 7.

First pereiopod overreaching distal margin of antennal scale by length of fingers, merus unarmed, ischium unarmed, basis without terminal spine, but forming obtuse angle, fingers 0.61-0.73 times as long as palm. Second pereiopod overreaching distal end of antennal scale by length of fingers and one fifth to one third of palm; merus armed with three to six, usually three or four, spines, ischium unarmed, basis unarmed except for terminal spine, fingers 0.89-1.08 times as long as palm. Third pereiopod overreaching anterolateral margin of carapace, attaining middle of cornea. Fourth pereiopod barely reaching end of basis of second

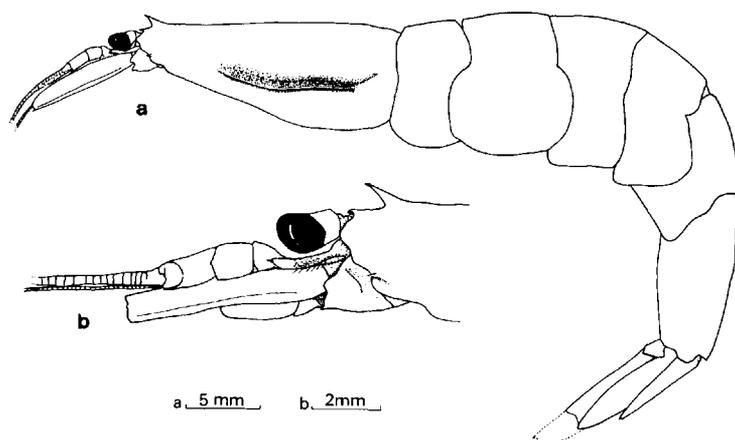


Fig. 5. *Pasiphaea australis* n. sp. a, Body of holotype, ovig. ♀, cl 15.8 mm, lateral view; b, anterior part of body of paratype, ♂, cl 16.5 mm.

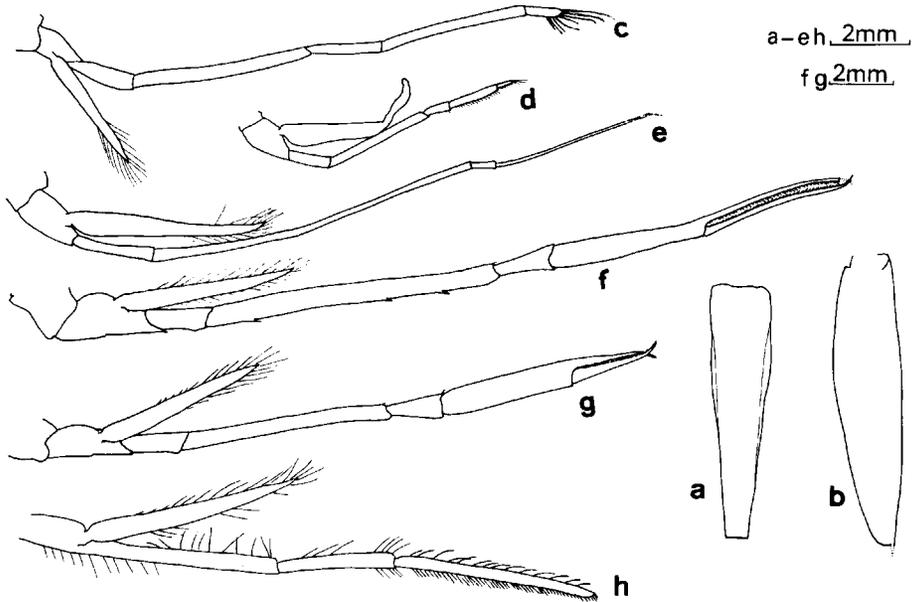


Fig. 6. *Pasiphaea australis* n. sp. Paratype, ♂ cl 16.5 mm. a, Telson, dorsal view; b, antennal scale; c, 5th pereopod; d, 4th pereopod; e, 3rd pereopod; f, 2nd pereopod; g, 1st pereopod; h, 3rd maxilliped.

