

## Deepwater Decapod Crustacea from Eastern Australia (Penaeidea and Caridea)

BRIAN KENSLEY<sup>1</sup>, H.A. TRANTER<sup>2</sup> AND D.J.G. GRIFFIN<sup>2</sup>

<sup>1</sup>National Museum of Natural History,  
NHB 163, Smithsonian Institution, Washington, D.C., 20560, U.S.A.  
<sup>2</sup>Australian Museum,  
P.O. Box A285, Sydney South, NSW 2000, Australia.

**ABSTRACT.** A taxonomic report on deepwater shrimps and prawns from Eastern Australia, primarily New South Wales, is presented. The collection, which includes penaeideans and carideans, consists of 73 species. Of these, 46 represent new records for the Australian fauna, while ten species and one subspecies are described as new. These latter are: *Haliporoides cristatus*, *H. sibogae australiensis*, *Pasiphaea berentsae*, *P. kapala*, *P. longitaenia*, *Lebbeus yaldwyni*, *Merhippolyte chacei*, *Plesionika grahami*, *Glyphocrangon holthuisi*, *G. lowryi* and *G. novacastellum*. Locality data and diagnoses are provided for all the species. Zoogeographically, the collection is made up of two major components: those species having a widespread distribution in all the oceans, and those which are Indo-Pacific in distribution.

KENSLEY, B., H.A. TRANTER & D.J.G. GRIFFIN, 1987. Deepwater decapod Crustacea from eastern Australia (Penaeidea and Caridea). Records of the Australian Museum 39(5): 263–331.

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The deepwater shrimps and prawns of eastern Australia are at present known only from early work by the *Challenger* (Bate, 1888) and the *Endeavour* (Schmitt, 1926) expeditions. Most of the studies since that time have concerned the commercially important penaeideans and few of these studies have dealt with deepwater species. Griffiths & Brandt (1983) briefly summarised the distribution of some mesopelagic species. Racek & Dall, in a series of major papers, have dealt with the shallow water penaeideans of Australia. Published work on penaeidean and caridean decapod crustaceans from other geographic areas form a sound basis for studies of the local fauna. These include the works of Calman (1925, 1939), Chace, in a series of extremely significant papers (1940, 1983, 1984, 1985), Crosnier (1970, 1976, 1978, 1985), Crosnier & Forest (1973), Hayashi & Miyake (1969), Holthuis (1951, 1955), Kensley (1968, 1971, 1977, 1981), Kubo (1949), Pérez Farfante (1977), and Yaldwyn (1960, 1967).

Since 1971, the New South Wales State Fisheries (now the Fisheries Division of the NSW Department of Agriculture) has been carrying out a series of trawling surveys along the coast of New South Wales, extending into Queensland waters to the north and the Bass Strait to the south, with a view to understanding the distribution of prawns (see Australian Fisheries, November 1973, pp. 24–29). Well over 100 species of crabs, lobsters, and shrimps have been found as a result of these studies. Of these, more than 40 have been recognised in the last ten years.

The present paper is a report on the shrimps and prawns collected between 1971 and 1984. Seventy three species are recorded here. The sergestid

shrimps have not been dealt with, as these will form part of a separate study, along with the sergestid fauna of New Zealand. There are at least 13 species of sergestids in the NSW collection. One new species from this collection, *Cryptopenaeus crosnieri* Pérez Farfante & Kensley, 1985, was described in a separate paper.

The material on which this paper is based is deposited in the collections of the Australian Museum (AM); some paratypic material has been deposited in the Smithsonian Institution. Each species account includes the original reference to the species, and either references to all Australian literature relevant to that species, or to a recent adequate Australian treatment of the species. Also included is a list of material examined along with locality data, a remarks section where necessary, and a summary of the geographic and bathymetric distribution. Carapace length (cl) is used as the standard measurement. Within each family, genera and species are arranged alphabetically.

## SYSTEMATIC SECTION

### Infraorder PENAEIDEA

#### Family SOLENOCERIDAE

##### *Haliporoides* Stebbing, 1914

##### *Haliporoides cristatus* n. sp.

Figs 1, 2, 5G–L

*Haliporoides* sp.—Potter & Dredge, 1985: 226.

**Type material.** New South Wales: HOLOTYPE: AM P35893, north-east of Point Danger, 27°55'S 154°03'E to

27°57'S 154°03'E, 629 m, demersal prawn trawl, *Kapala* (K78-23-09), 6 Nov 1978; 1 ♂, 23.5 mm. PARATYPES: AM P35894, east of Broken Bay, 33°43'-39'S 151°54'-55'E, 477 m, demersal prawn trawl, *Kapala* (K83-14-07), 27 Oct 1983; 1 ♂ (juv.) 16.0 mm, 8 ♀, 16.8-22.6 mm. AMP21588, north-east of Point Danger, 28°01'S 154°00'E to 27°58'S 154°00'E, 542 m, demersal prawn trawl, *Kapala* (K78-17-10), 17 Aug 1978; 1 ♂, 21.0 mm. AMP21699, south-east of Cape Hawke, 32°22'S 152°58'E to 32°17'S 153°01'E, 463 m, demersal prawn trawl, *Kapala* (K75-08-03), 2 Oct 1975; 1 ♂, 17.0 mm. USNM 211386, south-east of Broken Bay, 33°40'S 151°54'E to 33°33'S 151°58'E, 250 m, demersal prawn trawl, *Kapala* (K74-15-25/26), 5 Dec 1974, 1 ♂, 18.8 mm, 4 ♀, 17.5-23.2 mm. USNM 211387, east of Broken Bay, 33°43'-39'S 151°54'-55'E, 477 m, demersal prawn trawl, *Kapala* (K83-14-07), 27 Oct 1983, 1 ♂, 20.5 mm, 4 ♀, 21.0-22.9 mm.

**Additional material examined.** New South Wales: AM P33171, north-east of Point Danger, 28°01'S 154°00'E to 27°58'S 154°00'E, 542 m, demersal prawn trawl, *Kapala* (K78-17-10), 17 Aug 1978; 8 ♀. AMP21585, north-east of Sydney, 33°43'S 151°49'E, 411 m, *Kapala*, 28 Sept 1975; 4 ♂, 3 ♀. AM P21767, north-east of Yamba, 29°26'S 153°49'E to 29°20'S 153°50'E, 450 m, demersal prawn trawl, *Kapala* (K75-09-08), 12 Oct 1975; 1 ♀. AMP24805, north-east of Batemans Bay, 35°28'S 150°50'E to 35°33'S 150°47'E, 594 m, demersal fish trawl, *Kapala* (K76-11-12), 8 July 1976; 5 ♀. AMP25064, east of Broken Bay, 33°34'S 152°08'E, 457 m, *Kapala*, 1 Nov 1976; 1 ♂, 2 ♀. AM P25206, south-east of Broken Bay, 33°42'S 151°52'E to 33°39'S 151°54'E, 446 m, demersal prawn trawl, *Kapala* (K76-24-01), 20 Dec 1976; 6 ♂, 1 ♀. AM P26819, south-east of Newcastle, 32°59'S 152°34'E to 33°02'S 152°31'E, 360 m, demersal prawn trawl, *Kapala* (K77-23-08), 7 Dec 1977; 1 ♂, 2 ♀. AMP33167, north-east of Port Jackson, 33°46'S 151°49'E to 33°44'S 151°51'E, 425 m, demersal prawn trawl, *Kapala* (K80-21-04), 16 Dec 1980; 1 ♂, 1 ♀. AM P35919, off Sydney, 33°46'S 151°50'E to 33°42'S 151°53'E, 414 m, demersal prawn trawl, *Kapala* (K80-06-01), 24 May 1980; 2 ♂, 1 ♀. AM P33170, north-east of Point Danger, 27°55'S 154°03'E to 27°57'S 154°03'E, 629 m, demersal prawn trawl, *Kapala* (K78-23-09), 6 Nov 1978; 4 ♂, 5 ♀. AMP33172, south-east to east of Broken Bay, 33°43'S 151°52'E to 33°40'S 151°55'E, 405 m, demersal prawn trawl, *Kapala* (K77-12-01/02), 8 Aug 1977; 3 ♂, 1 ♀. AM P33168, north-east of Wollongong, 34°21'S 151°25'E to 34°19'S 151°27'E, 432 m, demersal prawn trawl, *Kapala* (K78-27-13), 13 Dec 1978; 2 ♀. Queensland: AM P25146, east of Fraser Island, 366 m, *Markwell Enterprise*; 9 ♀.

**Description.** Integument firm, with overall fine pile of very short setae. Rostrum just reaching base of antennular peduncle article 3, strongly arched over eye, uniform in height from orbital margin to first ventral tooth, then tapering abruptly to apex. Rostral and epigastric teeth:  $\frac{8+1}{2}$  to  $\frac{11+1}{4}$ , most frequent:  $\frac{10+1}{3}$ ; epigastric tooth situated about  $\frac{1}{3}$  carapace length from orbital margin; first rostral tooth situated just posterior of orbital margin. Adrostral carina strong, acute, running from orbital margin to base of rostral apex. Postrostral carina barely marked, obsolete at level of cervical groove. Pterygostomian spine strong, triangular, lacking

distinct keel, but basally rounded and extending into rounded hepatic carina. Hepatic sulcus deep. Cervical carina strong, rounded ventrally, obsolete at mid-dorsum. Suprahepatic spine subequal to hepatic spine. Posthepatic carina obsolete. Branchiocardiac carina rounded, sulcus relatively deep, not reaching posterior carapace margin. Postorbital spine subequal in strength to hepatic and suprahepatic spines. Submarginal carina acute, not quite reaching posterior margin of carapace.

Eye as illustrated.

Antennular peduncle about 0.6X length of carapace; prosartema not quite reaching distal margin of cornea; stylocerite short, basally broad, spine acute, falling considerably short of base of antennular peduncle article 2. Inner antennular flagellum 7X carapace length, outer flagellum 5X carapace length. Scaphocerite over-reaching antennular peduncle by about  $\frac{1}{8}$  of its own length, strongly rigid lateral margin ending in acute spine, falling short of apex of lamella; flagellum about 9X carapace length.

Mouthparts as figured.

Mandibular palp, second article almost 3X longer than wide, widest proximally; distal article about  $\frac{2}{3}$  length of proximal, slender, tapering, apically rounded. Maxilliped 3 extending beyond antennular peduncle by dactylus and half of propodus; dactylus slightly more slender and tapering in female than in male. Pereopod 1 reaching just beyond carpocerite in male and female; merus with distoventral movable spine and 3 fixed proximal spines; basis and ischium with distoventral fixed spine. Pereopod 2 reaching to base of antennular peduncle article 3 in female; almost to distal end of antennular peduncle article 2 in male. Pereopod 3 reaching by length of dactylus and propodus beyond antennular peduncle in female; by length of dactylus and half of propodus in male. Coxal plate of pereopod 3 in female expanded mesially, anterior surface hollowed, posterior surface strongly convex. Pereopod 4 extending beyond antennular peduncle by length of dactylus and  $\frac{3}{4}$  length of propodus in female. Pereopod 5 extending beyond antennular peduncle by length of dactylus, propodus and carpus in female. Pereopods increasing in length posteriorly; anteromesial spine on coxae of pereopods 3-5 in both sexes; in female, coxal spine on pereopod 4 largest; in male, coxal spines of pereopods 3 and 4 small, on 5, spine becomes broad, flattened, distally rounded, directed ventrolaterally. Abdomen with segments 4-6 mid-dorsally sharply keeled, ending posteriorly in very small spine. Abdominal segment 6 only slightly longer than broad, ventral margin evenly convex, with single small denticle (sometimes absent) posteriorly. Telson with median sulcus deepest in anterior half, flattening out posteriorly,



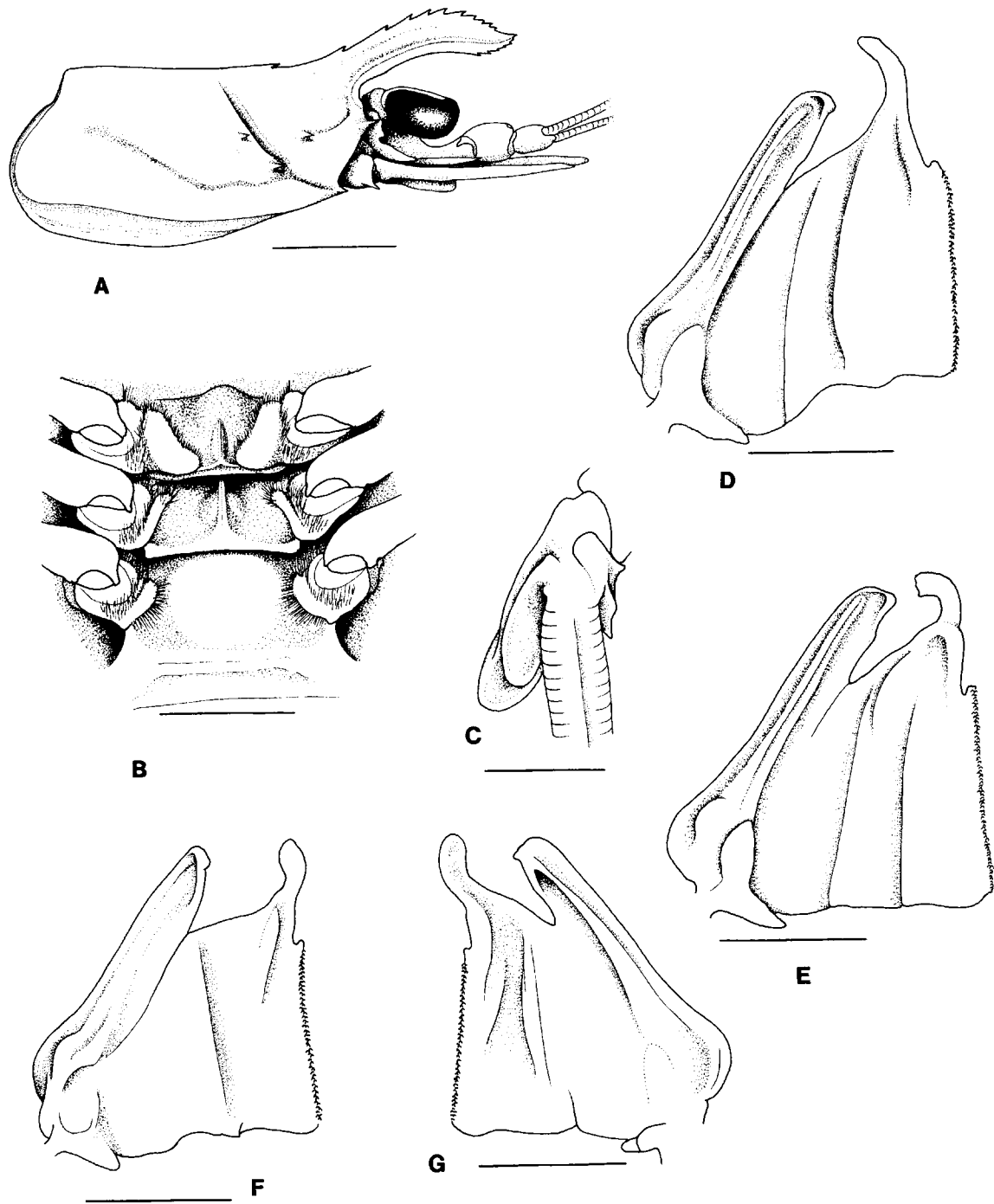


Fig. 1. *Haliporoides cristatus* n. sp. A, carapace in lateral view; B, thelycum; C, pleopod 2  $\delta$ , appendix masculina. Petasmata: D, cl 22.9 mm; E, cl 24.5 mm; F, cl 31.5 mm; G, cl 21.8 mm. (Scales: A = 10 mm, B = 5 mm, C = 2 mm, D-G = 3 mm).

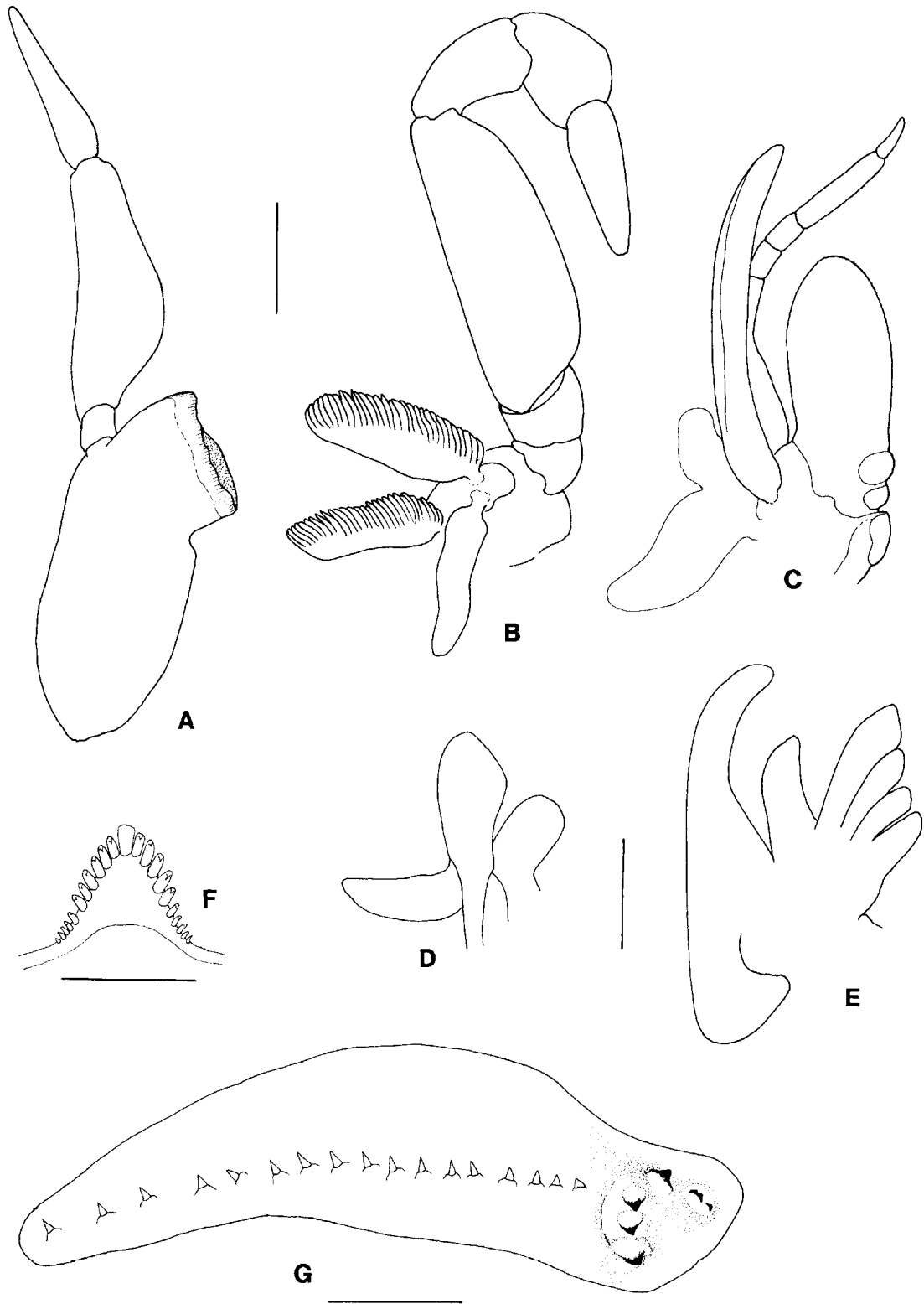


Fig. 2. *Haliporoides cristatus* n. sp. A, mandible; B, maxilliped 2; C, maxilliped 1; D, maxilla 1; E, maxilla 2; F, prepyloric ossicle; G, zygocardiac ossicle and cardiac plate. (Scales: A-E = 3 mm, F, G = 1 mm).

ending anterior to lateral spines; latter continuous with ridges flanking sulcus. Meisal uropodal ramus over-reaching telson by 0.4 of its own length; lateral ramus over-reaching inner by almost 0.3X its own length, bearing strong distolateral spine at about distal four-fifths. Pleopod 3–5 in male with rounded mediodorsal ridge; latter less marked in female.

Thelycum with sternite XII having sharp strongly raised median crest; sternite XIII with strong acute anteroventrally directed median spine and ridge; sternite XIV smoothly convex, bearing numerous short setules.

Petasma with ventromedian lobule distally narrowed, laterally curved, apically rounded. Dorsolateral lobule, margin distally oblique; ventrolateral lobule with distally free part falling considerably short of, and about twice width of distal free part of ventromedian lobule; distal margin curved mesially towards apex, ventral costa proximally broad, tapering distally along outer margin of lobule.

Appendix masculina about 1.5X longer than broad, distally narrowed, ventrally hollowed, lacking any setae. Appendix interna roughly subelliptical, falling short of, and tucked into ventral hollow of appendix masculina; dorsolateral spur short, bluntly triangular.

**Remarks.** (See Remarks section of following species).

**Etymology.** The specific name, from the Latin, meaning a crest, refers to the crested condition of the rostrum of this species.

*Haliporoides sibogae australiensis* n. ssp.

Figs 3, 4, 5A–F

*Haliporus sibogae* de Man, 1907: 138.

*Haliporoides sibogae*.—Grey, Dall & Baker, 1983: 15, 40, pls 3, 47.

**Type material.** New South Wales: HOLOTYPE: AM P34381, east of Broken Bay, 33°43–39'S 151°54–55'E, 477 m, demersal prawn trawl, *Kapala* (K83-14-07), 27 Oct 1983; 1 ♂, 31.5 mm. PARATYPES: AM P35891, east of Broken Bay, 33°43–39'S 151°54–55'E, 477 m, demersal prawn trawl, *Kapala* (K83-14-07), 27 Oct 1983; 1 ♂, 15.8 mm, 8 ♀, 15.6–39.5 mm. AM P33023, north-east of Port Jackson, 33°46–44'S 151°49–51'E, 425 m, demersal prawn trawl, *Kapala* (K80-21-04), 16 Dec 1980; 1 ♀. AM P30798, 32 km east of Greenwell Point, near Nowra, 34°55'S 151°08'E, 400 m, trawl, 16 July 1980; 1 ♀. AM P19149, south-east of Broken Bay, 33°42'S 151°55'E to 33°40'S 151°57'E, 810 m, demersal prawn trawl, *Kapala* (K72-07-16), 7 Dec 1972; 1 ♀, 39.3 mm. AM P21050, north-east of Wollongong, 34°16'S 151°26'E to 34°22'S 151°23'E, 356 m, demersal prawn trawl, *Kapala* (K75-05-01), 8 Aug 1975; 1 ♀, 31.0 mm. USNM 211389, north-east of Point Danger, 27°55–57'S 154°03'E, 629 m, *Kapala* (K78-23-09), 6 Nov 1978; 2 ♂, 26.3–26.5 mm. USNM 211388, east of Broken Bay, 33°43–39'S 151°54–55'E, 477 m, demersal prawn trawl, *Kapala* (83-14-07), 27 Oct

1983; 1 ♂, 15.4 mm, 5 ♀, 20.5–39.5 mm.