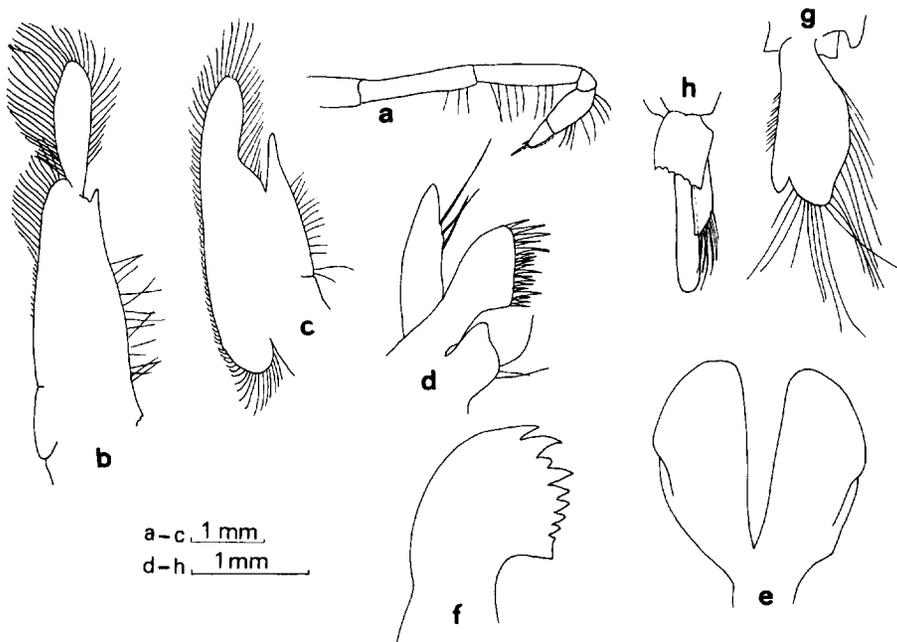


Fig. 7. *Pasiphaea australis* n. sp. Paratype, ♂ cl 16.5 mm. a, Second maxilliped; b, 1st maxilliped; c, 2nd maxilla; d, 1st maxilla; e, lower lip; f, mandible; g, endopod of 1st pleopod; h, appendix masculina.

pereiopod, exopod slightly overreaching mero-carpal articulation. Fifth pereiopod reaching near mid length of merus of second pereiopod, exopod overreaching ischio-meral articulation. Exopod on fifth pereiopod about 70% of that on fourth.

Appendix masculina about half length of appendix interna.

Eggs measuring  $1.0-1.2 \times 0.8-1.0$  mm.

*Remarks.* The present specimens belong to the *Pasiphaea* species group which is characterized by having the carapace and abdomen rounded dorsally, the telson truncated distally, and the merus of the first pereiopod unarmed. Among some 45 species, the following four species are included in this group: *P. cristata* Bate, 1888; *P. merriami* Schmitt, 1931; *P. natalensis* Burukovsky et Romensky, 1982; *P. kapala* Kensley, Tranter et Griffin, 1987.

The present species differs from *P. cristata* and *P. merriami* by having three to six ventral spines on the second pereiopod instead of only one spine in both *P. cristata* and *P. merriami*. The spine-like rostrum of *P. australis* also distinguishes this species from the somewhat triangular-shaped rostra in both the latter two species. *P. kapala* differs from *P. australis* by having six to 11, usually seven to nine, ventral spines on the second pereiopod, and less developed suprabranchial ridge so that it is hardly seen.

*Pasiphaea australis* overlaps with *P. natalensis* in the spine count on the second pereiopod and appeared to be most similar to the latter species.

So far described by Burukovsky and Romensky, *P. australis* differs from *P. natalensis* by having 1) the fingers of the first pereiopod clearly shorter than the palm instead of those longer than the palm, 2) the basis of the first pereiopod without a terminal spine, but forming an obtuse angle, instead of the ventral terminal portion ending in a spine, 3) the relatively longer sixth abdominal somite, being about one and half times as long as the telson instead of that somite nearly subequal, and 4) the smaller eggs measuring  $1.0-1.2 \times 0.8-1.0$  mm instead of  $2.2 \times 1.7$  mm. Details of differences between the two species are shown on Table 3.

*Ethymology.* The specific name came from "southern" in Latin, alluding the fact that the present specimens have been collected from southern Australia.

*Distribution.* Only known from Maria Island area, off east coast of Tasmania, southern Australia.

Genus *Parapasiphae* Smith

*Parapasiphae sulcatifrons* Smith, 1884

*Parapasiphae sulcatifrons* Smith, 1884, p. 384, pl. 5, fig. 4, pl. 6, figs. 1-7; Crosnier & Forest, 1973, p. 142, fig. 41; Butler, 1980, p. 58, fig. on p. 58; Hanamura, 1983, p. 78; Kikuchi & Nemoto, 1986, p. 55; Iwasaki & Nemoto, 1987, p. 31; Kensley *et al.*, 1987, p. 293.

*Material examined.* SO2-85-130, 1 ♂ (cl 17.2 mm); SO2-85-131, 1 ♀ (cl 18.6 mm); SO2-85-132, 1 ♂ (cl 21.0 mm), 1 ♀ (cl 18.4 mm).

Table 3. Comparison of *Pasiphaea natalensis* and *Pasiphaea australis* n. sp.

Items	<i>P. natalensis</i> Burukovsky et Romensky	<i>P. australis</i> n. sp.
carapace	Anterodorsal margin of carapace slightly produced anteriorly; suprabranchial ridge indistinct.	Anterodorsal margin of carapace produced anteriorly; suprabranchial ridge distinct.
abdomen	Sixth somite 1.00-1.15 times as long as telson.	Sixth somite 1.47-1.67 ( $\bar{x}$ : 1.54) times as long as telson.
1st pereiopod	Fingers as long as or slightly longer than palm length; basis with terminal spine.	Fingers 0.61-0.73 ( $\bar{x}$ : 0.65) times as long as palm; basis without terminal spine, but forming obtuse angle.
2nd pereiopod	Fingers about 1.3 times as long as palm.	Fingers 0.89-1.08 ( $\bar{x}$ : 0.93) times as long as palm.
body size	Supposedly sexually mature about 20 mm or more in cl, recorded largest specimen 23.5 mm (ovig. ♀) in cl.	Supposedly sexually mature about 15 mm in cl, largest specimen 16.3 mm (ovig. ♀) in cl.
egg size	$2.2 \times 1.7$ mm.	$1.0-1.2 \times 0.8-1.0$ mm.

*Distribution.* Atlantic; Indo-Pacific from southern Africa to west coasts of North and Central America. Previously known in Australia from south and east coasts (Kensley *et al.*, 1987; Iwasaki & Nemoto, 1987)

Family Rynchocinetidae  
Genus *Lipkius* Yaldwyn  
*Lipkius holthuisi* Yaldwyn, 1960

(Fig. 8)

*Lipkius holthuisi* Yaldwyn, 1960, p. 16, fig. 1; Kensley *et al.*, 1987, p. 304.

*Material examined.* CSIRO SO3-86-32, 1 ovig. ♀ (cl 30.5 mm).

*Description.* Rostrum long, more than one and half times as long as carapace, curving dorsally in distal two thirds, with 16 movable dorsal spines on proximal one third, including five spines placed behind orbital margin, and one fixed spine near apex. Ventral margin with 16 spines throughout length, sparsely placed distally. Carapace rounded dorsally on posterior half. Antennal spine strong. Pterygostomian spine small.

Abdomen rounded dorsally. Third somite slightly produced posteriorly, but not toothed. Pleuron of fourth somite with posteroventral spine. Pleuron of fifth somite with posteroventral spine and one additional spine on mid length of posterior

margin. Sixth somite 1.88 times as long as fifth, 3.40 times as long as high. Telson slightly longer than sixth somite, weakly grooved dorsally, with six pairs of dorsolateral spines.

Antennal scale 0.75 times as long as carapace, 0.35 times as long as wide, distolateral spine falling short level of distal margin of lamella. Eye large.

First pereopod with large chela, dactylus with pectinate spines. Second pereopod with somewhat smaller chela than that in first.

Epipods on first four pereopods. Exopods on first three pereopods, all rudimentary.

Eggs without ommatidia small and numerous, measuring 1.2-1.4 × 0.9-1.0 mm.

*Remarks.* *Lipkius holthuisi* is first described by Yaldwyn (1960) based on two specimens taken from New Zealand. Recently Kensley *et al.* (1987) recorded two specimens from eastern Australian waters.

The present material agrees well with the description and figures given by Yaldwyn (1960), except for the presence of a posterior spine on the pleuron of the fifth somite. This disparity might be due to the differences in body size from the original materials.

*Distribution.* Only known from New Zealand and eastern Australia. The present collection extends the vertical range down to 1,000 m.

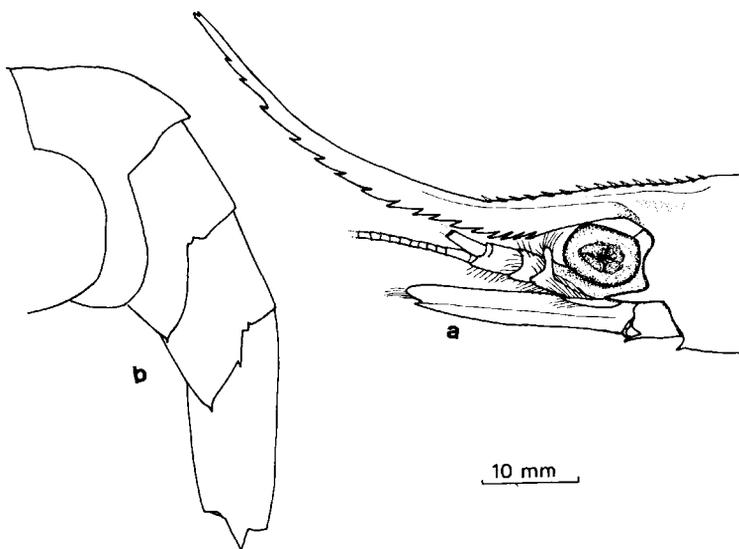


Fig. 8. *Lipkius holthuisi* Yaldwyn. Ovig. ♀, cl 30.5 mm. a, Anterior part of body (eye damaged); b, 3rd to 6th abdominal somites.

Family Pandalidae  
Genus *Plesionika* Bate

*Plesionika martia* (A. Milne Edwards, 1883)

(Figs. 9–11)

*Pandalus martius* A. Milne Edwards, 1883, pl. 21.

*Plesionika uniproducta* Bate, 1888, p. 641, pl. 113, fig. 1 (in part).

*Plesionika martia*: Schmitt, 1926, p. 377; Crosnier & Forest, 1973, p. 212, figs. 63d, 64e, 66; ?Kensley *et al.*, 1987, p. 316.

*Material examined.* SO3-84-77, 2 ♂♂ (cl 15.2 & 15.7 mm), 4 ♀♀ (cl 14.1–17.5 mm), 1 ex. (cl 12.9 mm); SO2-85-134, 1 ♀ (cl 19.4 mm); SO2-85-135, 1 ♀ (cl 18.3 mm).

*Additional material.* MP-Na3797, ORSTOM, off Congo, N.O. "Nizery", Stn. 30, 1°57'S, 8°47'E, 300–530 m, 16 April, 1980, B. Seret coll.: 2 ♂♂ (cl 18.9 & 23.0 mm), 2 ♀♀ (cl 19.5 & 22.5 mm), 5 ovig. ♀♀ (cl 20.2–23.6 mm).