**Additional material examined.** New South Wales: AM G6049, 35 mi east of Sydney, 1434 m; 9 ♀. AM P4696, east of Sydney, 272 m, *Gunundaal*, May 1920; 1 ♀. AM P4697, east of Sydney, 272 m, *Gunundaal*, May 1920; 1 ♀. AM P18020, south-east of Sydney, 34°19–13'S 151°24–28'E, 351–360 m, bottom trawl, *Kapala* (K71-10-03), 28 June 1971; 1 ♀. AM P18025, east of Long Reef, 33°41–44'S 151°55–53'E, 570 m, bottom trawl, *Kapala* (K71-07-01), 20 Apr 1971; 19 ♀. AM P19150, south-east to east of Broken Bay, 33°43'S 151°55'E to 33°37'S 152°02'E, 675 m, demersal prawn trawl, *Kapala* (K72-06-04), 19 Oct 1972; 1 ♀. AM P19151, east of Wollongong, 34°16'S 151°26'E, 366 m, *Kapala* (K71-10-03), 28 June 1971; 1 ♀. AM P19152, east to north-east of Port Jackson, 33°51'S 151°51'E to 33°45'S 151°55'E, 675 m, demersal prawn trawl, *Kapala* (K72-06-03), 19 Oct 1972; 5 ♂. AM P19644, transect from east of Newcastle to east of Sydney, 33°00–44'S 151°50'–152°31'E, 365 m, July 1972; 5 ♂. AM P20804, south-east of Cape Howe, 37°45'S 150°12'E to 37°38'S 150°16'E, 416 m, demersal fish trawl, *Kapala* (K75-03-02), 11 July 1975; 2 ♂, 2 ♀. AM P21688, north-east of Yamba, 29°26'S 153°49'E to 29°20'S 153°50'E, 450 m, demersal prawn trawl, *Kapala* (K75-09-08), 12 Oct 1975; 1 ♂, 1 ♀. AM P21698, south-east of Cape Hawke, 32°22'S 152°58'E to 32°17'S 153°01'E, 463 m, demersal prawn trawl, *Kapala* (K75-08-03), 2 Oct 1975; 1 ♂. AM P33016, off Sydney, 33°46'S 151°50'E to 33°42'S 151°53'E, 414 m, demersal prawn trawl, *Kapala* (K80-06-01), 24 May 1980; 4 ♂, 1 ♀. AM P33032, north-east of Point Danger, 27°55'S 154°03'E to 27°57'S 154°03'E, 629 m, demersal prawn trawl, *Kapala* (K78-23-09), 6 Nov 1978; 3 ♂, 4 ♀. AM P32410, south-east of Newcastle, 32°59'S 152°34'E to 33°02'S 152°31'E, 360 m, demersal prawn trawl, *Kapala* (K77-23-08), 7 Dec 1977; 3 ♀. AM P33017, north-east of Point Danger, 28°01'S 154°00'E to 27°58'S 154°00'E, 542 m, demersal prawn trawl, *Kapala* (K78-17-10), 17 Aug 1978; 5 ♂, 14 ♀. AM P32411 and AM P32412, north-east of Jervis Bay, 34°50'S 151°15', 801 m, benthic dredge, *Kapala* (K78-27-04), 12 Dec 1978; 1 ♂, 3 ♀. AM P33021, north-east of Wollongong, 34°21'S 151°25'E to 34°19'S 151°27'E, 432 m, demersal prawn trawl, *Kapala* (K78-27-13), 13 Dec 1978; 5 ♂, 4 ♀. AM P33018, south-east of Broken Bay, 33°40'S 151°54'E to 33°33'S 151°58'E, 450 m, demersal prawn trawl, *Kapala* (K74-15-25/26), 5 Dec 1974; 2 ♂, 1 ♀. AM P33019, north-east of Broken Bay, 33°29'S 152°07'E to 33°32'S 152°04'E, 594 m, demersal fish trawl, *Kapala* (K76-16-08), 14 Oct 1976; 2 ♂, 2 ♀. AM P33020, off Shoalhaven Bight, 34°54–57'S 151°12–11'E, 540 m, demersal prawn trawl, *Kapala* (K78-27-06), 12 Dec 1978; 5 ♂, 3 ♀. Victoria: AM E6124, 40 mi south south-east of Genoa Peak, 363 m, *Endeavour*; 1 ♂, 1 ♀. AM E4828, off eastern slope of Gabo Island, 363 m, Nov 1913; 1 ♀. AM P9640, Gabo Island to Everard Grounds, 400 m, *Endeavour*, 28 Oct 1914; 1 ♂. AMP9641, Gabo Island to Everard Grounds, 400 m, *Endeavour*, 28 Oct 1914; 1 ♀. AM P18021, south-east of Gabo Island, 37°39'S 150°17'E to 37°45'S 150°13'E, 396–401 m, danish trawl, *Kapala* (K71-13-02), 30 July 1971; 2 ♂, 2 ♀. AM P18024, south-east of Gabo Island, 37°42'S 150°16'E to 37°39'S 150°17'E, 387 m, *Kapala* (K71-13-01), 30 July 1971; 9 ♂, 10 ♀.

**Description.** Integument firm, with overall fine pile of very short setules. Rostrum reaching to

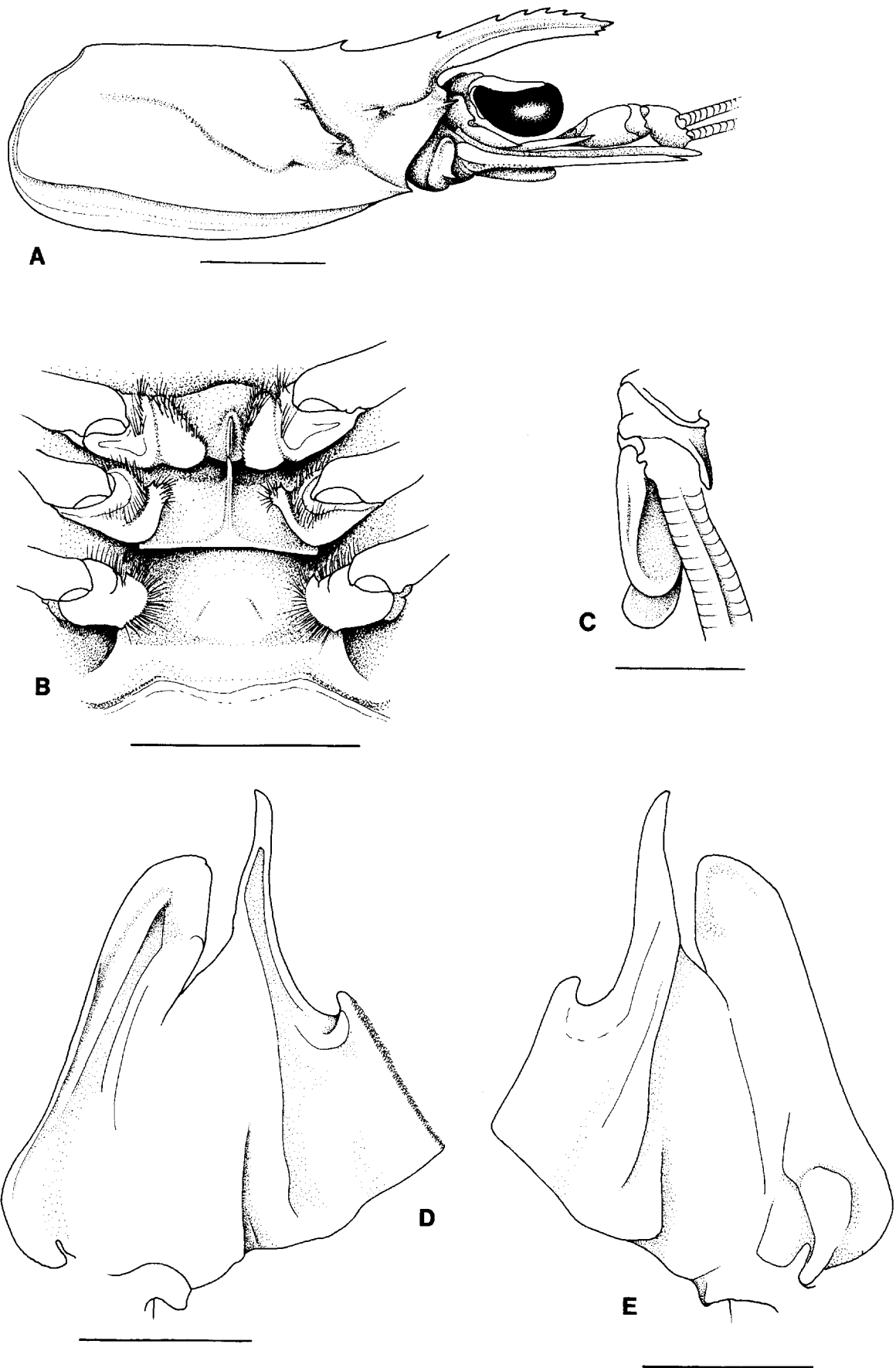


Fig. 3. *Haliporoides sibogae australiensis* n. ssp. A, carapace in lateral view; B, thelycum; C, pleopod 2  $\delta$ , appendix masculina; D,E, petasma cl 28.3 mm. (Scales: A,B = 10 mm, C = 2 mm, D,E = 3 mm).

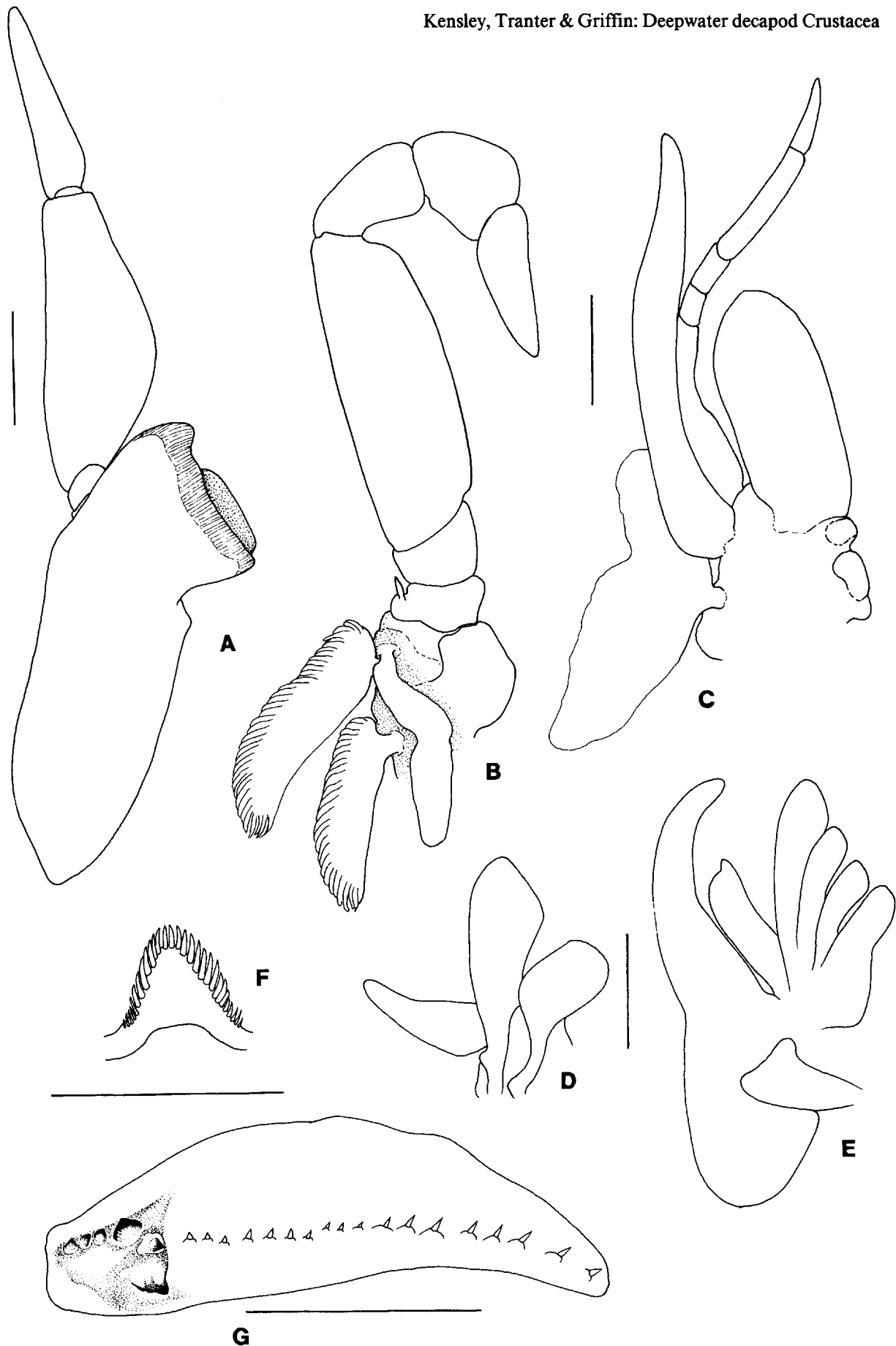


Fig. 4. *Haliporoides sibogae australiensis* n. ssp. A, mandible; B, maxilliped 2; C, maxilliped 1; D, maxilla 1; E, maxilla 2; F, prepyloric ossicle; G, zygocardiac ossicle and cardiac plate. (Scales: A-G = 3 mm).

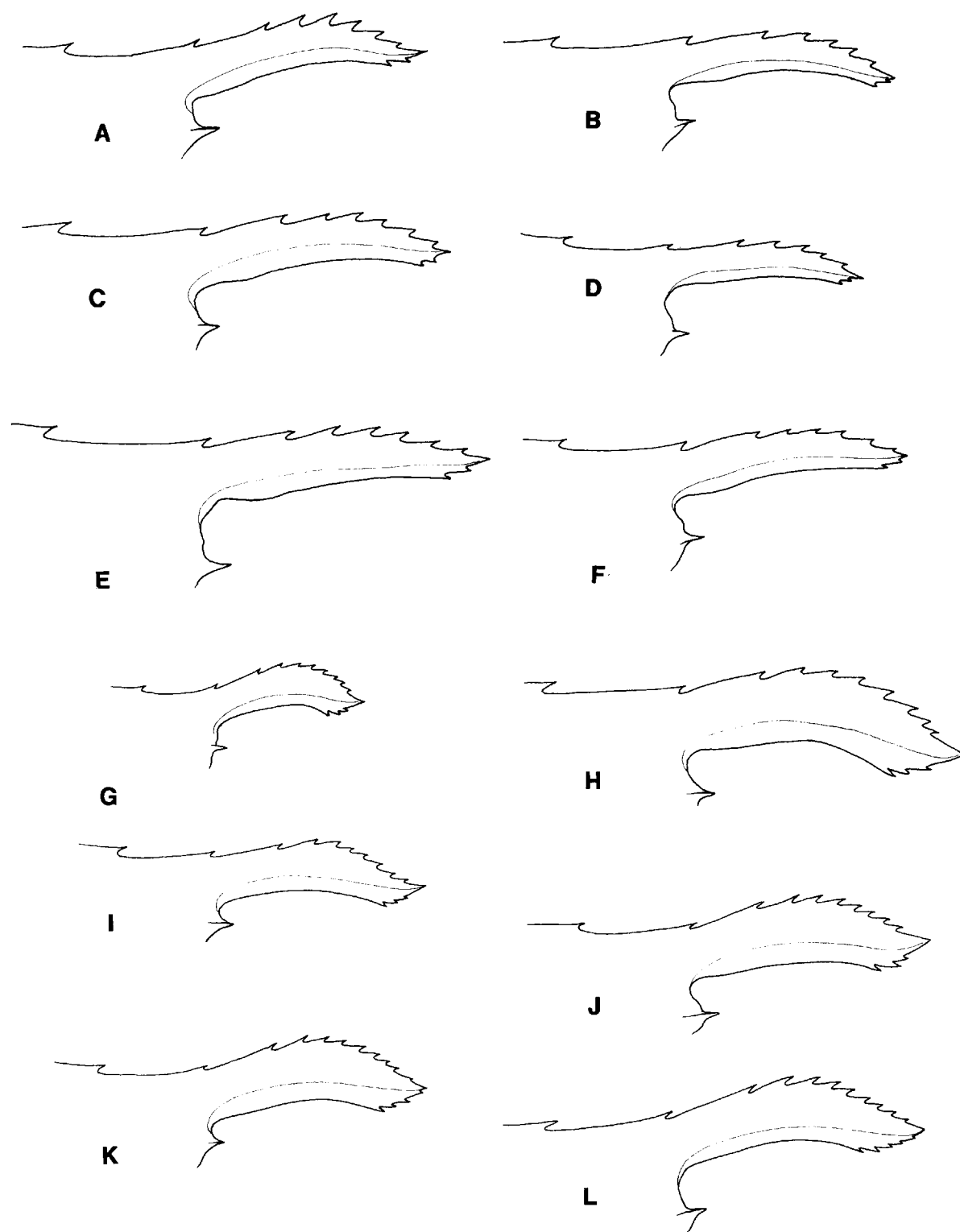


Fig. 5. Rostral variation. A-F, *Haliporoides sibogae australiensis* n. ssp. A, ♀ cl 29.9 mm; B, ♂ cl 27.6 mm; C, ♀ cl 33.9 mm; D, ♂ cl 28.1 mm; E, ♀ cl 35.0 mm; F, ♀ cl 29.0 mm; G-L, *Haliporoides cristatus* n. sp. G, ♂ cl 17.0 mm; H, ♀ cl 33.8 mm; I, ♂ cl 25.0 mm; J, ♀ cl 29.0 mm; K, ♀ cl 27.2 mm; L, ♀ cl 29.8 mm.

between midlength and distal margin of article 2 of antennular peduncle, subhorizontal to offset from carapace at angle of up to 30°, proximally low, tapering steadily to apex; straight to slightly arched over eye. Rostral and epigastric tooth-formula:  $\frac{6+1}{1}$  to  $\frac{8+1}{2}$ ; most frequent form  $\frac{7+1}{2}$ ; epigastric tooth situated at about 2/7 length of carapace from orbital margin; first rostral tooth situated over orbital margin. Adrostral carina strong, acute, running from orbital margin to base of rostral apex. Postrostral carina barely marked, obsolete anterior to cervical groove. Pterygostomian spine strong, narrowly triangular, with distinct carina continuous with anteriorly acute hepatic carina. Hepatic sulcus fairly deep, becoming obsolete just ventral to mid-dorsal line. Suprahepatic spine equal in strength to hepatic spine. Posthepatic carina absent. Branchiocardiac carina rounded, sulcus relatively deep anteroventrally, becoming posterodorsally obsolete well before posterior carapace margin. Postorbital spine stronger than hepatic and suprahepatic spines, keeled. Submarginal carina acute, reaching and extending dorsally along posterior carapace margin. Low inconspicuous rounded mid-dorsal tubercle near posterior margin visible only in large adults (cl 30♀ mm).

Eyes as illustrated.

Antennular peduncle about 0.6X carapace length; prosartema falling short of distal margin of eye and well short of base of peduncle article 2; stylocerite short, basally broad, spine acute, not reaching midlength of basal antennular peduncle article. Inner antennular flagellum 6X carapace length; outer flagellum 7X carapace length.

Scaphocerite over-reaching antennular peduncle by about 1/5 of its own length; strongly rigid lateral margin ending in acute spine falling short of apex of blade. Antennal flagellum at least 8X carapace length.

Mouthparts as figured.

Mandibular palp, second article 2.5X longer than wide, widest proximally; distal article slender, tapering, about 3/5 length of proximal article. Maxilliped 3 reaching beyond antennular peduncle by length of dactylus; latter slightly more slender in female than in male; ischium with distoventral fixed spine. Pereopod 1 reaching by length of the finger beyond carapace; merus with distocentral movable spine and 3 fixed proximal spines; basis and ischium with ventrodorsal fixed spine. Pereopod 2 reaching to base of antennular peduncle article 3 in male and female. Pereopod 3 reaching by length of fingers beyond antennular peduncle article 3 in male and female; coxal plate in female expanded mesially, anterior surface hollowed, posterior surface strongly convex. Pereopod 4 extending by length of dactylus and half of propodus beyond antennular peduncle in female, by length of dactylus and propodus in male. Pereopod 5

extending beyond antennular peduncle by length of dactylus, propodus and half of carpus in female, by dactylus, propodus, and distal 1/8 of carpus in male. Pereopods increasing in length posteriorly. Anteromesial spine on coxae of pereopods 3-5 in both sexes; in female, coxa 4 with largest spine; in male, spine on coxa 3 and 4 small, on 5 expanded anteroventrally, broad, flattened, distally rounded. Sternite XIII in male with midventrally directed strongly flattened spine.

Abdominal segments 4-6 mid-dorsally sharply keeled, ending posteriorly in very small spine. Abdominal segment 6 slightly longer than anterior width, ventral margin evenly convex, with single small denticle (sometimes absent) posteriorly. Telson with median sulcus deepest in anterior half, flattening out, ending at level of lateral spines; latter continuous with ridges flanking sulcus, posteriorly acute, anteriorly rounded. Mesial uropodal ramus over-reaching telson by 1/3 of its own length; lateral ramus over-reaching inner by about 1/4 of its own length, bearing strong distolateral spine at about distal five-sixths. Pleopods 3-5 in male with narrowly rounded mediodorsal ridge; ridge almost as strong in female.

Thelycum with sternite XII bearing strong raised median crest; sternite XIII with strong acute anteroventrally directed median spine and ridge; sternite XIV evenly convex, sometimes with faint hint of median papilla.

Petasma with ventromedial lobule distally narrowed, almost straight, apically narrowly rounded; dorsolateral lobule margin distally oblique. Ventrolateral lobule with distally free, broad, apically rounded part falling considerably short of ventromedial lobule, about 2-2.5X width of ventromedial lobule at base; distal margin curved mesially towards apex, ventral costa proximally submarginal, distally becoming more acute and extending almost to middle of surface of free part of lobule.