*Description.* Rostrum long, extending far beyond antennal scale, armed with eight or nine dorsal spines, including three to five closely placed teeth behind orbital margin, anteriormost tooth not placed beyond end of antennular peduncle,

ventral margin armed with at least 31 to 54 teeth. Carapace with median dorsal carina extending posteriorly two fifths to mid length, not so high in lateral aspect. Orbital margin very weakly convex or nearly vertical posteriorly. Antennal spine longer and more slender than pterygostomian spine.

Abdomen rounded dorsally, sixth somite 1.90–2.09 times as long as fifth. Pleuron of fifth somite with small ventrolateral spine, posterior portion terminating into 56°–65° angle. Telson 0.99–1.02 times as long as sixth somite, constantly shorter than endopod of uropod, armed with three pairs of dorsolateral spines, excluding terminal pair.

Eye with maximum diameter 0.25–0.28 times as long as carapace, ocellus broadening at juncture with cornea.

Stylocerite slightly overreaching dorsal arc of first segment of antennular peduncle, usually with minute tubercle on distal margin, slanting toward mesial margin, distomesial margin nearly straight or slightly concave, distolateral margin gently convex.

Antennal scale 0.96–1.04 times as long as car-

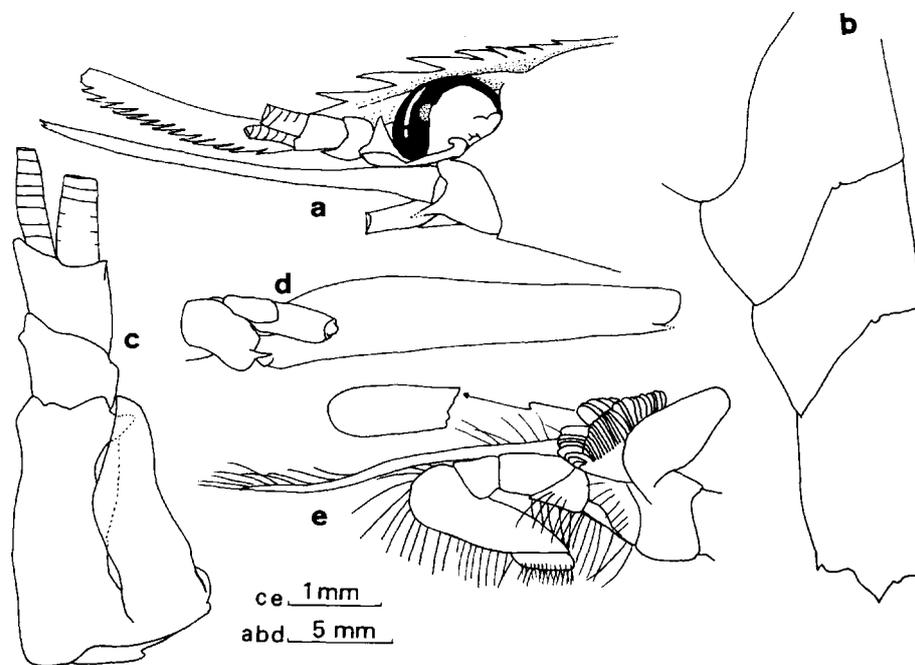


Fig. 9. *Plesionika martia* A. Milne Edwards. Southern Australia, ♂, cl 15.2 mm. a, Anterior part of body; b, 4th to 6th abdominal somites; c, antennular peduncle; d, antennal scale; e, 2nd maxilliped.

Table 4. Comparison of *Pasiphaea martia* taken from off Congo, southwestern Atlantic and southern Australia.

Items	off Congo, S. W. Atlantic (cl. 19.5-23.6 mm)	southern Australia (cl 12.9-19.4 mm)
rostrum	Spine formula: $\frac{7-8(3-4)}{>38-}>50$ , usually 3 or 4 spines behind orbital margin; dorsal spines moderately developed and its proximal series closely placed. Terminating into $48^{\circ}-55^{\circ}$ ( $\bar{x}$ : $52^{\circ}$ ) angle; dorsal margin nearly straight, ventral margin concave at mid length.	Spine formula: $\frac{8-9(3-5)}{>31-}>54$ , usually 3 or 4 spines behind orbital margin; dorsal spines well developed and its proximal series very closely placed. Terminating into $56^{\circ}-65^{\circ}$ ( $\bar{x}$ : $60^{\circ}$ ) angle; dorsal margin nearly straight, ventral margin nearly straight or weakly concave at mid length. 1.90-2.09
6th abdominal somite/5th abdominal somite	1.82-1.96	
telson/6th abdominal somite	0.97-1.08 (Telson usually shorter than endopod of uropod).	0.99-1.02 (Telson usually shorter than endopod of uropod.)
eye width/carapace	0.25-0.27	0.25-0.28
antennal scale/carapace	0.86-1.01	0.96-1.04
antennal scale length/width	4.89-5.50	5.20-5.82
3rd maxilliped		
penultimate segment/distal segment	1.18-1.27	1.02-1.19
2nd pereopod carpal articulations	21-26	20-25
3rd pleopod exopod/carapace	0.68-0.78	0.70-0.77

Deep-Sea Shrimps from Southern Australia

apace, 5.20–5.82 times as long as wide, distolateral spine falling short of level of distal margin of lamella.

Mandible with incisor process armed with five teeth on right side and six on left. Second maxilliped with podobranch, its larger branchial filaments leaf-shaped, about four times as long as wide. Third maxilliped with penultimate segment

1.02–1.19 times as long as distal.

Second pereiopods subequal in length, carpus composed of 21–26 subsegments.

Exopod of third pleopod 0.70–0.77 times as long as carapace.

Epipods on anterior four pereiopods.

*Remarks.* The southern Australian specimens have eyes that are comparable to specimens of *P.*

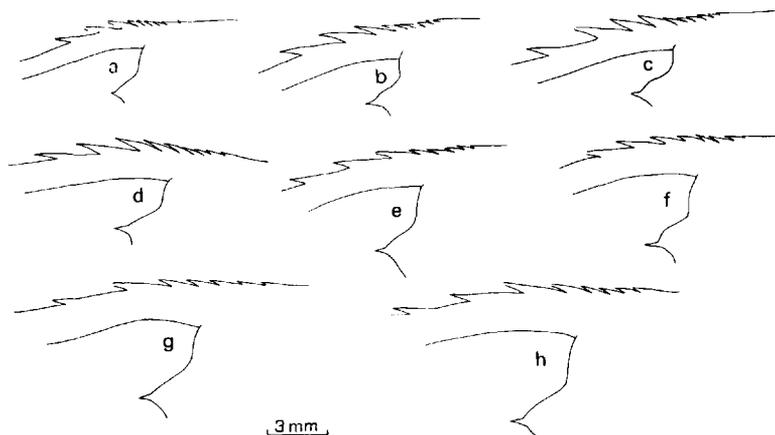


Fig. 10. Anterior part of carapace of *Plesionika martia* A. Milne Edwards. Specimens from southern Australia (a–d), and from off Congo (MP-Na3397) (e–h). a, ♀, cl 14.1 mm; b, ♂, cl 15.2 mm; c, ♀, cl 16.4 mm; d, ♂, cl 17.2 mm; e, ♂, cl 18.9 mm; f, ♀, cl 19.5 mm; cl 19.5 mm; g, ovig. ♀, cl 21.9 mm; h, ovig. ♀, cl 23.6 mm.

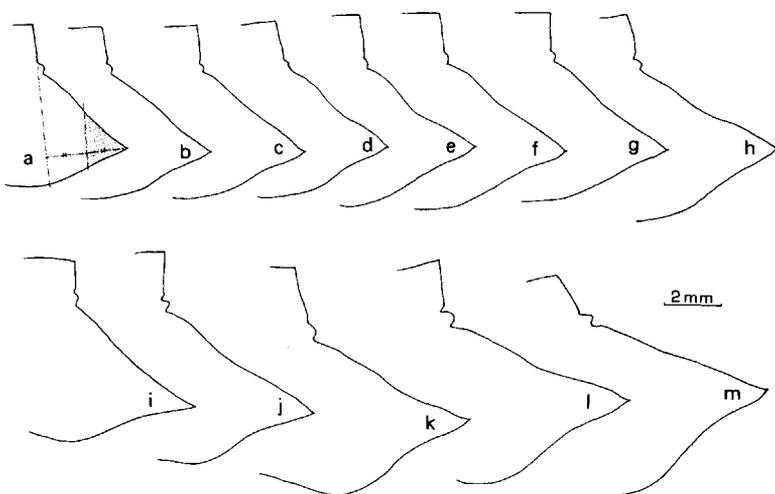


Fig. 11. Pleuron of 5th abdominal somite of *Plesionika martia* A. Milne Edwards. Specimens from southern Australia (a–h), and from off Congo (MP-Na3397) (i–m). a, ♀, cl 14.1 mm; b, ♂, cl 15.2 mm; c, ♀, cl 15.0 mm; d, ♂, cl 15.7 mm; e, ♀, cl 15.9 mm; f, ♂, cl 17.3 mm; g, ♀, cl 17.5 mm; h, ♀, cl 19.4 mm; i, ♀, cl 19.5 mm; j, ovig. ♀, cl 20.2 mm; k, ovig. ♀, cl 21.7 mm; l, ♀, cl 22.5 mm; m, ♀, cl 23.0 mm. Shaded part was measured to determine the angle of pleuron.

*maria* taken from the eastern Atlantic and those of *P. martia orientalis* Chace, 1985, known from the Philippine-Indonesian region (Chace, 1985) and the northwestern Australian shelf (Hanamura & Takeda, 1987). The exopod of the third pleopod of the southern Australian specimens is proportionately shorter than that of the subspecies from the Philippine-Indonesian region ( $\bar{x}$ : 0.79, Chace, 1985) as well as the northwestern Australian shelf ( $\bar{x}$ : 0.83), and somewhat similar to the value of *P. martia* from the southeastern Atlantic ( $\bar{x}$ : 0.74). The southern Australian specimens, however, disclosed minor differences from *P. martia* of the southeastern Atlantic (Table 4). These tabulated values also differ from those of the subspecies of the northwestern Australian shelf (e.g. Hanamura & Takeda, 1987).