Appendix masculina about twice longer than broad, distally narrowed, ventrally strongly hollowed, lacking setae. Appendix interna roughly rectangular, not reaching apex of, and tucked into ventral hollow of appendix masculina; dorsolateral spur short, bluntly triangular.

**Remarks.** The two species described above belong to the genus *Haliporoides* (sensu Pérez Farfante, 1977a) for possessing the following characters: epigastric tooth separated from rostral teeth by long interval; suprahepatic spine present; orbital spine lacking; ventral antennular flagellum subcylindrical; dorsal antennular flagellum subcylindrical; lateral ramus of uropod armed with distolateral spine; telson with single pair of fixed lateral spines; podobranchs restricted to maxilliped 2.

Pérez Farfante (1977a: 290) asserts that in the

Indo-West Pacific, *Haliporoides triarthrus* Stebbing, and *H. sibogae* (de Man) belong to this genus. Crosnier (1978), dealing with the *Hymenopenaeus* complex in Madagascar, recognised the following taxa: *Hymenopenaeus sibogae madagascariensis* Crosnier, *H. lucasi* Bate, *H. halli* Bruce, *H. propinquus* (de Man), *H. furici* Crosnier, and *H. triarthrus vinroi* Crosnier. Of these, *H. lucasi*, *H. halli*, *H. furici* and *H. propinquus* are true *Hymenopenaeus*; by Pérez Farfante's definition (1977a), the remainder are true *Haliporoides*.

Crosnier (1978) provides a table for comparing the *sibogae* complex of species and subspecies, to which group the two present species obviously belong. *Haliporoides sibogae madagascariensis* is distinguished from the typical form (recorded from Indonesia, Australia, Japan, New Zealand, and the Chinese Sea), by having a slightly (but still overlapping) higher rostral count, a postrostral carina extending beyond the cervical groove, and a slightly more elevated and proportionally deeper rostrum. It would seem that while *H. sibogae australiense* is closely related to the two *sibogae* forms, having a rostral formula very similar to the two previously recognised *H. sibogae* forms, a postrostral carina ending anterior to the cervical groove, a suprahepatic spine of equal strength to that of the hepatic spine, a female sternite XIV lacking a longitudinal ridge, a ventromedian lobule of the petasma slender but not distally bent, and slightly different appendix masculina and zygocardiac ossicle structure, it is sufficiently and constantly different to warrant subspecific separation.

Schmitt (1926), in recording *Haliporus sibogae* from Victoria, Australia, mentions the rostral formula as ranging from  $\frac{7}{1}$  to  $\frac{9}{2}$ . Six specimens from the *Endeavour* material in the USNM collections were examined, as well as the *Endeavour* material in

the Australian Museum. All belong to the present subspecies (see Material examined). The high-crested rostral form (*H. cristatus*) bears some superficial resemblance to *H. triarthrus triarthrus* and *H. triarthrus vinroi*, from the east coast of South Africa, Mozambique, and Madagascar, but differs in some major respects (see Table 1). These include the rostral formula (the African species never having more than three ventral teeth), the postrostral carina (which extends posteriorly to the cervical groove in *H. triarthrus*), the ventromedian lobule of the petasma (much broader in the African species) and the female sternite XIV (which has a distinct median raised area in *H. triarthrus*). On the basis of these characters, *H. cristatus* can easily be separated from *H. triarthrus*.

Potter & Dredge (1985: 226) refer to an undescribed species of *Haliporoides* taken in southern and central Queensland waters, and also recorded from off New South Wales. This species, which is *H. cristatus*, "... is separated from *H. sibogae* by its yellowish hue, the greater curvature of the rostrum, and the distinctive white stripe on the dorsal portion of the uropod."

### *Hymenopenaeus* Smith, 1882

#### *Hymenopenaeus halli* Bruce

*Hymenopenaeus halli* Bruce, 1966: 216, figs 1, 2.—  
Crosnier, 1978: 120, figs 39d, 40d, 42c, 43b, 45a-d, 46b, c.

**Material examined.** New South Wales: AM P33198, off New South Wales coast, demersal prawn trawl, *Kapala* (K78-23), Nov 1978; 1 ♂, 3 ♀. AM P33199, 33°47'S 151°55'E to 33°44'S 151°57'E, 890–900 m, demersal prawn trawl, *Kapala* (K78-28-16), 7 Dec 1978; 1 ♂, 2 juvs.

**Diagnosis.** Rostrum slender, straight, directed slightly obliquely, with 5–7 dorsal teeth well separated from 2 postrostral teeth; antennal,

	<i>H. sibogae</i>	<i>H. sibogae madagascariensis</i>	<i>H. triarthrus vinroi</i>	<i>H. sibogae australiensis</i>	<i>H. cristata</i>
Rostral formula (most frequent form in parentheses)	5+2/1 to 7+2/2 (5+2/2)	6+2/2 to 8+2/2 (6+2/2, 7+2/2)	8+2/2 to 12+2/2 (9+2/2)	5+2/1 to 6+2/2 (6+2/1)	7+2/3 to 9+2/3 (9+2/3)
Rostral shape	low, gentle curved	low, almost straight	high crested	low, almost straight to gently curved	high crested
Postrostral carina	stopping just anterior to cervical groove	ending posterior to cervical groove, half way to posterior margin	ending posterior to cervical groove, midway to posterior margin	ending anterior to cervical groove	ending anterior to cervical groove
Suprahepatic spine + Sternite XIV	small with longitudinal swelling	small with strong longitudinal swelling	minuscule almost indiscernible longitudinal swelling	= hepatic spine no longitudinal swelling	= hepatic spine no longitudinal swelling
Ventromedian lobule of petasma	short, pointed, ear-shaped	elongate (variable) pointed	broad, rounded	relatively elongate, rounded to subacute	relatively elongate, rounded
Lateral process of petasma	broad	broad	broad	moderately broad	narrow

Table 1. Comparison of five Indo-Pacific species of *Haliporoides*.



postantennal, hepatic, and branchiostegal spines present. Prosartema well developed; antennular flagella filiform, cylindrical. Telson with single pair of fixed lateral spines. Petasma with ventromedian lobule distally divided by deep slit into 2 subequal apically acute processes. Thelycum with sternal plate between bases of pereopod 5 having prominent medio-longitudinal ridge.

**Distribution.** Off Madagascar, Indonesia, South China Sea; 540–910 m.

#### *Hymenopenaus lucasi* (Bate)

*Solenocera lucasii* Bate, 1881: 185.

*Hymenopenaus lucasi*.—Crosnier, 1978: 115, figs 37f–h, 39c, 40c, 42d, 43a, 44, 46a.

**Material examined.** New South Wales: AM P33163, north-east of Danger Point, 27°55'S 154°03'E to 27°57'S 154°03'E, 629 m, demersal prawn trawl, *Kapala* (K78-23-09), 6 Nov 1978; 1 ♀.

**Diagnosis.** Rostrum short, horizontal, with 6 or 7 dorsal teeth, of which 3 or 4 posterior to orbital margin but not separated by marked gap; ventrally convex but unarmed. Petasma with mesial process distally tapering, apically rounded; lateral process much shorter than mesial, distally truncate; lateral flap broadly convex. Thelycum with sternite between bases of pereopod 3 bipartite, with rounded anterior part and posterior ovate and medially ridged portion; sternite between pereopod 4 anterior rounded, posteriorly bilobed; sternite of pereopod 5 ovate.

**Distribution.** Madagascar, Seychelles, Maldives, Indonesia, Japan; 200–629 m.

#### *Hymenopenaus propinquus* (de Man)

*Haliporus propinquus* de Man, 1907: 140.

*Hymenopenaus propinquus*.—Crosnier, 1978: 124, figs 39e, 40e, 42e, 43c, 45e–h, 46d, e, 47a.

**Material examined.** New South Wales: AM P25130, east of Broken Bay, 33°35'S 152°01'E to 33°32'S 152°03'E, 810 m, demersal prawn trawl, *Kapala* (K76-24-03), 20 Dec 1976; 1 ♀. AM P25140, east of Broken Bay, 33°35'S 152°01'E to 33°32'S 152°03'E, 810 m, demersal prawn trawl, *Kapala* (K76-24-03), 20 Dec 1976; 6 ♂, 3 ♀. AM P26761, north-east of Norah Head, 33°11'S 152°24'E to 33°09'S 152°25'E, 720 m, demersal prawn trawl, *Kapala* (K77-23-10), 7 Dec 1977; 1 ♂, 3 ♀. AM P26774, south-east of Broken Bay, 33°40'S 151°56'E to 33°37'S 151°56'E, 711 m, demersal prawn trawl, *Kapala* (K77-23-06), 6 Dec 1977; 1 ♂, 6 ♀, 2 juvs. AM P26802, north-east of Norah Head, 33°08'S 152°27'E to 33°10'S 152°24'E, 580 m, demersal prawn trawl, *Kapala* (K77-23-09), 7 Dec 1977; 1 ♀. AM P26814, north-east of Norah Head, 33°08'S 152°27'E to 33°10'S 152°24'E, 580 m, demersal prawn trawl, *Kapala* (K77-23-09), 7 Dec 1977; 4 ♂, 12 ♀. AM P33014, north-east of Broken Bay, 33°27'S 152°09'E to 33°25'S 152°11'E, 874 m, demersal prawn trawl, *Kapala* (K77-23-13), 8 Dec 1977; 1 ♂, 2 ♀. AM P33013, east of Broken Bay, 33°35'S 152°00'E to 33°33'S

152°02'E, 810 m, demersal prawn trawl, *Kapala* (K77-23-12), 8 Dec 1977; 1 ♂, 1 ♀. AM P33012, north-east of Point Danger, 28°03'S 154°04'E to 28°01'S 154°04'E, 724 m, demersal prawn trawl, *Kapala* (K78-23-08), 6 Nov 1978; 9 ♂, 1 ♀. AM P33015, east of Broken Bay, 33°32'S 152°06'E to 33°334'S 152°05'E, 810 m, demersal prawn trawl, *Kapala* (K79-20-13), 6 Dec 1979; 1 ♀. AM P35918, south-east of Broken Bay, 33°43'S 151°56'E to 33°39'S 151°58'E, 631 m, demersal fish trawl, *Kapala* (K84-16-03), 25 Sept 1984; 3 ♂, 2 ♀.

**Diagnosis.** Rostrum slender, directed obliquely upward, armed dorsally with 6 teeth separated by marked gap from 2 postrostral teeth. Petasma with mesial process extending well beyond lateral process, distally rounded, lacking marginal spines at apex; lateral process broadly triangular. Thelycum with sternite between pereopod 4 with transverse rounded setose swelling anteriorly and rounded lateral process posteriorly; sternite between pereopods 5 more or less hemispherical, with anterior margin faintly sinuous, posteriorly broadly rounded, surface with 2 submedian depressions.

**Distribution.** Gulf of Aden, Zanzibar, Reunion, Madagascar, Maldives, Indonesia; 510–1080 m.

#### *Solenocera* Lucas, 1849

##### *Solenocera choprai* Nataraj

*Solenocera choprai* Nataraj, 1945: 91, figs 1–4.—Crosnier, 1978: 141, figs 49g, 51d, e, 52c, 53a–c, 54a, b, 55c, 56a–e, 58c, 59f; Grey, Dall & Baker, 1983: 42, pl. 4 (pl. 4 in this reference is of *Solenocera alticarinata* Kubo, 1949).

**Material examined.** New South Wales: AM P32479, east of Danger Point, 28°16'S 153°50'E to 28°12'S 153°51'E, 144 m, trawl, *Kapala* (K78-09-08), 2 June 1978; 1 ♂, 1 ♀, 1 juv.

**Diagnosis.** Rostrum not reaching beyond eye, ventrally gently convex, dorsally with 8 teeth, 4 of which postorbital. Carapace lacking pterygostomial spine; inferior margin of hepatic groove anterior to hepatic spine ending in small excavate area; mid-dorsal carina posterior to cervical groove lamelliform. Petasma with distal process of ventromedian lobule not markedly extending beyond dorsolateral lobule; both fringed distally with spines. Thelycum in female consisting of rectangular hollow between bases of pereopod 5.

**Distribution.** Gulf of Suez, Arabian Sea, Madagascar, India, north-western Australia, China Sea; 50–175 m.

##### *Solenocera faxoni* de Man

*Solenocera faxoni* de Man, 1907: 136; 1911: 52, pl. 5, fig. 13.—Kubo, 1949: 241, figs 8U, 20P, 27C–E, 45F, 66A, B, 72R, X, 80C, 97, 98E–G, 100.

**Material examined.** New South Wales: AM P32475, east of Terrigal, 33°26'S 152°05'E, 396 m, prawn trawl,

*Kapala* (K79-08-08), 18 July 1979; 1 ♀. AM P32476, east of Charlotte Head, 32°17'S 153°01'E, 360 m, prawn trawl, *Kapala* (K78-03-03), 5 Apr 1978; 1 ♂. AM P32477, east of North Solitary Is., 29°56'S 153°41'E to 29°53'S 153°41'E, 360 m, demersal prawn trawl, *Kapala* (K78-06-01), 25 Apr 1978; 2 ♂. AM P32480, east of Point Danger, 28°05'S 153°58'E, 405 m, trawl, *Kapala* (K78-09-04), 1 June 1978; 5 ♂, 6 ♀.

**Diagnosis.** Rostrum barely reaching as far as eye, ventrally convex, unarmed, dorsally with 6 teeth of which 3–4 postorbital. Carapace tomentose only in region of rostrum; with hepatic, postorbital, and antennal spines present, pterygostomina spine absent; inferior margin of hepatic groove anterior to hepatic spine markedly raised, ending anteriorly in broadly flattened acute branchiostegal spine overlapping sterygostomial margin. Thelycum between bases of pereopods 4 and 5 simple deep hollow, demarked anteriorly by lateral ridge, meeting anteromesially as narrow laterally acute contiguous lobes between bases of pereopod 4.

**Distribution.** Indonesia, Japan; 250–310 m.

#### *Solenocera rathbuni* Ramadan

*Solenocera rathbuni* Ramadan, 1938: 57.—Crosnier, 1978: 163, figs 49e, 52f, 55f, 57c, 59b,i, 62a–c, 63a–d.

**Material examined.** New South Wales: AM P32482, east of Point Danger, 28°16'S 153°50'E, 137 m, trawl, *Kapala* (K78-09-09), 2 June 1978; 1 ♀. AM P32483, east of Point Danger, 28°05'S 153°49'E, 137 m, trawl, *Kapala* (K78-09-14), 3 June 1978; 7 ♂, 13 ♀.

**Diagnosis.** Postrostral carina almost reaching posterior margin of carapace; pterygostomial and branchiostegal spines absent; anterior hepatic carina straight or very faintly sinuous, ending just short of carapace margin, not reflexed. Abdominal somite 1 rounded; somite 2 with faint mid-dorsal ridge; somites 3–6 strongly carinate, somite 6 with mid-dorsal spine on posterior margin. Petasma with distal process of ventromedian lobule extending well beyond dorsolateral lobule, both fringed with spinules; ventral costa distally rounded. Dorsolateral lobule distally fringed with spinules; ventrolateral lobule distally rounded. Thelycum with sternite XII having posterolateral raised tubercle bearing spine, hollowed area of coxa articulating on anterior face of tubercle. Sternite XIII similar to sternite XII. Sternite XIV with 2 low submedian setose patches near anterior margin; strong apically bifid tubercle at mid-sternite; posterior margin with median furrow and raised roughly rectangular lateral plate.

**Remarks.** The present material is all considerably larger than that reported by Crosnier (1978) from Madagascar (8.2–10.5 mm cl, as against 17.5–25.8 mm cl). The lectotype from Hawaii, too, has a carapace length of only 9.3 mm.

The rostrum, carapace, the pterygostomial

region, and the antennular flagellar apices all agree with Crosnier's description. Slight differences in the thelycum can be detected. Crosnier figures sternite XIV as having two well separated submedian tubercles and a lower anteromedian tubercle. In the present material, these three tubercles are situated closer together, on a large median boss.

Crosnier (1978) provides several dimensions characteristic of *S. rathbuni*. In all four of his specimens, the ratio of length of superior antennular flagellum to carapace length is always 1.3 or more. In the present material, this ratio ranges from 0.78–0.94 in females, 0.92–1.0 in males. This difference may be due to the immaturity of the Malagasy specimens. In Crosnier's material, the number of articles in the inferior antennular flagellum was 55–58 in males, 55–59 in females. In the present material, male counts range from 49–56, female counts 49–62.

**Distribution.** Madagascar, Hawaii; 80–110 m.

### Family ARISTEIDAE

#### Subfamily BENTHESICYMINAE

##### *Benthescymus* Bate, 1881

##### *Benthescymus investigatoris* Alcock & Anderson

*Benthescymus investigatoris* Alcock & Anderson, 1899: 282.—Crosnier, 1978: 21, figs 7c, d, 8c, d, 9, 10.

**Material examined.** New South Wales: AM P33024, south-east of Broken Bay, 33°39'S 152°06'E to 33°37'S 152°07'E, 990 m, demersal prawn trawl, *Kapala* (K79-20-15), 6 Dec 1979; 2 specimens.

**Diagnosis.** Podobranchs present on maxillipeds 2 and 3, and on pereopods 1–3. Telson with 4 pairs of movable lateral spines. Rostrum short, apically acute, with 2 dorsal teeth. Abdominal segment 5 ending posteriorly in tiny mediadorsal tooth. Thelycum of female with raised triangular area on sternite 12; sternite 13 with subcircular shield having rounded posteromedial process and 2 anterolateral subacute processes. Petasma of male distally expanded, broadly oval, distal margin lacking lobes.

**Distribution.** Indo-West Pacific: Hawaii, Fiji, Japan, Indonesia, Philippines, Andaman Sea, Gulf of Manrar, Saya de Malha, east Africa from Somalia to South Africa, Madagascar; 600–1525 m.

##### *Gennadas* Bate, 1881

##### *Gennadas bouvieri* Kemp

*Gennadas bouvieri* Kemp, 1909: 726, pl. 74, figs 1–4, pl. 75, figs 6, 7.—Kensley, 1971: 273, fig. 1; Crosnier, 1978: 34, figs 15a, 18a, b; Griffiths & Brandt, 1983: 614.

**Material examined.** New Caledonia: AM P32898, east of New Caledonia, 21°05'S 166°45'E, 0–925 m,

midwater trawl, *Kimbla* (K4/71-5), 9 May 1971; 2 specimens. AM P32899, east of New Caledonia, 22°03'S 167°44'E, 0–800 m, midwater trawl, *Kimbla* (K4/71-11), 13 May 1971; 4 specimens.

New South Wales: AM P26590, south-east of Wollongong, 34°40'S 151°15'E to 34°35'S 151°17'E, 540 m, midwater trawl, *Kapala* (K77-19-05), 3 Nov 1977; 1 specimen. AM P32894, north-east of Broken Bay, 33°31'S 152°20'E to 33°28'S 152°22'E, 569 m, midwater trawl, *Kapala* (K77-24-02), 12 Dec 1977; 2 specimens. AM P32893, north-east of Broken Bay, 33°27'S 152°30'E to 33°23'S 152°32'E, 630 m, midwater trawl, *Kapala* (K77-24-03), 13 Dec 1977; 3 specimens. AM P32895, south-east of Norah Head, 33°20'S 152°32'E to 33°24'S 152°31'E, 360 m, midwater trawl, *Kapala* (K77-24-09), 14 Dec 1977; 3 specimens. AM P32892, north-east to east of Broken Bay, 33°28'S 152°34'E to 33°36'S 152°35'E, 630 m, midwater trawl, *Kapala* (K77-24-10), 14 Dec 1977; 8 specimens. AM P32896, north-east to east of Wollongong, 34°20'S 151°56'E to 34°25'S 151°54'E, 630 m, midwater trawl, *Kapala* (K77-24-12), 14 Dec 1977; 2 specimens. AM P32897, north-east of Norah Head, 33°05'S 153°05'E to 33°13'S 153°05'E, 630 m, midwater trawl, *Kapala* (K79-19-03), 28 Nov 1979; 1 specimen.

**Diagnosis.** Antennal angle acute, infra-antennal angle quadrate. Thelycum of female with sternite 13 with rounded flap lifting posteriorly, flanked by small lateral process; sternite 14 with broad oval shield having elongate process on anterolateral corners. Petasma of male with external lobe bipartite, both lobules acute; median lobe bipartite, both lobes acute, directed towards each other; internal lobe low; accessory lobe broadly oval.

**Remarks.** Griffiths & Brandt (1983) record this species associated with a warm-core eddy off eastern Australia.

**Distribution.** Caribbean; west coast of South Africa; Indo-Pacific; 250–630 m.

#### *Gennadas capensis* Calman

*Gennadas capensis* Calman, 1925: 5, pl. 1, figs 1, 2.—Kensley, 1971: 277, fig. 3; Crosnier, 1978: 36, fig. 18c.

**Material examined.** New Caledonia: AM P32886, east of New Caledonia, 22°03'S 167°44'E, 0–800 m, midwater trawl, *Kimbla* (K4/71-11), 13 May 1971; 8 specimens.

New South Wales: AM P32885, south-east of Port Jackson, 34°05'S 151°55'E to 34°10'S 152°14'E, 0–950 m, midwater trawl, *Kapala* (JP71-6), 25 Mar 1971; 5 specimens. AM P26600, north-east of Cape Howe, 37°24'S 150°30'E to 37°28'S 150°33'E, 540 m, midwater trawl, *Kapala* (K77-19-03), 1 Nov 1977; 6 specimens. AM P26588, south-east of Wollongong, 34°40'S 151°15'E to 34°35'S 151°17'E, 540 m, midwater trawl, *Kapala* (K77-19-05), 3 Nov 1977; 2 specimens. AM P32881, north-east of Broken Bay, 33°31'S 152°20'E to 33°28'S 152°22'E, 569 m, midwater trawl, *Kapala* (K77-24-02), 12 Dec 1977; 4 specimens. AM P32880, east of Broken Bay, 33°27'S 152°30'E to 33°23'S 152°32'E, 630 m, midwater trawl, *Kapala* (K77-24-03), 13 Dec 1977; 13 specimens.

AM P32882, north-east to east of Broken Bay, 33°28'S 152°34'E to 33°36'S 152°35'E, 630 m, midwater trawl, *Kapala* (K77-24-10), 14 Dec 1977; 13 specimens. AM P32884, north-east of Norah Head, 33°05'S 153°05'E to 33°13'S 153°05'E, 630 m, midwater trawl, *Kapala* (K79-19-03), 28 Nov 1979; 3 specimens.