Although data is limited, the southern Australian specimens have consistently shorter exopod on the third pleopod compared with specimens assigned to *P. martia orientalis* taken from northwestern Australian waters, and the dorsal rostral spines placed behind the orbital margin appears to be well developed and more closely set than those of the latter. I therefore prefer to treat here the southern Australian specimens as *P. martia*, but not the subspecies *P. martia orientalis*. However, differences in certain allometry between specimens of southern Australia and the southeastern Atlantic seem to suggest the presence of some local populations within its geographical range, that may or may not prove to be of specific or subspecific recognition or not. Future study is in need for *P. martia* complex in worldwide range.

*Distribution.* If my specific recognition is correct, *P. martia* would be distributed from the Atlantic Ocean to southern Australia waters through the southern part of the Indian Ocean. *P. martia orientalis* is known from the Philippine-Indonesian region and the northwestern Australian shelf.

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#### Literature

- Adensamer, T., 1898. Decapoden gesammelt auf S. M. Schiff "Pola" in den Jahren 1890-1984. Berichte der Commission für Erforschung des östlichen Mittelmeeres. XXII. Zoologische Ergebnisse. XI. Denkschr. Akad. Wiss. Wien, 65: 597-628.
- Baba, K., K. Hayashi, & M. Toriyama, 1986. Decapod crustaceans from continental shelf and slope around Japan. The intensive research of unexploited fishery resources on continental slopes. Japan Fish. Res. Conserv. Ass. Tokyo: 1-336.
- Balss, H., 1925. Macrura der deutschen Tiefsee-Expedition. 2. Natantia, Teil A. Wiss. Ergebn. Deutschen Tiefsee-Exped. Valdivia 1898-1899, 20: 217-315, pls. 20-28.
- Barnard, K. H., 1950. Descriptive catalogue of South African decapod Crustacea. Ann. S. Afr. Mus., 38: 1-837.
- Bate, C. S., 1881. On the Penaeidea. Ann. Mag. Nat. Hist., (5), 8: 169-196, pls. 11, 12.
- 1888. Report on the Crustacea Macrura collected by H. M. S. Challenger during the years 1873-1876. Rep. Voy. Challenger, Zool., 24: 1-942, pls. 1-150.
- Brullé, M., 1839. Crustacés. In: Webb et Berthelot, Histoire naturelle des Isles Canaries, 2, (2): 15-18, 1 pl. (not seen.)
- Burkenroad, M. D., 1936. The Aristaeinae, Solenocerinae and pelagic Penaeinae of the Bingham Oceanographic Collection. Materials for a revision of the oceanic Penaeidae. Bull. Bingham Oceanogr. Coll., 5 (2): 1-151.
- Burukovsky, R. N., & L. L. Romensky, 1982. Novyye nakhozhdyeniye neskol'kikh vidov kryevyvetok i opsaniiye *Pasiphaea natalensis*, sp. n. [New findings of

Deep-Sea Shrimps from Southern Australia

- several species of shrimps and description of *Pasi-phaea natalensis*, sp. n.]. Zool. Zh., 61: 1797-1801.
- Butler, T. H., 1980. Shrimps of the Pacific coast of Canada. Can. Bull. Fish. Aquat. Sci., 202: 1-280.
- Calman, W. T., 1925. On macrurous decapod Crustacea collected in South African waters by the S.S. "Pickle". With a note on specimens of the genus *Sergestes* by H. J. Hansen. S. Afr. Fish. Mar. Biol. Survey Rep. 4 (3): 1-26, pls. 1-4.
- Chace, F. A., Jr., 1985. The caridean shrimps (Crustacea: Decapoda) of the *Albatross* Philippine Expedition, 1907-1910, Part 3: Families Thalassocarididae and Pandalidae. Smiths. Contr. Zool., 411: 1-143.
- 1986. The caridean shrimps (Crustacea: Decapoda) of the *Albatross* Philippine Expedition, 1907-1910, Part 4: Families Oplophoridae and Nematocarinidae. *Ibid.*, 432: 1-82.
- Coutière, H., 1905a. Sur quelques Crustacés provenant des campagnes de la *Princesse Alice* (filet à grande ouverture). C. R. Acad. Sci. Paris, 140: 1113-1115.
- 1905b. Note préliminaire sur les *Eucyphotes* recueillis par S. A. S. le Prince de Monaco à l'aide du filet à grande ouverture (Campagnes de la *Princesse-Alice* 1903-1904). Bull. Mus. Océanogr. Monaco, 48: 1-35.
- 1906. Notes sur la synonymie et le développement de quelques Hoplophoridae (Campagnes de la "Princesse-Alice" 1904-1905). *Ibid.*, 70: 1-20.
- Crosnier, A., 1978. Crustacés Decapodés Pénéides Aristeidae (Benthescyminae, Aristeinae, Solenocerinae). Faune de Madagascar, ORSTOM, 46: 1-197.
- 1984. Penaeoid shrimps (Benthescyma, Aristeidae, Solenoceridae, Sicyoniidae) collected in Indonesia during the Corindon II and IV expeditions. Mar. Res. Indonesia, 24: 19-47.
- 1985. Crevettes pénéides d'eau profonde récoltées dans l'océan Indien lors des campagnes *Benthedi*, *Safari I* et *II*, MD 32/Réunion. Bull. Mus. Natn. Hist. Nat., Paris. (4), 7: 839-879.
- 1987. Oplophoridae (Crustacea Decapoda) récoltés de 1971 à 1982 par les navires français dans l'océan Indien occidental sud. *Ibid.*, 9: 695-726.
- & J. Forest, 1973. Les crevettes profondes de l'Atlantiques oriental tropical. Faune Tropicale, ORSTOM, 19: 1-409.
- Frogliola, C., & S. Giannini, 1984. Pelagic shrimps of the Adriatic Sea (Crustacea Decapoda Natantia). Atti. Soc. Ital. Sci. Nat. Museo Civ. Stor. Nat. Milano, 125: 49-60.
- Gordon, I., & R. W. Ingle, 1956. On a pelagic penaeid prawn, *Funchalia woodwardi* Johnson, new to the British fauna. J. Mar. Biol. Ass. U. K., 35: 475-481.
- Grey, D. L., W. Dall, & A. Baker, 1983. A guide to the Australian penaeid prawns. Dept. Primary Produc. N. T., Darwin: 1-140.
- Griffiths, F. B., & S. B. Brandt, 1983a. Mesopelagic Crustacea in and around a warm-core eddy in the Tasman Sea off eastern Australia. Austr. J. Mar. Freshw. Res., 34: 609-623.
- & ——— 1983b. Distribution of mesopelagic decapod Crustacea in and around a warm-core eddy in the Tasman Sea. Mar. Ecol. Prog. Ser., 12: 175-184.
- Grippa, G., 1976. *Funchalia woodwardi* Johnson, 1867, nelle acque di sicilia, con osservazioni sul genere. Atti. Soc. Ital. Nat. Museo Civ. Stor. Nat. Milano, 117: 117-136.
- 1987. A revision of gen. *Pelagopenaeus* Burkenroad, 1934 and *Funchalia* Johnson, 1867 (Crustacea, Decapoda, Penaeidea). Inv. Pesq., 51 (Suppl. 1): 73-85.
- Hanamura, Y., 1983. Pelagic shrimps (Penaeidea and Caridea) from Baja California and its adjacent region with description of a new species. Bull. Biogeogr. Soc. Japan, 38: 51-85.
- & M. Takeda, 1987. Family Pandalidae (Crustacea, Decapoda, Caridea) collected by the R. V. "Soela" from the northwest Australian shelf. Bull. Nat. Sci. Mus., Tokyo, (A), 13: 103-121.
- Hayashi, K., & S. Miyake, 1969. Bathypelagic caridean shrimps collected by "Koyo Maru" during the International Indian Ocean Expedition. Ohmu, 2: 59-77.
- Holthuis, L. B., 1977. The Mediterranean decapod and stomatopod Crustacea in A. Risso's published works and manuscripts. Ann. Mus. Hist. Nat. Nice, 5: 37-88, pls. 1-7.
- Iwasaki N., & T. Nemoto, 1987. Pelagic shrimps (Crustacea: Decapoda) from the Southern Ocean between 150°E and 115°E. Mem. Natl. Inst. Polar Res, (E), 38: 1-40.
- Johnson, J. Y., 1867. Descriptions of a new genus and a new species of macrurous decapod crustaceans belonging to the Penaeidae, discovered at Madeira. Proc. Zool. Soc. London, 1867: 895-901.
- Kemp, S., 1939. On *Acanthephyra purpurea* and its allies (Crustacea Decapoda: Hoplophoridae). Ann. Mag. Nat. Hist., (11), 4: 568-579.
- Kensley, B., 1968. Deep sea decapod Crustacea from west of Cape Point, South Africa. Ann. S. Afr. Mus., 50: 283-323.
- 1977. The South African Museum's *Meiring Naude* cruises. Part 5: Crustacea, Decapoda, Reptantia and Natantia. *Ibid.*, 74: 13-44.
- , H. A. Tranter, & D. J. G. Griffin, 1987. Deepwater decapod Crustacea from eastern Australia