**Diagnosis.** Antennal angle acute, infra-antennal angle quadrate. Thelycum of female with W-shaped process on sternite 13, with median apex formed by concave process. Coxa of pereopod 2 bearing posteriorly-directed spoon-shaped process. Petasma of male with external lobe acute, triangular, with smaller scute lobule on median margin; median lobe truncate; internal lobe of 2 bluntly rounded lobules; accessory lobe low, bipartite.

**Distribution.** Caribbean; north-eastern Atlantic; west coast of South Africa; Indian Ocean; 250–630 m.

#### *Gennadas gilchristi* Calman

*Gennadas gilchristi* Calman, 1925: 6, pl. 1, figs 3, 4.—Kensley, 1971: 272, 273, 280, fig. 6; Griffiths & Brandt, 1983: 612, 614.

**Material examined.** New Caledonia: AM P32879, east of New Caledonia, 21°05'S 166°45'E, 0–925 m, midwater trawl, *Kimbla* (K4/71-5), 9 May 1971; 1 specimen.

New South Wales: AM P32877, south-east of Port Jackson, 34°05'S 151°55'E to 34°10'S 151°14'E, 0–950 m, midwater trawl, *Kapala* (JP71-6), 25 Mar 1971; 221 specimens. AM P32878, south-east of Port Jackson to north-east of Wollongong, 34°02'S 152°12'E to 34°14'S 152°14'E, 0–600 m, midwater trawl, *Kapala* (JP71-8), 25–26 Mar 1971; 3 specimens. AM P32866, south-east of Norah Head, 33°20'S 152°32'E to 33°24'S 152°31'E, 360 m, midwater trawl, *Kapala* (K77-24-09), 14 Dec 1977; 153 specimens. AM P32869, north-east of Broken Bay, 33°27'S 152°30'E to 33°23'S 152°32'E, 630 m, midwater trawl, *Kapala* (K77-24-03), 13 Dec 1977; 30 specimens. AM P32870, north-east to east of Broken Bay, 33°28'S 152°34'E to 33°36'S 152°35'E, 630 m, midwater trawl, *Kapala* (K77-24-10), 14 Dec 1977; 98 specimens. AM P32868, north-east of Broken Bay, 33°31'S 152°20'E to 33°28'S 152°22'E, 569 m, midwater trawl, *Kapala* (K77-24-02), 12 Dec 1977; 30 specimens. AM P32867, north-east to east of Wollongong, 34°20'S 151°56'E to 34°25'S 152°54'E, 630 m, midwater trawl, *Kapala* (K77-24-12), 14 Dec 1977; 19 specimens. AM P26589, P26591, south-east of Wollongong, 34°40'S 151°15'E to 34°35'S 151°17'E, 540 m, midwater trawl, *Kapala* (K77-19-05), 3 Nov 1977; 10 specimens. AM P26592, P26593, P32873, north-east of Batemans Bay, 35°36'S 150°55'E to 35°39'S 150°56'E, 540 m, midwater trawl, *Kapala* (K77-18-05), 27 Oct 1977; 11 specimens. AM P26595, north-east of Wollongong, 34°10'S 152°04'E to 34°12'S 152°02'E, 540 m, midwater trawl, *Kapala* (K77-18-01), 26 Oct 1977; 6 specimens. AM P26601, north-east of Cape Howe, 37°24'S 150°30'E to 37°28'S 150°33'E, 540 m, midwater trawl, *Kapala* (K77-19-03), 1 Nov 1977; 21 specimens. AM P32865, north-east of Norah Head, 33°05'S 153°05'E to 33°13'S 153°05'E, 630 m, midwater

trawl, *Kapala* (K79-19-03), 28 Nov 1979; 37 specimens. AM P32872, south-east of Newcastle, 33°03'S 152°58'E to 32°59'S 153°03'E, 482 m, midwater trawl, *Kapala* (K79-19-02), 27 Nov 1979; 5 specimens. AM P32874, north-east of Norah Head, 33°08'S 152°48'E to 33°16'S 152°46'E, 630 m, midwater trawl, *Kapala* (K79-19-10), 29 Nov 1979; 1 specimen. AM P32876, east of Newcastle, 32°51'S 153°01'E to 32°59'S 152°54'E, 540 m, midwater trawl, *Kapala* (K79-19-08), 29 Nov 1979; 3 specimens. AM P32871, south-east of Norah Head, 33°23'S 152°37'E to 33°19'S 152°39'E, 666 m, midwater trawl, *Kapala* (K77-24-06), 13 Dec 1977; 1 specimen. AM P11487, 4.8 km east of Port Hacking, 200 m, haul 200/39, net 100, K. Sheard, CSIRO Fisheries Section, 6 July 1939; 1 specimen.

**Diagnosis.** Antennal and infra-antennal angles of carapace narrowly rounded. Thelycum of female with sternite 13 having bilobed process. Petasma of male with external lobe acute, median lobe of 2 diverging lobules, internal lobe acute, accessory lobe distally broadly rounded.

**Remarks.** This would appear to be the commonest species of *Gennadas* in Australian waters. Griffiths & Brandt (1983) give an account of its occurrence and abundance in a warm-core eddy in the Tasman Sea off eastern Australia, where it was more abundant outside and at the edge of the eddy than inside.

Of the material in the Australian Museum, 12 specimens were heavily parasitised by a nematode within the carapace. It is possible that this *Gennadas* is the intermediate host for some parasitic nematode of fish.

**Distribution.** Off the west coast of South Africa; Agulhas Basin; southern Indian Ocean; off eastern Australia; 100–1000 m.

#### *Gennadas incertus* (Balss)

*Amalopenaeus incertus* Balss, 1927: 265, figs 24–29.  
*Gennadas incertus*.—Kensley, 1971: 284, fig. 7; Crosnier, 1978: 37, figs 15b, 19a; Griffiths & Brandt, 1983: 614.

**Material examined.** New Caledonia: AM P35742, east of New Caledonia, 21°05'S 166°45'E, 0–925 m, midwater trawl, *Kimbla* (K4/71-5), 9 May 1971; 5 specimens.

New South Wales: AM P35738, south-east of Port Jackson, 34°05'S 151°55'E to 34°10'S 152°14'E, 0–950 m, midwater trawl, *Kapala* (JP71-6), 25 Mar 1977; 1 specimen. AM P35739, east of Broken Bay, 33°33'S 152°18'E to 33°31'S 152°18'E, 216 m, midwater trawl, *Kapala* (K77-24-01), 12 Dec 1977; 1 specimen. AM P35740, south-east of Norah Head, 33°20'S 152°32'E to 33°24'S 152°31'E, 360 m, midwater trawl, *Kapala* (K77-24-09), 14 Dec 1977; 3 specimens. AM P35741, north-east to east of Wollongong, 34°20'S 151°56'E to 34°25'S 151°54'E, 630 m, midwater trawl, *Kapala* (K77-24-12), 14 Dec 1977; 1 specimen.

**Diagnosis.** Antennal and infra-antennal angles of carapace acute. Thelycum of female with large

concave shield on sternite 12, shield on sternite 13 with acute anterolateral corners, sternite 14 with broad oval shield with anterior and posterior notch. Petasma of male with external lobe of 2 large diverging lobules, median lobe of slender outer and broad inner lobule, internal lobe simple, rounded, accessory lobe rounded, reaching as far as median and internal lobes.

**Remarks.** Griffiths & Brandt (1983) record this species associated with a warm-core eddy off eastern Australia.

**Distribution.** North east and north west Pacific; Indian Ocean; west coast of South Africa; 100–900 m.

#### *Gennadas kempii* Stebbing

*Gennadas kempii* Stebbing, 1914: 283, pl. 27.—Kensley, 1971: 285, fig. 8; Griffiths & Brandt, 1983: 614.

**Material examined.** New Caledonia: AM P32917, east of New Caledonia, 21°05'S 166°45'E, 0–925 m, midwater trawl, *Kimbla* (K4/71-5), 9 May 1971; 2 specimens.

New South Wales: AM P32916, north-east of Cape Howe, 37°24'S 150°30'E to 37°28'S 150°33'E, 540 m, midwater trawl, *Kapala* (K77-19-03), 1 Nov 1977; 1 specimen. AM P32914, north-east of Broken Bay, 33°31'S 152°20'E to 33°28'S 152°22'E, 569 m, midwater trawl, *Kapala* (K77-24-02), 12 Dec 1977; 2 specimens. AM P32915, north-east of Broken Bay, 33°27'S 152°30'E to 33°23'S 152°32'E, 630 m, midwater trawl, *Kapala* (K77-24-03), 13 Dec 1977; 1 specimen.

**Diagnosis.** Antennal and infra-antennal angles of carapace rounded. Thelycum of female with triangular shield on sternite 12, rectangular shield on sternite 13, pentagonal shield on sternite 14. Petasma of male with acute external lobe, broad truncate median lobe, rounded internal lobe, accessory lobe rounded, flap-like.

**Remarks.** Griffiths & Brandt (1983) record this species associated with a warm-core eddy of eastern Australia.

**Distribution.** South west coast off South Africa; Indian Ocean; east coast of Australia; 250–800 m.

#### *Gennadas propinquus* Rathbun

*Gennadas propinquus* Rathbun, 1906: 907, fig. 61.—Crosnier, 1978: 38, fig. 16b, 18d, e; Kensley, 1981b: 19. *Gennadas clavicarpus* de Man, 1907: 144.—Kensley, 1971: 278, fig. 4; Griffiths & Brandt, 1983: 614.

**Material examined.** New Caledonia: AM P32910, east of New Caledonia, 21°05'E 166°45'E, 0–925 m, midwater trawl, *Kimbla* (K4/71-5), 9 May 1971; 6 specimens.

New South Wales: AM P32909, south-east of Port Jackson, 34°05'S 151°55'E to 34°10'S 152°14'E, 0–950 m, midwater trawl, *Kapala* (JP71-6), 25 Mar 1971; 1 specimen. AM P32904, south-east of Norah Head, 33°20'S 152°32'E to 33°24'S 152°31'E, 360 m, midwater

trawl, *Kapala* (K77-24-09), 14 Dec 1977; 8 specimens. AM P32902, north-east of Broken Bay, 33°27'S 152°30'E to 33°23'S 152°32'E, 630 m, midwater trawl, *Kapala* (K77-24-03), 13 Dec 1977; 3 specimens. AM P32901, north-east of Broken Bay, 33°31'S 152°20'E to 33°28'S 152°22'E, 569 m, midwater trawl, *Kapala* (K77-24-02), 12 Dec 1977; 1 specimen. AM P32906, north-east to east of Wollongong, 34°20'S 151°56'E to 34°25'S 151°54'E, 630 m, midwater trawl, *Kapala* (K77-24-12), 14 Dec 1977; 4 specimens. AM P32903, east of Norah Head, 33°17'S 152°31'E to 33°19'S 152°31'E, 90 m, midwater trawl, *Kapala* (K77-24-08), 13 Dec 1977; 6 specimens. AM P32905, north-east to east of Broken Bay, 33°28'S 152°34'E to 33°36'S 152°35'E, 630 m, midwater trawl, *Kapala* (K77-24-10), 14 Dec 1977; 1 specimen. AM P32900, east of Broken Bay, 33°33'S 152°18'E to 33°31'S 152°18'E, 216 m, midwater trawl, *Kapala* (K77-24-01), 12 Dec 1977; 2 specimens. AM P26594, north-east of Wollongong, 34°10'S 152°04'E to 34°12'S 152°02'E, 540 m, midwater trawl, *Kapala* (K77-18-01), 26 Oct 1977; 1 specimen. AM P32907, east to north-east of Norah Head, 33°20'S 153°04'E to 33°12'S 153°13'E, 630 m, midwater trawl, *Kapala* (K79-19-05), 28 Nov 1979; 1 specimen.

**Diagnosis.** Antennal angle of carapace acute, infra-antennal angle quadrate. Thelycum of female with W-shaped process on sternite 13 closely connected to bluntly triangular shield on sternite 12; sternite 14 with 8-shaped process. Petasma of male, external lobe bipartite, large median lobe of 2 diverging acute lobules, internal lobe of 2 rounded lobules, accessory lobe a simple rounded flap.

**Remarks.** Griffiths & Brandt (1983) record this species (as *G. clavicornis*) associated with a warm-core eddy in the Tasman Sea off eastern Australia.

**Distribution.** Widespread through Indo-Pacific; surface to 1200 m.

#### *Gennadas scutatus* Bouvier

*Gennadas scutatus* Bouvier, 1906: 748.—Kensley, 1971: 288, fig. 10; Crosnier, 1978: 43, figs 17a, 19c; Griffiths & Brandt, 1983: 614.

**Material examined.** New Caledonia: AM P32911, east of New Caledonia, 21°05'S 166°45'E, 0–925 m, midwater trawl, *Kimbla* (K4/71-5), 9 May 1971; 3 specimens. AM P32912, east of New Caledonia, 22°03'S 167°44'E, 0–800 m, midwater trawl, *Kimbla* (K4/71-11), 13 May 1971; 1 specimen.

New South Wales: AM P32913, east of Norah Head, 33°17'S 152°31'E to 33°19'S 152°31'E, 90 m, midwater trawl, *Kapala* (K77-24-08), 13 Dec 1977; 1 specimen.

**Diagnosis.** Antennal and infra-antennal angles of carapace acute. Thelycum of female with sternite 12 triangular with seminal receptacles at base, sternite 13 triangular, sternite 14 with elongate flap extending forward over sternite 13 and reaching sternite 12. Petasma of male with external lobe of 2 rounded lobules, median lobe broad, of slender acute outer lobule and broadly truncate inner lobule; median lobe of 2 rounded lobules; accessory lobe a triangular flap.

**Remarks.** Griffiths & Brandt (1983) record this species associated with a warm-core eddy off eastern Australia.

**Distribution.** Caribbean; north-east and north-west Atlantic; west coast of South Africa; Indo-Pacific; surface to 600 m.

#### *Gennadas tinayrei* Bouvier

*Gennadas tinayrei* Bouvier, 1906: 10, figs 2–4, 14.—Kensley, 1971: 290, fig. 12; Crosnier, 1978: 44, figs 17b, 19d; Griffiths & Brandt, 1983: 614.

**Material examined.** New South Wales: AM P32888, north-east of Broken Bay, 33°31'S 152°20'E to 33°28'S 152°22'E, 569 m, midwater trawl, *Kapala* (K77-24-02), 12 Dec 1977; 1 specimen. AM P32890, east of Norah Head, 33°17'S 152°31'E to 33°19'S 152°31'E, 90 m, midwater trawl, *Kapala* (K77-24-08), 13 Dec 1977; 1 specimen. AM P32887, south-east of Norah Head, 33°20'S 152°32'E to 33°24'S 152°31'E, 360 m, midwater trawl, *Kapala* (K77-24-09), 14 Dec 1977; 2 specimens. AM P32891, north-east to east of Wollongong, 34°20'S 151°56'E to 34°25'S 151°54'E, 630 m, midwater trawl, *Kapala* (K77-24-12), 14 Dec 1977; 1 specimen.

**Diagnosis.** Antennal angle of carapace subacute, infra-antennal angle acute. Thelycum of female with narrow median posteriorly directed process on sternite 11; sternite 13 with broadly triangular process flanked by two rounded processes on each side; sternite 14 with small rectangular shield. Petasma of male with external lobe faintly divided into 2 apical lobules; median lobe broad, low, convex; inner lobe of 2 rounded lobules; accessory lobe bluntly rounded.

**Remarks.** Griffiths & Brandt (1983) found this species associated with a warm-core eddy off eastern Australia.

**Distribution.** North-east and north-west Atlantic; off west coast of South Africa; Indo-Pacific; 100–600 m.

#### Subfamily ARISTEINAE

##### *Aristaeomorpha* Wood Mason, 1891

##### *Aristaeomorpha foliacea* (Risso)

*Penaeus foliaceus* Risso, 1827: 69, pl. 2, fig. 6.

*Aristaeomorpha foliacea*.—Schmitt, 1926: 313, pl. 57, figs 1–3; Crosnier, 1978: 54, figs 23, 24; Grey, Dall & Baker, 1983: 36, pl. 1.

**Material examined.** New South Wales: AM P17966, east of Long Reef, 33°41–44'S 151°55–53'E, 540 m, bottom trawl, *Kapala* (K71-07-01), 20 April 1971; 1 specimen. AM P17904, north-east of Coffs Harbour, 29°51'S 153°40'E, 205 m, bottom trawl, *Kapala* (K71-09-03), 11 May 1971; 17 specimens. AM P18023, north-east to east of North Solitary Island, 29°49'S 153°42'E to 29°59'S 153°38'E, 369 m, demersal prawn trawl, *Kapala* (K71-09-04), 12 May 1971; 1 specimen. AM P18011, south-east of Gabo Island, 37°39'S 150°17'E to 37°42'S

150°17'E, prawn trawl, *Kapala* (K71-13-01), 30 July 1971; 3 specimens. AM P18017, P18022, P18016, south-east of Gabo Island, 37°45'S 150°13'E to 37°39'S 150°17'E, 405 m, trawl, *Kapala* (K71-13-02), 30 July 1971; 3 specimens. AM P18981, south-east to east of Broken Bay, 33°43'S 151°55'E to 33°37'S 152°02'E, 675 m, demersal prawn trawl, *Kapala* (K72-06-04), 19 Oct 1972; 3 specimens. AM P19155, east of Sydney, 33°00'S 151°43'E to 33°54'S 151°47'E, 732m, bottom trawl, *Kapala* (K72-07-01), 6 Nov 1972; 1 specimen. AM P19154, south-east of Broken Bay, 33°44'S 151°55'E to 33°40'S 151°58'E, 720 m, demersal prawn trawl, *Kapala* (K72-07-04), 9 Nov 1972; 1 specimen. AM P19002, north-east of Port Jackson, 33°52'S 151°50'E to 33°48'S 151°54'E, 765 m, demersal prawn trawl, *Kapala* (K72-07-15), 7 Dec 1972; 1 specimen. AM P19003, south-east of Broken Bay, 33°42'S 151°55'E to 33°40'S 151°57'E, 810 m, demersal prawn trawl, *Kapala* (K72-07-16), 7 Dec 1972; 9 specimens. AM P21048, P21043, north-east of Wollongong, 34°16'S 151°26'E to 34°22'S 151°23'E, 356 m, demersal prawn trawl, *Kapala* (K75-05-01), 8 Aug 1975; 3 specimens. AM P21036, north-east of Wollongong, 34°21'S 151°24'E to 34°14'S 151°28'E, 400 m, demersal prawn trawl, *Kapala* (K75-05-02), 8 Aug 1975; 2 specimens. AM P21011, east of Broken Bay, 33°27'S 152°03'E to 33°30'S 152°07'E, 540 m, trawl, *Kapala* (K75-05-04), 19 Aug 1975; 4 specimens. AM P25152, east of Broken Bay, 33°35'S 152°01'E to 33°32'S 152°03'E, 810 m, demersal prawn trawl, *Kapala* (K76-24-03), 20 Dec 1976; 1 specimen. AM P25371, south-east to east of Broken Bay, 33°34'S 151°52'E to 33°40'S 151°55'E, 405 m, demersal prawn trawl, *Kapala* (K77-12-01/02), 8 Aug 1977; 5 specimens. AM P26816, north-east of Norah Head, 33°08'S 152°27'E to 33°10'S 152°24'E, 580 m, demersal prawn trawl, *Kapala* (K77-23-09), 7 Dec 1977; 11 specimens. AM P33080, north-east of Point Danger, 28°01'S 154°00'E to 27°58'S 154°00'E, 542 m, demersal prawn trawl, *Kapala* (K78-17-10), 17 Aug 1978; 1 specimen. AM P33078, north-east of Point Danger, 28°03'S 154°04'E to 28°01'S 154°04'E, 724 m, demersal prawn trawl, *Kapala* (K78-23-08), 6 Nov 1978; 5 specimens. AM P33079, north-east of Norah Head, 33°08'S 152°27'E to 33°10'S 152°24'E, 580 m, demersal prawn trawl, *Kapala* (K77-23-09), 7 Dec 1977; 8 specimens. Victoria: AM P18011, south-east of Gabo Island, 37°39'S 150°17'E to 37°42'S 150°16'E, 387 m, Danish trawl, *Kapala* (K71-13-01), 30 July 1971; 3 specimens. AM P18017, P18022, P18016, south-east of Gabo Island, 37°39-45'S 150°17-13'E, 396-401 m, Danish trawl, *Kapala* (K71-13-02), 30 July 1971; 3 specimens.

**Diagnosis.** Body pubescent. Rostrum fairly long, reaching beyond scaphocerite in adult females and young males, shorter in adult males; up to 9 dorsal rostral spines, no ventral spines. Hepatic spine present. Thelycum of female with sternite 13 bearing anteriorly directed oval shield, sternite 14 bearing rounded medial process. Petasma in male roughly rectangular, with distolateral corner somewhat produced.

**Distribution.** Mediterranean; north-east and north-west Atlantic; Caribbean; Gulf of Mexico; Indo-West Pacific to Japan and Fiji; southern and eastern Australia; New Zealand; 90-1300 m.

*Aristeus* Duvernoy, 1840

*Aristeus semidentatus* Bate

*Aristeus semidentatus* Bate, 1881: 189.—Crosnier, 1978: 68, fig. 26g.

**Material examined.** New South Wales: AM P26772, south-east of Broken Bay, 33°40-35'S 151°56-58'E, 714-732 m, demersal prawn trawl, *Kapala* (K77-23-06), 6 Dec 1977; 1 ♀. AM P26777, south-east of Broken Bay, 33°40-35'S 151°56-58'E, 714-732 m, demersal prawn trawl, *Kapala* (K77-23-06), 6 Dec 1977; 1 ♂, 1 ♀. AM P25143, east of Broken Bay, 33°30-27'S 152°05-07'E, 810 m, demersal prawn trawl, *Kapala* (K76-24-04), 21 Dec 1976; 1 ♀. AM P33196, east of Broken Bay, 33°32'S 152°06'E to 33°34'S 152°05'E, 810 m, demersal prawn trawl, *Kapala* (K79-20-13), 6 Dec 1979; 1 ♂, 1 ♀. AM P33197, south-east of Broken Bay, 33°39'S 152°06'E to 33°37'S 152°07'E, 990 m, demersal prawn trawl, *Kapala* (K79-20-15), 6 Dec 1979; 2 ♀, 8 juvs.

**Diagnosis.** Carapace glabrous; branchiostegal spine produced posteriorly into supporting, anteriorly keeled ridge. Subdistal spine on external face of merus of pereopods 1 and 2. Fingers of pereopods relatively short. Photophores present on pereopods.