- (Penaeidea and Caridea). Rec. Austr. Mus., 39: 263-331, 1 pl.
- Kikuchi, T., & T. Nemoto, 1986. List of pelagic shrimps (Crustacea, Decapoda) from the western North Pacific. Bull. Biogeogr. Soc. Japan, 41: 51-59.
- Ledoyer, M., 1979. Caridea (Crustacea, Decapoda) des îles Kerguelen, Crozet, Marion et Prince Edward, et du sud de Madagascar (Banc Walters), des campagnes MD.03, MD.04 et MD.08 du M/S «Marion-Dufresne». Campagne océanographique MD.08/Benthos aus îles Crozet, Marion et Prince Edward: Premiers Résultats Scientifiques, 44: 137-153. Comité National Français des Recherches Antarctiques, Paris.
- Macpherson, E., 1983. Crustáceos Decápodos capturados en las costas de Namibia. Res. Exp. Cient., 11: 3-79.
- 1984. Crustáceos Decápodos del Banco Valdivia (Atlántico sudoriental). *Ibid.*, 12: 39-105.
- Man, J. G., de, 1931. On a new species of the genus *Hoplophorus* (*Oplophorus*) H. M.-Edw., *Hoplophorus novae-zeelandiae*, sp. n. J. Linn. Soc. London, Zool., 37: 369-378.
- Martens, E., von, 1868. Ueber einige ostasiatische Süßwasserthiere. Arch. Naturg., 34: 1-67.
- Milne Edwards, A., 1883. Recueil de figures de Crustacés nouveaux ou peu connus: 1-3, pls. 1-44.
- Monod, Th., 1972. Sur quatre crevettes du Pacifique sud. Cah. Pacif., 16: 7-29.
- Richardson, L. R., & J. C. Yaldwyn, 1958: A guide to the natant decapod Crustacea (Shrimps and Prawns) of New Zealand. Tuatara, 7: 17-41.
- Riggio, G., 1900. Contributo allo carcinologia del Mediterraneo (Sunto). Monitore. Zool. Ital., suppl., 11: 19-20.
- 1905. Contributo allo carcinologia del Mediterraneo. I. Nota sopra alquanti Crostacei nel mare di Messina. Natural. Sicil., Nelle ser., 17: 93-96, 117-120, 134-140, 179-186, 208-216, 237-242, 254-263, 274-387, pls. 2, 3, 5.
- Risso, A., 1816. Histoire naturelle des Crustacés des environs de Nice, 175 pp., pls. 1-3. Librairie Grecque-Latine-Allemande: Paris. (not seen.)
- 1827. Histoire naturelle des principales productions de l'Europe méridionale et particulièrement de celles des environs de Nice et des Alpes-Maritimes, 5, I-VIII, 1-403, pls. 1-10. (not seen.)
- Roger, E. J., 1938. Quelques observations au sujet d'un Crustacé Décapode Macroure assez rare: *Funchalia woodwardi* Johnson. Bull. Soc. Zool. Fr., 63: 23-32.
- Schmitt, W. L., 1926. Report on the Crustacea Macrura (Families Peneidae, Campylonotidae and Pandalidae) obtained by the F.I.S. "Endeavour" in Australian Seas. With notes on the species of "*Penaeus*" described by Haswell and contained, in part, in the collections of the MacLeay Museum, at the University of Sydney. Biological result of the fishing experiments carried out by the F.I.S. "Endeavour" 1904-14. Commonw. Austr. Fish. Bd., 5: 310-381, pls. 57-68.
- Smith, S. I., 1884. Report on the decapod Crustacea of the Albatross dredgings off the east coast of the United States in 1883. Rep. U.S. Fish. Comm., 10: 345-426, pls. 1-10.
- 1887. Report on the decapod Crustacea of the Albatross dredgings off the east coast of the United States, during the summer and autumn of 1884. *Ibid.*, 13, 605-706, pls. 1-20.
- Stebbing, T. R. R., 1905. South African Crustacea. Part III. Mar. Invest. S. Afr., 4: 21-123, pls. 17-26.
- 1914. Stalk-eyed Crustacea Malacostraca of the Scottish National Antarctic Expedition. Trans. Roy. Soc. Edin., 50: 253-307, pls. 23-32.
- Wasmer, R. A., 1986. Pelagic shrimps of the family Ophlophoridae (Crustacea: Decapoda) from the Pacific sector of the Southern Ocean: USNS *Eltanin* cruises 10, 11, 14-16, 19-21, 24, and 25. Biology of the Antarctic Seas XVII, Antarctic Res. Ser., 44: 29-68.
- Wood Mason, J., 1892. Illustrations of the zoology of the royal Indian marine surveying steamer "Investigator". Crustacea, pt. 1, pls. 1-5.
- Yaldwyn, J. C., 1960. Crustacea Decapoda Natantia from the Chatham Rise: A deep water bottom fauna from New Zealand. N.Z. Dept. Sci. Indust. Res. Bull., 139: 13-53.
- Yokoya, Y., 1933. On the distribution of decapod crustaceans inhabiting the continental shelf around Japan, chiefly based upon materials collected by the S. S. "Sōyō-Maru", during the year 1923-1930. J. Coll. Agr. Tokyo Univ., 12: 1-226.
- Yu, H.-P., & T.-Y. Chan, 1986. The illustrated penaeoid prawns of Taiwan. Southern Materials Center, Inc., Taipei, 1-183.
- Zarenkov, N. A., 1968. Dyesyatinogiye rakoobraznyye (Crustacea Decapoda), sobrannyye sovyetskimi antarkticheskimy zkspyeditsiyami v antarkticheskoy i antiboryealnoy oblastyakh [Crustacea Decapoda collected in the Antarctic and Subantarctic regions by the Soviet Antarctic Expeditions]. Acad. Nauk SSSR, Zool., Inst. Issled. Fauny Morei, 6: 153-199.
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オーストラリア南部海域より得られた深海性エビ類

花村幸生

近年オーストラリア CSIRO 漁業部門では、オーストラリア周辺の大陸棚における生物調査を精力的に行っている。こうした一連の調査のうち、オーストラリア南部タスマニア近海域で得られた試料中、いくつかのエビ類標本を調べる機会を得た。本研究によって出現が確認され

たエビ類はクルマエビ類とコエビ類に属する7科14種であった。このうち、*Hymenodora gracilis* と *Nemato-carcinus sigmoides* はオーストラリアでの初出現記録であった。また、*Pasipheaea* 属の1種は新種と考えられ、*P. australis* として記載した。

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