**Remarks.** Crosnier (1978) presented two tables in which characters of four species of *Aristeus* from Madagascar were compared. These features of *A. semidentatus* from Madagascar were compared with those for the present Australian material (see Tables 2 and 3). It was found that the number of photophores on the carpus and propodus of pereopods 1, 2, 4, and 5 was consistently lower than Crosnier's figures. Further, the ratio of chela to carpus in pereopod 1, and the ratio of carpus to merus in pereopod 5 was consistently higher than Crosnier's figures. For the remaining features provided in the diagnosis by Crosnier (1978: 68), the

		No. Photophores			No. Photophores
Prd 1	carpus	6-8	Prd 4	carpus	7-12
	propodus	2-3		propodus	8-11
	dactyl	0		dactyl	0
Prd 2	carpus	0-2	Prd 5	carpus	8-13
	propodus	1-2		propodus	8-13
	dactyl	0		dactyl	8-10
Prd 3	carpus	0-3			
	propodus	1-2			
	dactyl	0			

Table 2. Pereopodal photophore counts for Australian specimens of *Aristeus semidentatus*.

	chela/carpus			carpus/merus	
	Prd 1	Prd 2	Prd 3	Prd 4	Prd 5
♀	1.11-1.23	0.88-0.97	0.75-1.04	1.02-1.08	1.24-1.37
♂	1.12-1.15	0.92-0.94	0.78	1.02	1.40

Table 3. Pereopodal carpus/merus ratios for Australian specimens of *Aristeus semidentatus*.

Australian material is in agreement.

The present material may be differentiated from *A. mabahissae* by the lower ratio of chela/carpus of pereopod 1, and the higher ratio of carpus/merus of pereopod 5.

*Aristeus virilis* (Bate)

*Hemipenaeus virilis* Bate, 1881: 187.

*Aristeus virilis*.—Crosnier, 1978: 61, figs 25a, b, 26a, b.

**Material examined.** New South Wales: AM P21683, P21684, north-east of Woolli, 29°49'S 153°44'E, 503 m, prawn trawl, *Kapala* (K75-09-03), 10 Oct 1975; 12 specimens. AM P21684, south-east of Clarence River, 29°37'S 153°46'E, 410 m, demersal prawn trawl, *Kapala* (K75-09-04), 10 Oct 1975; ? specimens. AM P21686, north-east of Yamba, 29°26'S 153°49'E to 29°20'S 153°50'E, 450 m, demersal prawn trawl, *Kapala* (K75-09-08), 12 Oct 1975; 1 specimen. AM P24485, east of Sydney, 33°35'S 151°59'E, 366 m, *Kapala* (K76-09-02), 24 June 1976; 1 specimen. AM P26770, north-east of Norah Head, 33°11'S 152°24'E to 33°09'S 152°25'E, 720 m, demersal prawn trawl, *Kapala* (K77-23-10), 7 Dec 1977; 1 specimen. AM P33003, north-east of North Solitary Island, 29°53'S 153°42'E to 29°50'S 153°43'E, 453 m, demersal prawn trawl, *Kapala* (K78-06-07), 26 April 1978; 1 specimen. AM P33002, north-east of Point Danger, 28°03'S 154°04'E to 28°01'S 154°04'E, 724 m, demersal prawn trawl, *Kapala* (K78-23-08), 6 Nov 1978; 1 specimen.

**Diagnosis.** Body pubescent. Single movable subdistal spine present on external surface of merus of third pereopods. Between 16 and 22 photophores on propodus of pereopod 5. Thelycum in female with sternite 13 bearing broadly ovate, setose, anteroventrally-directed process. Petasma of male distally broad, somewhat produced mediolaterally.

**Distribution.** Indo-West Pacific to New Caledonia, New Hebrides, and Japan; 400–900 m.

*Plesiopenaeus* Bate, 1881

*Plesiopenaeus edwardsianus* (Johnson)

*Penaeus edwardsianus* Johnson, 1867: 897.

*Plesiopenaeus edwardsianus*.—Crosnier, 1978: 88, figs 31a–c, 32a–c, 33a; Grey, Dall & Baker, 1983: 38, pl. 2.

**Material examined.** New South Wales: AM 19103, 33°43'–39'S 151°54'–58'E, 694 m, *Kapala* (K72-05-01), 19 Oct 1972; 7 specimens. AM P19089, south-east to east of Broken Bay, 33°43'S 151°55'E to 33°37'S 152°02'E, 675 m, demersal prawn trawl, *Kapala* (K72-06-04), 19 Oct 1972; 6 specimens. AM P19090, east of Sydney, 34°00'S 151°43'E, 732 m, *Kapala* (K72-07-01), 6 Nov 1972; 1 specimen. AM P19102, east of Long Reef, 33°43'–40'S 152°55'–57'E, 823 m, *Kapala* (K72-17-12), 7 Dec 1972; 3 specimens. AM P20494, east of Broken Bay, 33°38'–34'S 151°57'–152°01'E, 796 m, *Kapala* (K75-01-02), 2 April 1975; 2 specimens. AM P21005, P21006, east of Broken Bay, 33°32'S 152°04'E to 33°38'S 152°00'E, 810 m, demersal prawn trawl, *Kapala* (K75-05-05), 19 Aug 1975; 6 specimens. AM P25155, P25193, north-east of Broken

Bay, 33°30'S 152°05'E to 33°27'S 152°07'E, 808 m, demersal prawn trawl, *Kapala* (K76-24-04), 21 Dec 1976; 25 specimens. AM P33084, south-east of Wollongong, 34°31'S 151°20'E to 34°34'S 151°19'E, 684 m, demersal prawn trawl, *Kapala* (K77-21-01), 21 Nov 1977; 2 specimens. AM P33085, south-east of Broken Bay, 33°40'S 151°56'E to 33°37'S 151°56'E, 711 m, demersal prawn trawl, *Kapala* (K77-23-06), 6 Dec 1977; 3 specimens. AM P26763, north-east of Norah Head, 33°11'S 152°24'E to 33°09'S 152°25'E, 720 m, demersal prawn trawl, *Kapala* (K77-23-10), 7 Dec 1977; 8 specimens. AM P33081, north-east of Danger Point, 28°03'S 154°04'E to 28°01'S 154°04'E, 724 m, demersal prawn trawl, *Kapala* (K78-23-08), 6 Nov 1978; 22 specimens. AM P33086, east of Broken Bay, 33°34'S 152°04'E to 33°31'S 152°06'E, 713 m, demersal prawn trawl, *Kapala* (K79-20-04), 4 Dec 1979; 1 specimen. AM P33083, off New South Wales, *Kapala* (K79-23); 3 specimens. AM P35917, east of Long Reef, 33°43'–39'S 151°56'–58'E, 630 m, demersal fish trawl, *Kapala* (K84-16-03), 25 Sept 1984; 1 specimen.

**Diagnosis.** Rostrum elongate, but becoming shorter in adult males, with 3 dorsal spines at base, ventral margin unarmed. Hepatic spine absent, postantennal spine absent. Podobranch present on pereopod 3. Epipodite on pereopod 4. Exopods lacking on pereopods. Abdominal segments 3–6 ending in small posterodorsal spine. Thelycum in female with small anteriorly directed spine on sternite 12; heart-shaped, anteriorly directed shield on sternite 13; roughly elongate rectangular shield on sternite 14. Scaphocerite of adult male modified, bearing slender distal prolongation.

**Distribution.** Widespread throughout the Indo-West Pacific and Atlantic Oceans; off New South Wales; 274–1850 m.

Family PENAEIDAE

*Funchalia* Johnson, 1867

*Funchalia villosa* (Bouvier)

*Hemipenaeopsis villosus* Bouvier, 1905: 981.

*Funchalia villosa*.—Dall, 1957: 163, fig. 9; Crosnier & Forest, 1973: 296; Casanova, 1976: 63; Casanova & Judkins, 1977: 125, 126; Kensley, 1977: 29, figs 8c, d; Crosnier, 1985: 869, figs 13a–e, 14b, c.

**Material examined.** New South Wales: AM P19464, north-east of Wollongong, 34°10'S 151°37'E to 34°14'S 151°35'E, 50 m, midwater trawl, *Kapala* (K73-01-01), 30 Apr 1973; 38 specimens. AM P32932, off Port Kembla, 34°28'S 151°29'E, 225 m, midwater trawl, *Kapala* (K74-05-JP1), 22 Jan 1974; 2 specimens. AM P26556, north-east of Batemans Bay, 35°36'S 150°55'E to 35°39'S 150°56'E, 540 m, midwater trawl, *Kapala* (K77-18-05), 27 Oct 1977; 1 specimen. AM P26557, north-east of Batemans Bay, 35°36'S 150°55'E to 35°39'S 150°56'E, 540 m, midwater trawl, *Kapala* (K77-18-05), 27 Oct 1977; 3 specimens. AM P30329, east of Broken Bay, 33°33'S 152°18'E to 33°31'S 152°18'E, 216 m, midwater trawl, *Kapala* (K77-24-01), 12 Dec 1977; 20 specimens. AM P32920, north-east of Broken Bay, 33°31'S 152°20'E to



33°28'S 152°22'E, 569 m, midwater trawl, *Kapala* (K77-24-02), 12 Dec 1977; 10 specimens. AM P32919, north-east of Broken Bay, 33°27'S 152°30'E to 33°23'S 152°32'E, 630 m, midwater trawl, *Kapala* (K77-24-03), 13 Dec 1977; 15 specimens. AM P32931, south-east of Norah Head, 33°23'S 152°27'E to 33°19'S 152°39'E, 666 m, midwater trawl, *Kapala* (K77-24-06), 13 Dec 1977; 1 specimen. AM P32929, north-east of Norah Head, 33°16'S 152°29'E to 33°14'S 152°30'E, 36 m, midwater trawl, *Kapala* (K77-24-07), 13 Dec 1977; 26 specimens. AM P32921, east of Norah Head, 33°17'S 152°31'E to 33°19'S 152°31'E, 90 m, midwater trawl, *Kapala* (K77-24-08), 13 Dec 1977; 27 specimens. AM P32922, south-east of Norah Head, 33°20'S 152°32'E to 33°24'S 152°31'E, 360 m, midwater trawl, *Kapala* (K77-24-09), 14 Dec 1977; 39 specimens. AM P32918, north-east to east of Broken Bay, 33°28'S 152°34'E to 33°36'S 152°35'E, 630 m, midwater trawl, *Kapala* (K77-24-10), 14 Dec 1977; 19 specimens. AM P32923, north-east of Wollongong, 34°05'S 152°02'E to 34°13'S 152°00'E, 630 m, midwater trawl, *Kapala* (K77-24-11), 14 Dec 1977; 17 specimens. AM P32924, north-east to east of Wollongong, 34°20'S 151°56'E to 34°25'S 151°54'E, 630 m, midwater trawl, *Kapala* (K77-24-12), 14 Dec 1977; 84 specimens. AM P32926, south-east of Newcastle, 33°03'S 152°58'E to 32°59'S 153°03'E, 482 m, midwater trawl, *Kapala* (K79-19-02), 27 Nov 1979; 6 specimens. AM P32925, north-east of Norah Head, 33°05'S 153°05'E to 33°13'S 153°05'E, 630 m, midwater trawl, *Kapala* (K79-19-03), 28 Nov 1979; 20 specimens. AM P32927, east of Newcastle, 32°59'S 153°03'E to 32°51'S 153°01'E, 391 m, midwater trawl, *Kapala* (K79-19-07), 29 Nov 1979; 3 specimens. AM P32928, north-east of Norah Head, 33°08'S 152°48'E to 33°16'S 152°46'E, 630 m, midwater trawl, *Kapala* (K79-19-10), 29 Nov 1979; 1 specimen.

**Diagnosis.** Rostrum with 4–5 dorsal teeth, ventrally unarmed. Carapace with 1 epigastric tooth; hepatic spine absent in adults; antennal spine present; branchiocardiac ridge prominent. Fifth and sixth abdominal somites with prominent lateral ridges. Petasma asymmetrical, shorter ramus distally a simple lobe with broad apical angle; longer ramus distally deeply grooved and curved, with pair of blunt lateral knobs distally, blunt triangular projection on outer proximal margin. Thelycum forming deep receptacle, anterior plate between pereopod 4 bases cordiform, grooved, lateral edges curved ventrally, anteriorly acute; sternal plate roughly quadrangular, with anterolateral extensions fusing with anterior plate to form walls of seminal receptacle.

**Distribution.** Eastern and western Atlantic, Mediterranean, Caribbean, south-western Indian Ocean, off Lord Howe Island; 50–666 m.

*Funchalia woodwardi* Johnson

*Funchalia woodwardi* Johnson, 1867: 895

*Funchalia woodwardi*.—Crosnier & Forest, 1973: 296; Casanova, 1976: 64; Casanova & Judkins, 1977: 125; Kensley, 1977: 29, fig. 8A, B.

**Material examined.** New South Wales: AM P26555, north-east of Batemans Bay, 35°36'S 150°55'E to 35°39'S 150°56'E, 540 m, midwater trawl, *Kapala* (K77-18-05), 27 Oct 1977; 1 ♀.

**Diagnosis.** Rostrum with 10–12 dorsal teeth, ventrally Eral ridges. Petasma asymmetrical, shorter ramus distally a simple lobe with broad apical angle; longer ramus distally deeply grooved and curved, with pair of blunt lateral knobs distally, blunt triangular projection on outer proximal margin. Thelycum forming deep receptacle, anterior plate between pereopod 4 bases cordiform, grooved, lateral edges curved ventrally, anteriorly acute; sternal plate roughly quadrangular, with anterolateral extensions fusing with anterior plate to form walls of seminal receptacle.

**Distribution.** North-eastern Atlantic, Mediterranean, south-eastern South Africa; 250–540 m.

*Parapenaeus* Smith, 1885

*Parapenaeus sextuberculatus* Kubo

*Parapenaeus sextuberculatus* Kubo, 1949: 403, figs 7F, 21B, 28D–F, 47R, 61A,A', 75B,H, 78H, 143B,F.—Dall, 1957: 179; Hall, 1962: 31; Crosnier, 1985: 312, 330, figs 9a,d, 10a-c, 11a.

**Material examined.** New South Wales: AM P32469, south-east of Coffs Harbour, 30°20'S 153°16'E to 30°23'S 153°25'E, 279 m, demersal prawn trawl, *Kapala* (K77-13-05), 19 Aug 1977; 1 ♂. AM P32484, east of Brooms Head, 29°44–50'S 153°41–39'E, 162 m, trawl, *Kapala* (K78-21-10), 11 Oct 1978; 7 ♀. AM P32485, east of Brooms Head, 29°36–40'S 153°45–43'E, 270 m, trawl, *Kapala* (K78-06-04), 26 Apr 1978; 1 ♂. AM P32486, east of Sugarloaf Point, 32°06–03'S 153°04–05'E, 360 m, prawn trawl, *Kapala* (K77-13-01), 17 Aug 1977; 1 ♂, 1 ♀. AMP32487, east of Port Jackson, 33°53'S 151°50'E, 360 m, *Kapala* (K77-09-02), 4 July 1977; 2 ♀. AM P32489, east of Brooms Head, 29°47–49'S 153°41–40'E, 234 m, *Kapala* (K78-05-07), 19 Apr 1978; 3 ♂, 4 ♀. AM P32490, east of Brooms Head, 29°47–49'S 153°41–40'E, 234 m, *Kapala* (K78-05-07), 19 Apr 1978; 1 ♀.

**Diagnosis.** Rostrum very slightly arched, with 5–6 dorsal teeth, well separated from epigastric tooth. Branchiostegal spine present, situated on anterior carapace margin. Abdominal somite 6 less than twice length of somite 5. Thelycum with plate of sternite XIII having cordiform anteriorly directed process; sternite XIV with pair of anterolateral somewhat transversely elongate tubercles, pair of rounded posterolateral tubercles, single low rounded posteromedian tubercle. Petasma distally broadly rounded and with small distal point, distolateral plate distally bifid and with rounded anterior and posterior ridges.

**Distribution.** Japan, Philippines, Indonesia, India, 140–320 m; Madagascar, 250–350 m.

*Penaeopsis* Bate, 1881

*Penaeopsis eduardoi* Pérez Farfante

*Penaeopsis eduardoi* Pérez Farfante, 1977b: 172, figs 1–4.



**Material examined.** New South Wales: AM P32462, east of Port Jackson, 33°46'S 151°49'E to 33°44'S 151°51'E, 425 m, trawl, *Kapala* (K80-21-01), 16 Dec 1980; 2 ♀. AM P32463, north-east of Danger Point, 29°53'S 153°42'E to 29°55'S 153°42'E, 405 m, trawl, *Kapala* (K78-06-06), 26 Apr 1978; 5 ♀. AM P32464, north-east of Danger Point, 27°55'S 154°03'E to 27°57'S 154°03'E, 540 m, trawl, *Kapala* (K78-23-09), 6 Nov 1978; 1 ♂, 3 ♀. AM P32465, east of Broken Bay, 33°27'–30'S 151°05'–03'E, 391 m, prawn trawl, *Kapala* (K79-12-07), 21 Aug 1979; 1 ♂. AM P32466, south-east of Cape Byron, 28°41'S 153°51'E to 28°44'S 153°52'E, 149 m, demersal prawn trawl, *Kapala* (K78-17-21), 18 Aug 1978; 1 ♂. AM P32467, off Sydney, 33°46'S 151°50'E to 33°42'S 151°53'E, 414 m, demersal prawn trawl, *Kapala* (K80-06-01), 24 May 1980; 1 ♂. AM P32468, north-east of Danger Point, 27°55'S 154°03'E to 27°57'S 154°03'E, 629 m, demersal prawn trawl, *Kapala* (K78-23-09), 6 Nov 1978; 1 ♂. AM P32470, east of Long Reef, 33°42'–39'S 151°52'–54'E, 447 m, prawn trawl, *Kapala* (K74-24-01), 20 Dec 1976; 1 ♂. AM P32474, north-east of Danger Point, 28°01'S 154°00'E to 27°58'S 154°00'E, 542 m, demersal prawn trawl, *Kapala* (K78-17-10), 17 Aug 1978; 1 ♀. AM P32493, east of Sugarloaf Point, 32°19'–16'S 153°00'–02'E, 360 m, trawl, *Kapala* (K78-03-03), 5 Apr 1978; 4 ♀.

**Diagnosis.** Rostrum horizontal to slightly upturned, with 8–15 dorsal teeth; epigastric tooth well separated from rostral teeth. Telson bearing 2 pairs of articulated lateral spines; terminally hastate. Thelycum with plate of sternite XIV with caudally pedunculate posteromedian tubercle; sternite XIII with plate caudally bifid; sternite of XII basally broad, conical, directed anteriorly. Petasma with ventral costa produced into distal spine projecting well beyond cincinnuli.

**Distribution.** Bay of Bengal to Japan, Philippines, Indonesia, Taiwan, Fiji; 290–570 m.

*Penaeus* Fabricius, 1798

*Penaeus longistylis* Kubo

*Penaeus longistylis* Kubo, 1943: 200.—1949: 282, figs 7A, 24F,G, 49I, 58E, 73C,I, 77Q, 109–111; Hall, 1962: 15, fig. 81; Racek & Dall, 1965: 13, pl. 1, fig. 2; Grey, Dall & Baker, 1983: 50, pl. 8.

*Penaeus jejunos* Hall, 1956: 75; 1962: 16.

*Penaeus caesius* Dall, 1957: 143, fig. 2A–G.

**Material examined.** New South Wales: AM P33165, south-east of Coffs Harbour, 30°20'S 153°16'E to 30°23'S 153°25'E, 270 m, demersal prawn trawl, *Kapala* (K77-13-05), 19 Aug 1977; 1 ♀. AM P33166, south-east of Cape Hawke, 32°18'S 152°43'E to 32°12'S 152°43'E, 90 m, demersal prawn trawl, *Kapala* (K78-19-06), 12 Sept 1978; 2 ♂, 1 ♀. AM P33164, north-east of North Solitary Island, 29°44'S 153°41'E to 29°50'S 153°39'E, 160 m, demersal prawn trawl, *Kapala* (K78-21-10), 10 Oct 1978; 1 ♀.

**Diagnosis.** Rostrum with 12 dorsal teeth, single anteroventral tooth. Adrostral groove almost reaching posterior margin of carapace; median groove of postrostral carina much less than half length of carapace; hepatic carina and gastro-frontal

carina well developed. Stylocerite reaching or just falling short of distal end of basal antennular peduncle article. Pereopod 1 with stout ischial spine. Petasma with median lobe apically rounded, reaching as far as distal margin of lateral lobe. Thelycum with anterior plate anteriorly elongate, apically narrowly rounded; posterior plate between bases of pereopod 5 consisting of 2 plates meeting in midline, together forming broadly oval structure.

## Infraorder CARIDAE

### Family OPLOPHORIDAE

*AcanthePHYRA* A. Milne Edwards, 1881

*AcanthePHYRA acutifrons* Bate

*AcanthePHYRA acutifrons* Bate, 1888: 749, pl. 126 fig. 3.—Chace, 1940: 146–147, fig. 23; Holthuis, 1951: 28; Crosnier & Forest, 1973: 28, fig. 8b.

**Material examined.** New South Wales: AM P26836, 70 km east of Broken Bay, 33°29'S 152°25'E to 33°23'S 152°28'E, 0–630 m, midwater trawl, J.R.Paxton, *Kapala* (K77-24-03), 13 Dec 1977; 1 specimen.

**Diagnosis.** Rostrum less than half carapace length, basally deep, 1 ventral spine; carapace dorsally carinate, denticulate anteriorly, carina behind branchiostegal spine very short; all abdominal segments carinate, segments 3–6 with a dorsal terminal spine; telson with 5–6 pairs of dorsolateral spinules.

**Remarks.** *AcanthePHYRA acutifrons* is the largest of the species of this genus collected off eastern Australia in this survey. This specimen is similar in size to the ovigerous female figured by Chace (1940). The denticles behind the rostrum are much less prominent than in the smaller specimen figured by Crosnier & Forest (1973). The sixth abdominal segment is short, dorsal length less than 1.5 times the posterior height.

This species is distinguished from the similar, but much smaller, *A. curtirostris* by the presence of a carina on the first abdominal segment, the very short carina behind the branchiostegal spine, the short sixth abdominal segment and the smaller number of dorsolateral spinules on the telson.

This species has not previously been recorded off eastern Australia.

**Distribution.** Indo-west Pacific, eastern and western Atlantic; 650–2400 m.

*AcanthePHYRA curtirostris* Wood-Mason

*AcanthePHYRA acutifrons* Bate, 1888: 749 (in part, see Kemp, 1906).

*AcanthePHYRA curtirostris* Wood-Mason in Wood-Mason & Alcock, 1891: 195.—1892: 364–365, fig. 5; Kemp, 1906: 22, 24; Chace, 1940: 143–144, fig. 21; Crosnier & Forest, 1973: 39–41, fig. 8a; Kensley, 1981a: 57; 1981b: 21.

**Material examined.** New Caledonia: AM P32863, 22°03'S 167°44'E, 0–800 m, midwater trawl, *Kimbla* (K4/71-11), 13 May 1971; 1 ovig. ♀.

New South Wales: AM P26837, 70 km east of Broken Bay, 33°29'S 152°25'E to 33°23'S 152°28'E, 0–630 m, midwater trawl, *Kapala* (K77-24-03), 13 Dec 1977; 1 specimen.

**Diagnosis.** Rostrum less than half carapace length, basally deep, 1 ventral spine. Carapace dorsally carinate, carina behind branchiostegal spine about 1/3 carapace length; first abdominal segment not carinate; segments 3–6 carinate with dorsal, terminal spine; telson with 8–9 pairs of dorsolateral spinules.

**Remarks.** *Acantheephyra curtirostris* is similar to *A. acutifrons* in having a short rostrum with one ventral spine. It is distinguished from that larger species by the presence of a longer carina behind the branchiostegal spine, the absence of a dorsal carina on the first abdominal segment, the presence of 8–9 pairs of dorsolateral spinules on the telson and a longer sixth abdominal segment in which the dorsal length is more than twice the posterior height.

**Distribution.** Indo-west Pacific, northeastern Atlantic, Caribbean; 630–4970 m.

#### *Acantheephyra pelagica* (Risso)

*Pandalus pelagicus* Risso, 1816: 79

*Acantheephyra pelagica*.—Holthuis, 1947: 315–316; Kensley, 1972: 40 (in key), fig. 18E, F; 1981a: 57; 1981b: 21; Crosnier & Forest, 1973: 29–31.

**Material examined.** New South Wales: AM P32853, 70 km east of Tuggerah Lake, 33°19'S 152°25'E to 33°23'S 152°28'E, 0–630 m, midwater trawl, *Kapala* (K77-24-03), 13 Dec 1977; 1 specimen. AM P32854, 80 km east of Tuggerah Lake, 33°20'S 152°32'E to 33°24'S 152°31'E, 0–360 m, midwater trawl, *Kapala* (K77-24-09), 14 Dec 1977; 1 specimen. AM P32855, 65 km east of Broken Bay, 33°31'S 152°20'E to 33°28'S 152°22'E, 0–540 m, midwater trawl, *Kapala* (K77-24-02), 12 Dec 1977; 1 specimen. AM P26606, south-east of Port Hacking, 34°10'S 150°04'E to 34°12'S 150°02'E, 0–660 m, midwater trawl, *Kapala* (K77-18-01), 26 Oct 1977; 1 specimen. AM P32856, 80 km east of Lake Illawarra, 34°20'S 151°56'E to 34°25'S 151°54'E, 0–630 m, midwater trawl, *Kapala* (K77-24-12), 14 Dec 1977; 4 specimens. AM P32857, off Lake Illawarra, 34°40'S 151°15'E to 34°35'S 151°17'E, 594–675 m, fish trawl, *Kapala* (K77-19-05), 3 Nov 1977; 1 specimen. AM P26607, east of Brush Island, 35°36'S 150°55'E to 35°39'S 150°52'E, 0–650 m midwater trawl, *Kapala* (K77-18-05), 27 Oct 1977; 1 specimen.

**Diagnosis.** Rostrum more than half carapace length with evenly spaced spines on dorsal and ventral margins. No carina running entire length of carapace; first abdominal segment not carinate, segments 3–6 carinate with dorsal terminal spine; telson with 7–11 pairs of dorsolateral spinules.

**Remarks.** This species is distinguished from the more common *A. quadrispinosa* by the presence of

7–11 rather than four dorsolateral spinules on the telson.

These specimens were collected from 33°20'S to 35°40'S in trawls to a depth of 675 m.

**Distribution.** Indo-Pacific, north and south Atlantic, Mediterranean; 540–2166 m.

#### *Acantheephyra quadrispinosa* Kemp

*Acantheephyra quadrispinosa* Kemp, 1939: 576.—Kensley, 1968: 311; 1972: 40 (in key), fig. 18C, D; 1981a: 57; 1981b: 21.

**Material examined.** New Caledonia: AM P32832, 19°55'S 170°00'E, 0–500 m, midwater trawl, *Kimbla* (K4/71-8), 12 May 1971; 8 specimens. AM P32833, 21°05'S 166°45'E, 0–925 m, midwater trawl, *Kimbla* (K4/71-5), 9 May 1971; 2 specimens. AM P32834, 22°03'S 167°44'E, 0–800 m, midwater trawl, *Kimbla* (K4/71-11), 13 May 1971; 3 specimens.

New South Wales: AM P32841, off Port Stephens, 32°59'S 153°03'E to 32°51'S 153°01'E, 495 m, midwater trawl, *Kapala* (K75-19-07), 29 Nov 1979; 4 specimens (1 ovig. ♀). AM P32842, off Newcastle, 33°05'S 153°05'E to 33°13'S 153°05'E, 630 m, midwater trawl *Kapala* (K79-19-03), 28 Nov 1979; 43 specimens. AM P32849, off Newcastle, 33°03'S 152°58'E to 32°59'S 153°03'E, 630 m, midwater trawl, *Kapala* (K79-19-02), 27 Nov 1979; 3 specimens. AM P32850, off Newcastle, 33°07'S 153°11'E to 33°01'S 153°05'E, 630 m, midwater trawl, *Kapala* (K79-19-06), 28 Nov 1979; 2 specimens. AM P32846, off Norah Head, 33°15'S 153°06'E to 33°20'S 153°04'E, 360 m midwater trawl, *Kapala* (K79-19-04), 28 Nov 1979; 1 specimen. AM P32847, off Norah Head, 33°20'S 153°04'E to 33°12'S 153°13'E, 630 m, midwater trawl, *Kapala* (K79-19-05), 28 Nov 1979; 2 specimens. AM P32839, 80 km east of Tuggerah Lake, 33°20'S 152°32'E to 33°24'S 152°31'E, 0–360 m, midwater trawl, *Kapala* (K77-24-09), 14 Dec 1977; 57 specimens (1 ovig. ♀). AM P32848, 70 km east of Broken Bay, 33°19'S 152°25'E to 33°23'S 152°28'E, 0–630 m, midwater trawl, *Kapala* (K77-24-03), 13 Dec 1977; 29 specimens (1 ovig. ♀). AM P32843, 100 km east of Broken Bay, 33°28'S 152°34'E to 33°36'S 152°35'E, 0–630 m, midwater trawl, *Kapala* (K77-24-10), 14 Dec 1977; 122 specimens (8 ovig. ♀). AM P32851, 65 km east of Broken Bay, 33°31'S 152°20'E to 33°28'S 152°22'E, 0–540 m, midwater trawl, *Kapala* (K77-24-02), 12 Dec 1977; 8 specimens. AM P32844, 65 km east of Sydney Heads, 34°05'S 152°02'E to 34°13'S 152°00'E, 0–630 m, midwater trawl, *Kapala* (K77-24-11), 14 Dec 1977; 41 specimens (2 ovig. ♀). AM P32835, south-east of Sydney, 34°02'S 152°12'E to 34°14'S 152°14'E, 0–600 m, midwater trawl, *Kapala* (JP71-8), 25–26 Mar 1971; 19 specimens (2 ovig. ♀). AM P32836, south-east of Sydney, 34°05'S 151°55'E to 34°10'S 152°14'E, 0–950 m, midwater trawl, *Kapala* (JP71-6), 25 Mar 1971; 126 specimens (11 ovig. ♀). AM P32837, south-east of Sydney, 34°05'S 151°56'E to 34°09'S 152°05'E, 0–1200 m, midwater trawl, *Kapala* (JP71-1), 23 Mar 1971; 4 specimens (1 ovig. ♀). AM P32838, south-east of Sydney, 34°09'S 152°07'E to 34°14'S, 152°14'E, 0–250 m, midwater trawl, *Kapala* (JP71-4), 24–25 Mar 1971; 102 specimens (1 ovig. ♀). AM P26605, P26599, south-east of Port Hacking, 34°10'S 152°04'E to 34°12'S 152°02'E, 0–660 m, midwater trawl, *Kapala* (K77-18-01), 26 Oct

1977; 12 specimens (1 ovig. ♀). AM P32845, 80 km east of Lake Illawarra, 34°20'S 151°56'E to 34°25'S 151°54'E, 0–630 m, midwater trawl, *Kapala* (K77-24-12), 14 Dec 1977; 14 specimens. AM P32852, off Lake Illawarra, 34°40'S 151°15'E to 34°35'S 151°17'E, 594–675 m, fish trawl, *Kapala* (K77-19-05), 3 Nov 1977; 17 specimens. AM P24773, east of Brush Island, 35°28'S 150°50'E to 35°33'S 150°47'E, 567–594 m, fish trawl, *Kapala* (K76-11-12), 8 July 1976; 1 specimen. AM P26562, P26563, east of Brush Island, 35°36'S 150°55'E to 35°39'S 150°52'E, 0–650 m, midwater trawl, *Kapala* (K77-18-05), 27 Oct 1977; 22 specimens. AM P32840, east of Cape Howe, 37°24'S 150°30'E to 37°28'S 150°33'E, 0–540 m, fish trawl, *Kapala* (K77-19-03), 1 Nov 1977; 6 specimens.

**Diagnosis.** Rostrum more than half carapace length with evenly spaced spines on dorsal and ventral margins. No carina running entire length of carapace; first abdominal segment not carinate, segments 3–6 carinate with a dorsal terminal spine; telson with 4 pairs of dorsolateral spinules.

**Remarks.** *Acantheephyra quadrispinosa* was by far the most commonly caught species of *Acantheephyra*. Specimens were collected from 20°S to 22°S, off New Caledonia, in trawls to a depth of 925 m, and from 33°S to 37°30'S off New South Wales, in trawls to a depth of 1200 m.

**Colour.** Colour in life uniformly bright red.

**Distribution.** Indo-Pacific, south Atlantic; 250–1700 m.

#### *Acantheephyra smithii* Kemp

*Acantheephyra smithii* Kemp, 1939: 572–573, 577–578.—Hayashi & Miyake, 1969: 61–63, fig. 2.

**Material examined.** New Caledonia: AM P32858, 19°55'S 170°E, 0–550 m, midwater trawl, *Kimbla* (K4/71-8), 12 May 1971; 3 specimens. AM P32859, 22°03'S 167°44'E, 0–800 m, midwater trawl, *Kimbla* (K4/71-11), 13 May 1971; 1 specimen.

New South Wales: AM P32860, 100 km east of Broken Bay, 33°28'S 152°34'E to 33°36'S 152°35'E, 0–630 m, midwater trawl, *Kapala* (K77-24-10), 14 Dec 1977; 1 specimen. AM P32861, 70 km east of Broken Bay, 33°33'S 152°18'E to 33°35'S 152°17'E, 0–216 m, midwater trawl, *Kapala* (K77-24-01), 12 Dec 1977; 2 specimens. AM P32862, 65 km east of Sydney Heads, 34°05'S 152°02'E to 34°13'S 152°00'E, 0–630 m, midwater trawl, *Kapala* (K77-24-11), 14 Dec 1977; 2 specimens (2 ovig. ♀).

**Diagnosis.** Rostrum more than half carapace length with evenly spaced spines on dorsal and ventral margins. Carina running entire length of carapace; first abdominal segment not carinate, a medial V-shaped indentation on posterior margin; segments 3–6 carinate with dorsal, terminal spine; telson with 4 pairs of dorsolateral spinules.

**Remarks.** In this species the carinae on abdominal segments 2–6 are high and end in a strong spine on segments 3–6; the pleura of the fourth and fifth abdominal segments are similar in shape and the sixth abdominal segment is short, the dorsal length is

about 1.5 times the posterior height. In *A. quadrispinosa* and *A. pelagica* there is no medial V-shaped indentation on the posterior margin of the first abdominal segment; on the fifth abdominal segment the posterolateral angle of the pleura is more strongly produced backwards than it is on the fourth segment and the dorsal length of the sixth segment is more than twice the posterior height.

These specimens were collected from 20°S to 34°S in trawls to a depth of 800 m.

*Acantheephyra smithii* has not previously been recorded from eastern Australian waters or further south than 24°S.

**Distribution.** Indian Ocean, western to central Pacific; 216–800 m.

#### *Janicella* Chace, 1986

##### *Janicella spinicauda* (A. Milne Edwards)

*Oplophorus spinicauda* A. Milne Edwards, 1883, pl. 30.—Chace, 1940: 184–186, fig. 54; Hayashi & Miyake, 1969: 68–69; Kensley, 1972: 38 (in key), figs 17D,E; 1981a: 58; 1981b: 22.

*Janicella spinicauda*.—Chace, 1986: 44, figs 23, 24.

**Material examined.** New Caledonia: AM P32864, 21°05'S 166°45'E, 0–925 m, midwater trawl, *Kimbla* (K4/71-5), 9 May 1971; 1 ovig. ♀.

**Diagnosis.** Rostrum about twice carapace length, with spines on dorsal and ventral margins. Lateral margin of scaphocerite with 3 well spaced teeth in distal half. Third maxillipeds and first pereopods with foliaceous exopods. Only abdominal segments 2–4 carinate, each with prominent terminal dorsal spine. Telson with long spine on either side of base of setose terminal appendage.

**Remarks.** This species is distinguished from others in the genus by the presence of a strong terminal spine on the second abdominal segment and the form of the telson.

Our only specimen was collected off New Caledonia; *J. spinicauda* has not been recorded off New South Wales.

**Distribution.** Indo-Pacific, north and south Atlantic; 460–1120 m.

#### *Meningodora* Smith, 1882

##### *Meningodora mollis* Smith

*Meningodora mollis* Smith, 1882: 74, pl. 11, figs 8, 9, pl. 12, figs 5–9.—Kensley, 1972: 36 (in key), fig. 16I; Crosnier & Forest, 1973: 44–46, fig. 10c.

**Material examined.** New Caledonia: AM P33138, 21°05'S 166°45'E, 0–925 m, midwater trawl, *Kimbla* (K4/71-5), 9 May 1971; 2 specimens.

**Diagnosis.** Rostrum short, not exceeding or only slightly exceeding eyes, with about 7 dorsal teeth, no ventral teeth; eyes slightly narrower than the eyestalk.

Dorsal margin of carapace carinate, without teeth in posterior three-quarters; only 1 lateral carina running entire length of carapace; first abdominal segment noncarinate; third segment without terminal dorsal spine or lobe; fourth to sixth segments carinate, with terminal dorsal spine.

**Remarks.** In these specimens the cornea is only slightly narrower than the eyes-stalk, i.e., they agree with the specimen figured by Crosnier & Forest (1973). The third abdominal segment is carinate dorsally and the propod of the third pereopod is 2.5 times as long as the dactyl. The short rostrum and the narrow cornea distinguish this species from *M. vesca*.

**Distribution.** Western and eastern Atlantic, Indian Ocean, western and eastern Pacific; 840–2160 m.

#### *Meningodora vesca* (Smith)

*Notostomus viscus* Smith, 1886: 189, 192 (nomen nudum).

*Notostomus vescus*.—Chace, 1940: 153–156, figs 29, 30.

*Meningodora vesca*.—Crosnier & Forest, 1973: 46–48, fig. 10d; Kensley, 1981b: 22.

**Material examined.** New Caledonia: AM P33139, 22°03'S 167°44'E, 0–800 m, midwater trawl, *Kimbla* (K4/71-11), 13 May 1971; 3 specimens.

New South Wales: AM P33140, 100 km east of Broken Bay, 33°28'S 152°34'E to 33°36'S 152°35'E, 0–630 m, midwater trawl, *Kapala* (K77-24-10), 14 Dec 1977; 1 specimen. AM P19097, off Sydney, 34°05'S 151°55'E to 34°10'E 152°14'E, 0—about 950 m, midwater trawl, *Kapala* (JP71-6), 25 Mar 1971; 3 specimens. AM P26603, north-east of Cape Howe, 37°24'S 150°30'S to 37°28'S 150°33'E, 0–540 m, midwater trawl, *Kapala* (K77-19-03), 1 Nov 1977; 2 specimens.

**Diagnosis.** Rostrum about  $\frac{1}{3}$  carapace length, with about 9–12 dorsal teeth and usually 1 or 2 ventral teeth. Cornea wider than eyestalk. Dorsal margin of carapace carinate, without teeth in posterior three-quarters; only 1 lateral carina running entire length of carapace; first abdominal segment not carinate; third segment without terminal dorsal spine or lobe; fourth to sixth segments carinate with a terminal dorsal spine.

**Remarks.** This species is distinguished from *M. mollis* by the longer rostrum and the larger cornea of the eye.

The specimens from off New South Wales were collected between 33°28'S and 37°28'S in trawls at depths to 950 m.

**Distribution.** South-western and south-eastern Atlantic, Indo-west Pacific; 615–5400 m.

*Notostomus* A. Milne Edwards, 1881

*Notostomus* cf. *crosnieri* MacPherson

*Notostomus crosnieri* MacPherson, 1984: 54, figs 6a, 7a, 8a,b.

*Notostomus auriculatus* Barnard, 1950: 670, figs 124h, i.—

Crosnier & Forest, 1973: 52–56, figs 14, 16c.

*Notostomus* sp. Holthuis & Sivertsen, 1967: 32–36, figs 4, 5.

**Material examined.** New South Wales: AM P33146, east of Port Stephens, 32°59'S 153°03'E to 32°51'S 153°01'E, 495 m, midwater trawl, *Kapala* (K79-19-07), 29 Nov 1979; 7 specimens (6 ovig. ♀). AM P33147, 70 km east of Broken Bay, 33°25'S 152°31'E, 0–630 m, midwater trawl, *Kapala* (K77-24-03), 13 Dec 1977; 1 specimen. AM P33148, 100 km east of Broken Bay, 33°28'S 152°33'E, 0–630 m, midwater trawl, *Kapala* (K77-24-10), 14 Dec 1977; 4 specimens (1 ovig. ♀). AM P33149, south-east of Sydney, 34°05'S 151°55'E to 34°10'S 152°14'E, 0—about 950 m, midwater trawl, *Kapala* (JP71-6), 25 Mar 1971; 1 specimen. AM P26564, P26565, east of Brush Island, 35°36'S 150°55'E to 35°39'S 150°52'E, 0–650 m, midwater trawl, *Kapala* (K77-18-05), 27 Oct 1977; 2 specimens. AM P35915, east of Long Reef, 33°43'S 151°56'E to 33°39'S 151°58'E, 626–637 m, demersal fish trawl, *Kapala* (K84-16-03), 25 Sept 1984; 1 juv.

**Diagnosis.** Dorsal carina of carapace finely denticulate along whole length; 5 lateral carinae on posterior carapace. All abdominal segments carinate, segments 3–6 with a terminal medial spine. Upper lateral rostral carina extending behind the orbital margin; lower lateral rostral carina not continuous with gastro-orbital carina; gastro-orbital carina with anterior extremity produced laterally, appearing as an obtuse angle in dorsal view. Stylocerite reaching at least midlength of third segment of antennular peduncle.

**Remarks.** These specimens agree with the figure of the carapace of the type of *N. auriculatus* given by Barnard (1950). They also agree with the description and figures of incomplete specimens, from an albatross chick, given by Holthuis & Sivertsen (1967). In most respects they agree with the specimens figured and described as *N. auriculatus* by Crosnier & Forest (1973), but described as a new species, *N. crosnieri*, by MacPherson (1984).

The dorsal carina is as figured by Crosnier & Forest with an abrupt slope to the posterior carapace margin, anteriorly with the denticles changing to quite large teeth above the orbit. The upper lateral rostral carina extends posteriorly beyond the margin of the orbit and curves slightly ventrally; both upper and lower lateral carinae continue forwards onto the rostrum and are quite distinctly visible along at least two-thirds of its length. The anterior extremity of the gastro-orbital carina, in all our specimens, is produced into a rounded lobe, very clearly visible in dorsal view. This lobe was described and figured by Holthuis & Sivertsen and appears also to be shown in the figure given by Barnard. Crosnier & Forest (1973) do not say whether such a lobe was present on their specimens. On all our specimens the subhepatic and infrahepatic carinae meet posteriorly as shown in Barnard's figure rather than remaining separate as shown by Crosnier & Forest (1973) and MacPherson (1984, Fig. 7B).

The first abdominal segment is strongly indented medially on the posterior margin and the length of the dorsal carina is about half (i.e. 0.42–0.58) the length of the segment at its articulation with the second segment. This is still clearly less than the same measurement in *N. elegans* but greater than the 0.25–0.4 of Crosnier & Forest's specimens of *P. auriculatus*; further, the carina also lacks the small anterior spine present in Crosnier & Forest's specimens, and figured by MacPherson (1984, Fig. 8B).

The dorsal carina of the second abdominal segment is subequal (0.9–1.0) to the length of the segment at its articulation with the first segment, but there is no posterior spine on the carina as in Crosnier & Forest's specimens. The lengths of the pereopods agree with that given by Crosnier & Forest for their specimens. The carpus of pereopods 3 and 4 is more than one-third the length of the propod in the adult, the dactyl slightly more than one-quarter the length of the propod (see Table 4).

	cl 21.3 mm	cl 46.5 mm
Pereopod 3		
carpus/propod	0.34	0.39
dactyl/propod	0.28	0.28
Pereopod 4		
carpus/propod	0.32	0.38
dactyl/propod	0.28	0.26

Table 4. Pereopodal ratios for two specimens of *Notostomus* cf. *crosnieri*.

There are four to six pairs of dorsolateral spinules on the telson, rather than the three pairs in Crosnier & Forest's specimens.

The differences between our specimens from eastern Australia and those of Crosnier & Forest, and MacPherson from the Atlantic may only indicate geographic variability in a very widely occurring species. However, the differences are of an order used to distinguish other species from one another. It is possible, especially regarding the large number of specimens available to us and to Crosnier & Forest, and MacPherson, that the Australian material is a separate species (see Table 5).

These specimens can be distinguished from specimens of *N. elegans* using the characters of the upper lateral rostral carina teeth at the base of the rostrum, stylocerite, and first abdominal segment given by Crosnier & Forest (1973). We would add the presence of an anterior lobe on the gastro-orbital carina of *N. crosnieri*. Also, *N. crosnieri* lacks the carinae on the pleura of the abdominal segments present in *N. elegans*. On the third to fifth segment there is an oblique groove on the anterior part of the pleuron (shown in Crosnier & Forest, 1973, fig. 14) rather than the curved carina in *N. elegans*. Differences between the two species are also discussed under *N. elegans*.

These specimens were trawled at depths up to 900 m between 32°50'S and 35°40'S.

**Colour.** Colour in life of *N. cf. crosnieri* is uniformly bright red.

**Distribution.** Western and southern coasts of Africa, Tristan da Cunha, eastern Australia, south-eastern Pacific.

	<i>N. crosnieri</i> specimens	Eastern Australian specimens
rostral carinae	on basal 1/3 of rostrum	on 2/3 to 3/4 of rostrum
anterior of gastro-orbital carina	? produced	obtuse lobe
subhepatic & infrasubhepatic carinae	separate posteriorly, except a few specimens on 1 side	joining posteriorly in all specimens
1st abdominal segment carina	small anterior spine	no spine
Length 1st abdom. carina/1st. length 1st abdom. seg.	0.25–0.4	0.42–0.58
2nd abdominal segment carina	small posterior spine	no spine
dorsolateral spinules on telson	3 pairs	4–6 pairs
ovig. ♀, cl.	28–32.5 mm	42–50.5 mm

Table 5. Comparison of *Notostomus crosnieri* with Eastern Australian specimens.

#### *Notostomus elegans* A. Milne Edwards

*Notostomus elegans* A. Milne Edwards, 1881: 8; 1883, pl. 31.—Crosnier & Forest, 1973: 56–63, figs 15, 16a,b.

*Notostomus patentissimus* Bate, 1888: 826–829, pl. 133, fig. 1, pl. 134, figs 1, 2.

*Notostomus longirostris* Bate, 1888: 833, pl. 135, fig. 4.

**Material examined.** New South Wales: AM P33144, east of Port Stephens, 32°59'S 153°03'E to 32°51'S 153°01'E, 495 m, midwater trawl, *Kapala* (K79-19-07), 29 Nov 1979; 1 specimen. AM P33145, east of Newcastle, 33°05'S 153°05'E to 33°13'S 153°05'E, 630 m, midwater trawl, *Kapala* (K79-19-03), 28 Nov 1979; 1 specimen. AM P35864, east of Newcastle, 33°07'S 153°11'E to 33°01'S 153°05'E, 630 m, midwater trawl, *Kapala* (K79-19-06), 28 Nov 1979; 1 specimen. AM P26604, north-east of Cape Howe, 37°24'S 150°30'E to 37°28'S 150°33'E, 0–540 m, midwater trawl, *Kapala* (K77-19-03), 1 Nov 1977; 2 specimens.

**Diagnosis.** Dorsal carina of carapace finely denticulate along its whole length; 5 lateral carinae on posterior carapace. All abdominal segments carinate, segments 3–6 with terminal medial spine. Upper lateral rostral carina not extending beyond orbital margin; lower lateral rostral carina not continuous with gastro-orbital carina; gastro-orbital carina not more strongly produced at posterior extremity. Tip of stylocerite reaching no further than midlength of second segment of antennular peduncle.

**Remarks.** These specimens agree with the description and figures of *N. elegans* given by Crosnier & Forest and the figures of the type of *N. westergreni* in the same paper (except for the denticle on the fifth pleuron). We have compared our

specimens with the types of *N. patentissimus* and *N. longirostris*, and in our opinion they are conspecific. They agree with the types in the following: 1) the upper lateral orbital carina which is horizontal, does not extend posteriorly behind the orbit; 2) the tip of the stylocerite reaches at least to the base and sometimes the midlength of the second segment of the antennular peduncle; 3) the spine on the scaphocerite (where still present) is subequal to, or less than the width across the scaphocerite at the base of the spine; 4) the dorsal carina slopes gradually to the posterior margin of the carapace; 5) the slope of the dorsal carina behind the orbit is similar; above the orbit the denticles of the carina are enlarged to only moderately sized teeth; 6) presence of a denticle at the posteroventral angle of the pleuron of the fifth abdominal segment; 7) the carina of the first abdominal segment is only moderately indented posteriorly; 8) the first and second abdominal segments have a submarginal carina on the pleuron; the first segment also has a carina in the form of an inverted 'Y' just below the articulation with the second segment; 9) presence of a carina curving posteriorly near the ventral margin on the anterior part of the pleura of abdominal segments 3–5; Crosnier & Forest (1973) noted that the spine at the tip of the scaphocerite is shorter in *N. elegans* than in *N. auriculatus*. To quantify this we have divided the length of the spine by the width across the scaphocerite at the base of the spine. In our specimens of *N. elegans* and the type of *N. longirostris* the spine is about four-fifths to subequal (0.8–0.90) to the width across the scaphocerite at the base of the spine. (The same ratio for *N. auriculatus* is 1.2–1.5.)

The anterior dorsal margin slopes slightly more steeply in *N. elegans* and in the types of *N. longirostris* and *N. patentissimus* than it does in *N. auriculatus*. We have measured the height of the dorsal carapace margin above the gastro-orbital carina both at the anterior extremity of the carina and at the point where the post-hepatic carina joins the gastro-orbital carina. In *N. elegans* the anterior height is about two-thirds (0.66–0.7) of the posterior height, while in *N. auriculatus* this ratio is about three-quarters (0.73–0.79).

On the other hand, the posterior dorsal margin, just anterior to the posterior carapace margin slopes more abruptly in *N. auriculatus* than in *N. elegans*.

The first abdominal segment is only moderately indented medially on the posterior margin while the length of the dorsal carina is about two-thirds to four-fifths the length of the segment at its articulation with the second segment.

The dactyls of pereopods 3 and 4 are less than one-fourth (0.2–0.23) the length of the propodi in *N. elegans* and the type of *N. longirostris*; the propodi and dactyls of pereopods 3–5 are detached in the type of *N. patentissimus*.

Crosnier & Forest (1973) stated that in *N. elegans* the submarginal carina usually extends anteriorly

beyond the infra-subhepatic carina while in *N. auriculatus* it usually ends behind the infra-subhepatic carina. In the types of *N. longirostris* and *N. patentissimus* and one of our specimens (cl 24 mm) of *N. elegans* the submarginal carina extends anteriorly beyond the tip of the infra-subhepatic carina; in two other specimens (cl 17, 50.5 mm) the tips of the two carinae are at the same level, while in two other specimens (cl 42, 44.5 mm) the tip of the submarginal carina is behind that of the infra-subhepatic carina as it is in all our specimens of *N. auriculatus*.

The type of *N. westergreni* Faxon has been examined by one of us (BK); it was found that the infra-subhepatic carina extends anteriorly beyond the submarginal carina. Perhaps this character, as demonstrated above, is too variable to be of any use in separating species.

Our specimens were trawled at depths up to 630 m between 32°51'S and 37°28'S. *N. elegans* has not been recorded previously from eastern Australian waters.

**Distribution.** North and tropical Atlantic, eastern Australia, Celebes Sea (*N. patentissimus*), Banda Sea (*N. longirostris*); 630–2780 m.

#### *Notostomus gibbosus* A. Milne Edwards

*Notostomus gibbosus* A. Milne Edwards, 1881: 7; 1883, pl. 32.—Crosnier & Forest, 1973: 49–51, fig. 13.

*Notostomus perlatus* Bate, Kemp, 1913: 66–68, pl. 7, fig. 10; Chace, 1940: 170–171, fig. 42.

**Material examined.** New South Wales: AMP33150, 65 km east of Broken Bay, 33°31'S 152°20'E, 569 m, midwater trawl, *Kapala* (K77-24-02, JP77-18), 12 Dec 1977; 1 specimen.

**Diagnosis.** Dorsal carina of carapace finely denticulate along its whole length; four lateral carinae on posterior carapace. All abdominal segments carinate, segments 3–6 with terminal medial spine; no upper lateral rostral carina; lower lateral rostral carina continuous with gastro-orbital carina.

**Remarks.** This specimen agrees well with the figure of *N. gibbosus* given by Crosnier & Forest (1973) and with the specimen described and figured as *N. perlatus* by Kemp (1913). A full synonymy for this species is given by Crosnier & Forest (1973).

This species has not been recorded before from Australian waters nor from so far south; previous records have been from tropical waters.

**Colour.** The colour of the preserved specimen is uniformly pale red with darker red carinae.

**Distribution.** Indo-west Pacific, eastern and western Atlantic; 569–3932 m.



*Oplophorus* H. Milne Edwards, 1837*Oplophorus novaezeelandiae* (de Man)

*Hoplophorus novae-zeelandiae* de Man, 1931: 369, figs. 1–20.

*Oplophorus novaezeelandiae*.—Yaldwyn, 1967: 3; Kensley, 1972: 38 (in key), fig. 17G,H; Crosnier & Forest, 1973: 26–27, fig. 5.

**Material examined.** New South Wales: AM P32795, 70 km east of Tuggerah Lake, 33°17'S 152°31'E to 33°19'S 152°31'E, 0–90 m, midwater trawl, *Kapala* (K77-24-08), 13 Dec 1977; 2 specimens. AM P32791, 70 km east of Tuggerah Lake, 33°19'S 152°25'E to 33°23'S 152°28'E, 0–630 m, midwater trawl, *Kapala* (K77-24-03), 13 Dec 1977; 1 specimen. AM P32794, 80 km east of Tuggerah Lake, 33°20'S 152°34'E to 33°24'S 152°31'E, 0–360 m, midwater trawl, *Kapala* (K77-24-09), 14 Dec 1977; 4 specimens. AM P32793, 90 km east of Tuggerah Lake, 33°25'S 152°32'E to 33°21'S 152°34'E, 0–360 m, midwater trawl, *Kapala* (K77-24-05), 13 Dec 1977; 1 specimen. AM P32796, off Port Hacking, 34°09'S 152°07'E to 34°20'S 152°02'E, approx. 550 m, midwater trawl, *Kapala* (JP71-2), 23 Mar 1971; 2 specimens. AM P32792, off Lake Illawarra, 34°40'S 151°15'E to 34°35'S 151°17'E, 594–675 m, fish trawl, *Kapala* (K77-19-05), 3 Nov 1977; 1 specimen. AM P32797, south of Montague Island, 36°24'S 150°18'E to 36°30'S 150°17'E, 126 m, fish trawl, *Kapala* (K77-19-01), 1 Nov 1977; 1 specimen. AM P32790, south-east of Twofold Bay, 37°24'S 150°30'E to 37°28'S 150°33'E, 540 m, fish trawl, *Kapala* (K77-19-03), 1 Nov 1977; 2 specimens.

**Diagnosis.** Rostrum at least twice carapace length, with spines on dorsal and ventral margins. Lateral margin of scaphocerite smooth. Posterolateral angle of carapace without spine. Third maxilliped and first pereopod with foliaceous exopods. Sixth abdominal segment not carinate, segments 3–5 with a dorsal carina terminating in long spine.

**Remarks.** The smooth outer margin of the scaphocerite distinguishes *O. novaezeelandiae* from other species of this genus.

These specimens were collected from 33°S to 37°30'S in trawls to a depth of 675 m.

This species has not previously been recorded off the eastern coast of Australia.

**Distribution.** South-west Indian Ocean, south-west Pacific and south-west Atlantic; 90–725 m.

*Oplophorus spinosus* (Brulle)

*Palaemon spinosus* Brulle, 1839: 18.

*Oplophorus grimaldii*.—Chace, 1940: 187–189, fig. 55; Kensley, 1972: 38 (in key), fig. 17I,J.

*Oplophorus spinosus*.—Holthuis, 1949: 229–230; 1955, fig. 1a; Crosnier & Forest, 1973: 25.

**Material examined.** Queensland: AM P32829, north-east of Danger Point, 28°02'S 153°59'E to 27°59'S 153°59'E, 540 m, prawn trawl, *Kapala* (K78-09-05), 2 June 1978; 1 specimen. AM P32803, north-east of Danger Point, 28°03'S 154°04'E to 28°01'S 154°04'E, 720 m, prawn

trawl, *Kapala* (K78-23-08), 6 Nov 1978; 2 specimens. New South Wales: AM P17907, north-east of Coffs Harbour, 29°49'S 153°42'E to 29°59'S 153°38'E, 369 m, bottom trawl, *Kapala* (K71-09-04), 12 May 1971; 1 specimen. AM P32807, east of Newcastle, 32°51'S 153°01'E to 32°59'S 152°54'E, 630 m, midwater trawl, *Kapala* (K79-19-08), 29 Nov 1979; 1 specimen. AM P32834, east of Newcastle, 32°59'S 153°03'E to 32°51'S 153°01'E, 495 m, midwater trawl, *Kapala* (K79-19-07), 29 Nov 1979; 1 specimen. AM P32813, east of Newcastle, 33°03'S 152°58'E to 32°59'S 153°03'E, 630 m, midwater trawl, *Kapala* (K79-19-02), 27 Nov 1979; 6 specimens (2 ovig. ♀). AM P32806, south-east of Newcastle, 33°05'S 153°05'E to 33°13'S 153°05'E, 630 m, midwater trawl, *Kapala* (K79-19-03), 28 Nov 1979; 31 specimens (9 ovig. ♀). AM P32805, south-east of Newcastle, 33°07'S 153°11'E to 33°01'S 153°05'E, 630 m, midwater trawl, *Kapala* (K79-19-06), 28 Nov 1979; 1 specimen. AM P18100, south-east of Newcastle, 33°11'S 152°23'E, 576 m, Danish trawl, *Kapala* (K71-14-01), 10 Aug 1971; 4 specimens. AM P32823, east of Norah Head, 33°15'S 153°06'E to 33°20'S 153°04'E, 360 m, midwater trawl, *Kapala* (K79-19-04), 28 Nov 1979; 1 specimen. AM P32819, 70 km east of Tuggerah Lake, 33°17'S 152°31'E to 33°19'S 152°31'E, 0–90 m, midwater trawl, *Kapala* (K77-24-08), 13 Dec 1977; 17 specimens. AM P32804, east of Norah Head, 33°20'S 153°04'E to 33°12'S 153°13'E, 630 m, midwater trawl, *Kapala* (K79-19-05), 28 Nov 1979; 5 specimens (2 ovig. ♀). AM P32814, 80 km east of Tuggerah Lake, 33°20'S 152°32'E to 33°24'S 152°31'E, 0–360 m, midwater trawl, *Kapala* (K77-24-09), 14 Dec 1977; 208 specimens (79 ovig. ♀). AM P32822, 90 km east of Tuggerah Lake, 33°23'S 152°37'E to 33°19'S 152°39'E, 0–540 m, midwater trawl, *Kapala* (K77-24-06), 13 Dec 1977; 2 specimens. AM P32821, 90 km east of Tuggerah Lake, 33°25'S 152°32'E to 33°21'S 152°32'E, 0–360 m, midwater trawl, *Kapala* (K77-24-05), 13 Dec 1977; 3 specimens. AM P32812, 70 km east of Broken Bay, 33°19'S 152°25'E to 33°23'S 152°28'E, 0–630 m, midwater trawl, *Kapala* (K77-24-03), 13 Dec 1977; 129 specimens (67 ovig. ♀). AM P32830, 100 km east of Broken Bay, 33°28'S 152°34'E to 33°36'S 152°35'E, 0–630 m, midwater trawl, *Kapala* (K77-24-10), 14 Dec 1977; 88 specimens (30 ovig. ♀). AM P32817, 65 km east of Broken Bay, 33°31'S 152°20'E to 33°28'S 152°22'E, 0–540 m, midwater trawl, *Kapala* (K77-24-02), 12 Dec 1977; 270 specimens (111 ovig. ♀). AM P32808, east of Broken Bay, 33°32'S 152°06'E to 33°34'S 152°05'E, 810 m, prawn trawl, *Kapala* (K79-20-13), 6 Dec 1979; 2 specimens (1 ovig. ♀). AM P21068, east of Broken Bay, 33°32'S 152°00'E to 33°38'S 152°04'E, 810 m, prawn trawl, *Kapala* (K75-05-05), 19 Aug 1975; 1 specimen. AM P32809, east of Broken Bay, 33°34'S 152°04'E to 33°31'S 152°06'E, 720 m, prawn trawl, *Kapala* (K79-20-04), 4 Dec 1979; 1 specimen (ovig.). AM P30331, P32820, 70 km east of Broken Bay, 33°33'S 152°18'E to 33°35'S 152°17'E, 1–216 m, midwater trawl, *Kapala* (K77-24-01), 12 Dec 1977; 14 specimens (6 ovig. ♀). AM P19386, east of Long Reef, 33°41'S 151°53'E to 33°49'S 151°47'E, 450–441 m, Danish trawl, *Kapala* (K71-12-04), 20 July 1971; 1 specimen. AM P18976, east of Long Reef, 33°42'S 152°50'E to 33°48'S 152°54'E, 765 m, bottom trawl, *Kapala* (K72-07-15), 7 Dec 1972; 5 specimens. AM P18988, east of Long Reef, 33°43'S 151°55'E to 33°37'S 152°02'E, 675 m, bottom trawl, *Kapala* (K72-06-04), 19 Oct 1972; 2 specimens (1 ovig. ♀). AM P18980, east of Long Reef, 33°44'S 151°55'E to 33°40'S 151°58'E, 720 m, bottom trawl, *Kapala* (K72-07-

04), Nov 1971; 2 specimens (1 ovig. ♀). AM P18989, east of Sydney, 33°51'S 151°51'E to 33°45'S 151°55'E, 675 m, bottom trawl, *Kapala* (K72-06-03), 19 Oct 1972; 1 specimen. AM P32835, east of Sydney, 34°02'S 152°12'E to 34°14'S 152°14'E, about 600 m, midwater trawl, *Kapala* (JP71-8), 25–26 Mar 1971; 3 specimens. AM P32816, 65 km east of Sydney Heads, 34°05'S 152°02'E to 34°13'S 152°00'E, 0–630 m, midwater trawl, *Kapala* (K77-24-11), 14 Dec 1977; 2 specimens (1 ovig. ♀). AM P32826, east of Sydney, 34°05'S 151°56'E to 34°09'S 152°05'E, to 1200 m, midwater trawl, *Kapala* (JP71-1), 23 Mar 1971; 3 specimens. AM P32827, east of Sydney, 34°05'S 151°55'E to 34°10'S 152°14'E, about 950 m, midwater trawl, *Kapala* (JP71-6), 25 Mar 1971; 2 specimens. AM P32800, south-east of Sydney, 34°10'S 152°16'E to 34°00'S 152°14'E, about 350 m, midwater trawl, *Kapala* (JP71-7), 25 Mar 1971; 18 specimens. AM P32799, south-east of Sydney, 34°10'S 151°59'E to 34°09'S 152°05'E, about 60 m, midwater trawl, *Kapala* (JP71-3), 24 Mar 1971; 22 specimens. AM P32828, south-east of Sydney, 34°09'S 152°07'E to 34°14'S 152°14'E, about 250 m, midwater trawl, *Kapala* (JP71-4), 24–25 Mar 1971; 1 specimen. AM P32798, south-east of Sydney, 34°09'S 152°07'E to 34°20'S 152°02'E, about 550 m, midwater trawl, *Kapala* (JP71-2), 23 Mar 1971; 67 specimens. AM P32801, 80 km east of Lake Illawarra, 34°20'S 151°56'E to 34°25'S 151°54'E, 0–630 m, midwater trawl, *Kapala* (K77-24-12), 14 Dec 1977; 12 specimens (2 ovig. ♀). AM P32810, east of Kiama, 34°40'S 151°15'E to 34°35'S 151°17'E, 594–675 m, midwater trawl, *Kapala* (K77-19-05), 3 Nov 1977; 46 specimens (24 ovig. ♀). AM P32815, east of Nowra, 34°55'S 151°13'E to 34°53'S 151°14'E, 810 m, demersal trawl, *Kapala* (K78-27-05), 12 Dec 1978; 2 specimens (1 ovig. ♀). AM P32811, east of Brush Island, 35°36'S 150°55'E to 35°39'S 150°59'E, 540 m, midwater trawl, *Kapala* (K77-18-05), 27 Oct 1977; 4 specimens (2 ovig. ♀). AM P21818, south of Montague Island, 36°24'S 150°18'E to 36°30'S 150°17'E, 126 m, bottom trawl, *Kapala* (K77-19-01), 1 Nov 1977; 6 specimens. AM 32802, south-east of Twofold Bay, 37°24'S 150°30'E to 37°28'S 150°33'E, 540 m, midwater trawl, *Kapala* (K77-19-03), 1 Nov 1977; 13 specimens (1 ovig. ♀).

**Diagnosis.** Rostrum less than twice carapace length, with spines on dorsal and ventral margins. Lateral margin of scaphocerite spinose, inner margin with a distal barb. Anterolateral angle of carapace without a hooked spine. Third maxilliped and first pereopod with foliaceous exopods. Sixth abdominal segment not carinate, segments 3–5 with a dorsal carina terminating in long spine.

**Remarks.** In some of our specimens there is a tubercle at the posterolateral angle of the carapace but this is not curved forwards like the hooked spine in *O. gracilirostris*. In addition, the lateral carina above the orbit converges posteriorly towards the midline in *O. spinosus*, while in *O. gracilirostris* it is subparallel to the midline. *O. spinosus* is distinguished from *O. novaezeelandiae* by the scaphocerite which has a spinose, rather than a smooth, outer margin, and from *O. spinicauda* by the lack of a terminal spine dorsally on the second abdominal segment.

These specimens were collected between 28°S and 37°30'S in trawls down to 1200 m.

**Distribution.** West and east Atlantic, Indo-west Pacific; 75–1200 m.

*Systellaspis* Bate, 1888

*Systellaspis debilis* (A. Milne Edwards)

*Acanthephyra debilis* A. Milne Edwards, 1881: 13.

*Systellaspis debilis*.—Chace 1940: 181–184, figs 51–53; Kensley, 1972: 38, fig. 17B, C; Crosnier & Forest, 1973: 87–92, figs 26b, 27b.

**Material examined.** New Caledonia: AM P32983, 19°55'S 170°00'E, 0–550 m, midwater trawl, *Kimbla* (K4/71-8), 12 May 1971; 4 specimens. AM P32984, 19°52'S 170°00'E, 0–275 m, midwater trawl, *Kimbla* (K4/71-7), 12 May 1971; 20 specimens. AM P32985, 21°05'S 166°45'E, 0–925 m, midwater trawl, *Kimbla* (K4/71-5), 9 May 1971; 11 specimens (1 ovig. ♀).

New South Wales: AM P32998, 80–128 km east of Newcastle, 33°03'S 152°58'E to 32°59'S 153°03'E, 630 m, midwater trawl, *Kapala* (K79-15-02), 27 Nov 1979; 12 specimens. AM P32997, 80–128 km east of Newcastle, 33°05'S 153°05'E to 33°13'S 153°05'E, 630 m, midwater trawl, *Kapala* (K79-19-03), 28 Nov 1979; 34 specimens (16 ovig. ♀). AM P32991, 70 km east of Tuggerah Lake, 33°17'S 152°31'E to 33°19'S 152°31'E, 0–90 m, midwater trawl, *Kapala* (K77-24-08), 13 Dec 1977; 12 specimens (1 ovig. ♀). AM P32994, 70 km east of Broken Bay, 33°19'S 152°25'E to 33°23'S 152°28'E, 0–630 m, midwater trawl, *Kapala* (K77-24-03), 13 Dec 1977; 13 specimens (3 ovig. ♀). AM P32993, 80–128 km east of Tuggerah Lake, 33°20'S 153°04'E to 33°12'S 153°13'E, 630 m, midwater trawl, *Kapala* (K79-19-05), 28 Nov 1979; 34 specimens (11 ovig. ♀). AM P32992, 80 km east of Tuggerah Lake, 33°20'S 152°32'E to 33°24'S 152°31'E, 0–360 m, midwater trawl, *Kapala* (K77-24-09), 14 Dec 1977; 19 specimens (6 ovig. ♀). AM P30990, 90 km east of Tuggerah Lake, 33°23'S 152°37'E to 33°19'S 152°39'E, 0–540 m, midwater trawl, *Kapala* (K77-24-06), 13 Dec 1977; 2 specimens. AM P32996, 100 km east of Broken Bay, 33°28'S 152°34'E to 33°36'S 152°35'E, 0–630 m, midwater trawl, *Kapala* (K77-24-10), 14 Dec 1977; 21 specimens (7 ovig. ♀). AM P25061, east of Broken Bay, 33°30'S 152°05'E to 33°27'S 152°07'E, 806–810 m, trawl, *Kapala* (K76-24-04), 21 Dec 1976; 1 specimen. AM P32988, 65 km east of Broken Bay, 33°31'S 152°20'E to 33°28'S 152°22'E, 0–540 m, midwater trawl, *Kapala* (K77-24-02), 12 Dec 1977; 14 specimens (5 ovig. ♀). AM P30330, 70 km east of Broken Bay, 33°33'S 152°18'E to 33°35'S 152°17'E, 216 m, midwater trawl, *Kapala* (K77-24-01), 12 Dec 1977; 16 specimens (4 ovig. ♀). AM P25124, east of Broken Bay, 33°35'S 152°01'E to 33°32'S 152°03'E, 810 m, midwater trawl, *Kapala* (K76-24-03), 20 Dec 1976; 1 ovig. ♀. AM P32987, east of Broken Bay, 33°35'S 152°00'E to 33°33'S 152°02'E, 810 m, demersal trawl, *Kapala* (K77-23-12), 8 Dec 1977; 1 specimen. AM P32982, south-east of Sydney, 34°02'S 152°12'E to 34°14'S 152°14'E, 0–600 m, midwater trawl, *Kapala* (JP71-8), 25–26 Mar 1971; 5 specimens. AM P32980, south-east of Sydney, 34°05'S 151°56'E, 0–1200 m, midwater trawl, *Kapala* (JP71-1), 23 Mar 1971; 126 specimens (5 ovig. ♀). AM P32981, south-east of Sydney, 34°05'S 151°22'E to 34°10'S 152°14'E, 0–950 m, midwater trawl, *Kapala* (JP71-6), 25 Mar 1971; 21 specimens. AM P32979, south-east of Sydney, 34°10'S 152°16'E to 34°00'S 152°14'E, about 350 m, midwater



trawl, *Kapala* (JP71-7), 25 Mar 1971; 1 specimen. AM P32977, south-east of Sydney, 34°10'S 151°59'E to 34°09'S 152°05'E, 0–60 m, midwater trawl, *Kapala* (JP71-3), 24 Mar 1971; 155 specimens (2 ovig. ♀). AM P32978, south-east of Sydney, 34°09'S 152°07'E to 34°14'S 152°14'E, 0—about 250 m, midwater trawl, *Kapala* (JP71-4), 24–25 Mar 1971; 2 specimens. AM P32976, south-east of Sydney, 34°09'S 152°07'E to 34°20'S 152°02'E, 0—about 550 m, midwater trawl, *Kapala*, (JP71-2), 23 Mar 1971; 1 specimen. AM P32999, 80 km east of Lake Illawarra, 34°20'S 151°56'E to 34°25'S 151°54'E, 0–630 m, midwater trawl, *Kapala* (K77-24-12), 14 Dec 1977; 6 specimens (2 ovig. ♀). AM P33001, off Port Kembla, 34°28'S 151°29'E, 0–225 m, midwater trawl, *Kapala* (K74-05-JP1), 22 Jan 1974; 5 specimens. AM P32986, east of Kiama, 34°40'S 151°15'E to 34°35'S 151°17'E, 594–675 m, midwater trawl, *Kapala* (K77-19-05), 3 Nov 1977; 2 specimens. AM P32989, east of Brush Island, 35°36'S 150°55'E to 35°39'S 150°59'E, 540 m, lightfish net trawl, *Kapala* (K77-18-05), 27 Oct 1977; 8 specimens (1 ovig. ♀). AM P33000, off Cape Howe, 37°24'S 150°30'E to 37°28'S 150°33'E, 0–540 m, midwater trawl, *Kapala* (K77-19-03), 1 Nov 1977; 8 specimens (2 ovig. ♀).

**Diagnosis.** Rostrum slender, usually longer than carapace length, with evenly spaced spines on dorsal and ventral margins. No dorsal or lateral carina running the entire length of the carapace; only third and part of fourth abdominal segments carinate; third segment with a large terminal dorsal spine; posterior margin of fourth and fifth segments denticulate on either side of a small median spine.

**Remarks.** *S. debilis* is the only species of *Systellapsis* represented in this collection. This species is distinguished by the presence of denticulations on the posterior margin of the fourth and fifth abdominal segments.

These specimens were collected off New Caledonia between 19°50'S and 21°S in trawls at depths to 1200 m.

**Distribution.** Western and eastern Atlantic, Indo-west Pacific; 150–1500 m.

#### Family NEMATOCARCINIDAE

*Nematocarcinus* A. Milne Edwards, 1881

##### *Nematocarcinus gracilis* Bate

*Nematocarcinus gracilis* Bate, 1888: 815, pl. 132, fig. 8.—Chace, 1986: 71, fig. 38.

**Material examined.** New South Wales: AM P25059, east of Broken Bay, 33°30'–27'S 152°05'–07'E, 808 m, demersal prawn trawl, *Kapala* (K76-24-04), 21 Dec 1976; 1 ♂. AM P25099, east of Broken Bay, 33°30'–27'S 152°05'–07'E, 808 m, demersal prawn trawl, *Kapala* (K76-24-04), 21 Dec 1976; 1 ♀. AM P25128, east of Broken Bay, 33°30'–27'S 152°05'–07'E, 808 m, demersal prawn trawl, *Kapala* (K76-24-04), 21 Dec 1976; 2 ♂, 1 ♀.

**Diagnosis.** Rostrum nearly horizontal, not reaching end of antennular peduncle, with 13–22 evenly spaced, basally articulated, dorsal spines and single distal fixed ventral spine. Pleuron of

abdominal segment 5 with acute posteroventral tooth. Abdominal segment 6 lacking ventral tubercles. Pereopods 3 and 4 with dactyl shorter than propod.

**Distribution.** Arabian Sea to Hawaii; Philippines; 165–1170 m.

##### *Nematocarcinus undulatipes* Bate

*Nematocarcinus undulatipes* Bate, 1888: 801, pl. 130.—Chace, 1986: 76, figs 41, 42.

**Material examined.** New South Wales: AM P25096, east of Broken Bay, 33°30'–27'S 152°05'–07'E, 808 m, *Kapala* (K76-24-04), 21 Dec 1976; 1 ♂, 1 ♀. AM P25097, east of Broken Bay, 33°30'–27'S 152°05'–07'E, 808 m, *Kapala* (K76-24-04), 21 Dec 1976; 1 ♂. AM P25141, east of Broken Bay, 33°35'S 152°01'E, 810 m, *Kapala* (K76-24-03), 20 Dec 1976; 3 ♂, 2 ovig. ♀. AM P26762, south-east of Newcastle, 33°11'–09'S 152°24'E, 732 m, *Kapala* (K77-23-10), 7 Dec 1977; 6 ♂, 26 ovig. ♀, 1 ♀. AM P26764, south-east of Newcastle, 33°11'–09'S 152°24'E, 732 m, *Kapala* (K77-23-10), 7 Dec 1977; 13 ovig. ♀, 6 ♀. AM P26791, east of Broken Bay, 33°35'S 152°00'E, 823 m, *Kapala* (K77-23-12), 8 Dec 1977; 4 ovig. ♀, 1 ♀.

**Diagnosis.** Rostrum nearly horizontal, with 7–14 dorsal articulated teeth, posterior teeth closely spaced, becoming more widely spaced anteriorly; single distal ventral fixed tooth. Rostrum not, or barely reaching end of antennular peduncle. Pleuron of fifth abdominal segment with acute posteroventral tooth. Sixth abdominal segment lacking ventral tubercles.

**Distribution.** Western Indian Ocean, Philippines, Indonesia, to Kermadec Islands; 366–1269 m.

#### Family STYLODACTYLIDAE

*Parastylodactylus* Figueira, 1971

##### *Parastylodactylus* sp.

Fig. 6

**Material examined.** New South Wales: AM P35911, north-east of Danger Point, 27°55'S 154°03'E to 27°51'S 154°03'E, 540 m, prawn trawl, *Kapala* (K78-23-09), 6 Nov 1978; 1 ovig. ♀, cl. 9.1 mm.

**Remarks.** The present specimen shows several differences from *P. bimaxillaris* (Bate, 1888) (see Chace, 1983: 8, fig. 4), the only species in the genus. These differences include the presence of a stronger posteroventral spine on abdominal somite 6; a stronger posteroventral spine on pleuron 5; three clumps of setae on the distal eyestalk (a single row in *P. bimaxillaris*); a larger carapace (length 9.1 mm as against 6.7–7.1 mm) in the ovigerous female; a higher rostral tooth count (40+/9+) against 20–22/5–9 in *P. bimaxillaris*; the merus of pereopod 2 bears eight to nine spines (unarmed in *P. bimaxillaris*); the posterior three pairs of pereopods are unarmed

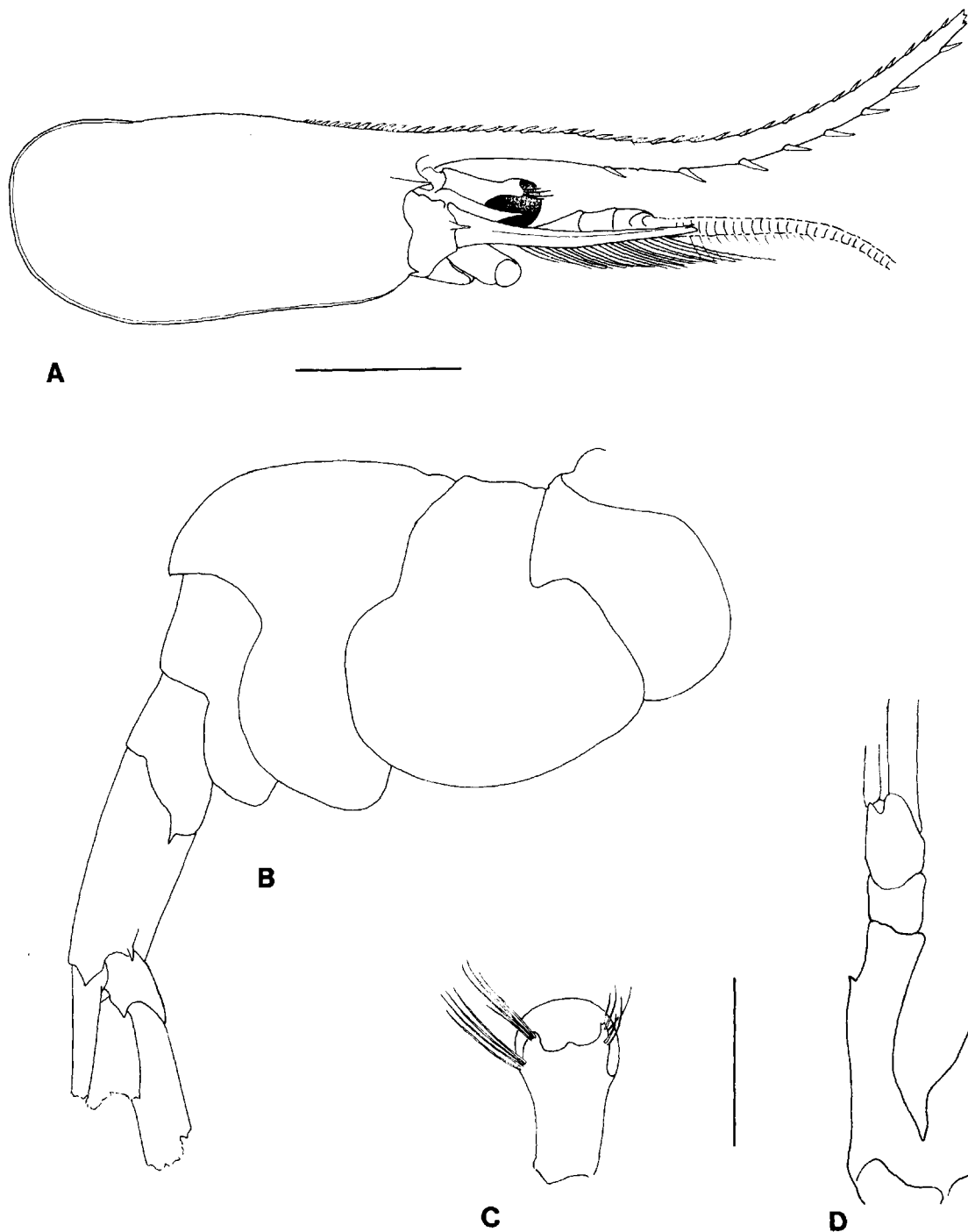
except for a single distal spine (*P. bimaxillaris* has two to three additional meral spines); and a basally more elongate stylocerite of the antennule than in *P. bimaxillaris*. These differences would indicate that this specimen belongs to an undescribed species of *Parastylodactylus*. Unfortunately, as the specimen has a damaged rostrum and tailfan, and lacks several of the pereopods, it was decided not to designate a new species.

*Stylodactylus* A. Milne Edwards, 1881

*Stylodactylus libratus* Chace

*Stylodactylus libratus* Chace, 1983: 12, fig. 5.

**Material examined.** New South Wales: AM P35909, north-east of Danger Point, 27°55'S 154°03'E to 27°57'S 154°03'E, 540 m, prawn trawl, *Kapala* (K78-23-09), 6 Nov 1979; 1 ♀, cl. 13.0 mm.



**Fig. 6.** *Parastylodactylus* sp. **A**, carapace in lateral view; **B**, abdomen in lateral view; **C**, eye; **D**, antenna 1; (Scales: **A**, **B** = 5 mm, **C**, **D** = 3 mm).

**Diagnosis.** Supraorbital spine large. Single spine below prominent branchiostegal spine. Rostrum almost horizontal, tooth format 22/5. All abdominal pleura rounded. Telson twice longer than wide, with 3 or 4 pairs of dorsal spines and strong mid-dorsal point on posterior margin flanked by 2 pairs of spines. Scaphocerite with 4–5 elongate spines on outer margin.

**Remarks.** The description of *Stylodactylus libratus* was based on a single male specimen, thus the degree of variation of morphological characters is unknown. While the present specimen agrees in most points with the description of *S. libratus*, a few differences are apparent: article 2 of the antennular peduncle is not subequal in length to article 3, but twice its length; there are fewer rostral teeth (22/5 as against 31/8); there is only one, not two secondary branchiostegal spines on the carapace; the pereopods exhibit a heavier dorsal and lateral spination than in *S. libratus*. As these differences, however, could be within the range of variation of the species, it is thought best not to describe the single specimen as a new species.

#### *Stylodactylus multidentatus* Kubo

*Stylodactylus multidentatus* Kubo, 1942: 34, figs 4,5.—Chace, 1983: 20, fig. 8.

**Material examined.** New South Wales: AM P21029, north-east of Wollongong, 34°16'–22'S 151°26'–23'E, 356 m, demersal prawn trawl, *Kapala* (K75-05-01), 8 Aug 1975; 1 male. AM P24475, east of Sydney, 33°39'–36'S 151°54'–57'E, 356 m, *Kapala* (K76-07-06), 27 May 1976; 1 female. AM P24484, east of Sydney, 33°35'–30'S 151°59'–152°02'E, 356 m, *Kapala* (K76-09-02), 24 June 1976; 1 male.

**Diagnosis.** Carapace with 2 spines on anteroventral margin; strong supraorbital spine present. Rostrum armed with 14–23 ventral spines. Antennal scale with spines on lateral margin. Abdominal pleura rounded. Posterior telsonic margin lacking median spine.

**Distribution.** Southern Japan; Philippines; 152–366 m.

#### Family PASIPHAEIDAE

*Eupasiphae* Wood-Mason & Alcock, 1893

*Eupasiphae gilesii* (Wood-Mason & Alcock)

*Parapasiphae* (*Eupasiphae*) *Gilesii* Wood-Mason & Alcock, 1893: 166.

*Eupasiphae gilesii*.—Crosnier & Forest, 1973: 150, fig. 44; Kensley, 1977: 32, fig. 10B.

**Material examined.** New South Wales: AM P26568, north-east of Batemans Bay, 35°36'S 150°55'E to 35°39'S 150°56'E, 540 m, midwater trawl, *Kapala* (K77-18-05), 27 Oct 1977; 1 ♀. AM P26835, north-east of Broken Bay, 33°31'S 152°20'E to 33°28'S 152°32'E, 630 m, midwater trawl, *Kapala* (K77-24-03), 13 Dec 1977; 1 ovig. ♀, 1 juv.

AM P33066, north-east to east of Broken Bay, 33°28'S 152°34'E to 33°36'S 152°35'E, 630 m, midwater trawl, *Kapala* (K77-24-10), 14 Dec 1977; 1 juv. AM P33067, north-east to east of Wollongong, 34°20'S 151°56'E to 34°25'S 151°54'E, 630 m, midwater trawl, *Kapala* (K77-24-12), 14 Dec 1977; 2 juvs. AM P33063, south-east of Newcastle, 33°03'S 152°58'E to 32°59'S 153°03'E, 482 m, midwater trawl, *Kapala* (K79-19-02), 27 Nov 1979; 1 ovig. ♀. AM P33062, north-east of Norah Head, 33°05'S 153°05'E to 33°13'S 153°05'E, 630 m, midwater trawl, *Kapala* (K79-19-03), 28 Nov 1979; 1 juv. AM P33064, south-east of Newcastle, 33°07'S 153°11'E to 33°01'S 153°05'E, 630 m, midwater trawl, *Kapala* (K79-19-06), 28 Nov 1979; 2 ♂. AM P33065, east of Newcastle, 32°59'S 153°03'E to 32°51'S 153°01'E, 391 m, midwater trawl, *Kapala* (K79-19-07), 29 Nov 1979; 1 ♂. AM P33068, south-east of Port Jackson to north-east of Wollongong, 34°02'S 152°12'E to 34°14'S 152°14'E, 0–600 m, midwater trawl, *Kapala* (JP71-8), 25 Mar 1971; 1 juv.

**Diagnosis.** Dorsal postrostral and carapace carina serrate throughout. Antennal and branchiostegal spines present. Mandibular palp of 2 articles. Maxilliped 3 with 2 arthrobranchs. Pereopod 4 shorter than either pereopods 3 or 5.

**Remarks.** This would seem to be the first Pacific record of a species widespread throughout the Atlantic and Indian oceans.

**Distribution.** Bermuda; Cape Verde Islands; Canary Islands; Madeira; off Natal, South Africa; Arabian Sea; Gulf of Oman; Andaman Sea; 340–770 m.

*Parapasiphae* Smith, 1884

*Parapasiphae sulcatifrons* Smith

*Parapasiphae sulcatifrons* Smith, 1884: 384, pl. 5, fig. 4, pl. 6, figs 1–7.

*Parapasiphae sulcatifrons*.—Crosnier & Forest, 1973: 142, fig. 41.

**Material examined.** New South Wales: AM P26566, north-east of Batemans Bay, 35°36'S 150°55'E to 35°39'S 150°56'E, 540 m, midwater trawl, *Kapala* (K77-18-05), 27 Oct 1977; 1 ♀, 1 juv. AM P26567, north-east of Batemans Bay, 35°36'S 150°55'E to 35°39'S 150°56'E, 540 m, midwater trawl, *Kapala* (K77-18-05), 27 Oct 1977; 4 ♂, 4 ♀, 2 juvs. AM P33076, north-east of Cape Howe, 37°24'S 150°30'E to 37°28'S 150°33'E, 540 m, midwater trawl, *Kapala* (K77-19-03), 1 Nov 1977; 18 specimens. AM P33073, north-east of Broken Bay, 33°31'S 152°20'E to 33°28'S 152°22'E, 569 m, midwater trawl, *Kapala* (K77-24-02), 12 Dec 1977; 3 ♂, 3 ovig. ♀, 4 ♀. AM P33075, north-east of Broken Bay, 33°27'S 152°30'E to 33°23'S 152°32'E, 630 m, midwater trawl, *Kapala* (K77-24-03), 13 Dec 1977; 14 specimens. AM P33074, north-east to east of Broken Bay, 33°28'S 152°34'E to 33°36'S 152°35'E, 630 m, midwater trawl, *Kapala* (K77-24-10), 14 Dec 1977; 27 juvs. AM P33077, north-east to east of Wollongong, 34°20'S 151°56'E to 34°25'S 151°54'E, 630 m, midwater trawl, *Kapala* (K77-24-12), 14 Dec 1977; 1 juv.

**Diagnosis.** Mandibular palp of 2 articles. Carapace lacking antennal and branchiostegal spines;

mid-dorsal carapace carina unarmed, anteriorly sulcate. Fingers of chela of pereopod 2 not longer than palm. Pereopod 4 shorter than either pereopods 3 or 5.

**Remarks.** This would seem to be the first record of the species from the western Pacific.

**Distribution.** North and south Atlantic; Indian Ocean; off west coast of U. S. A.; 500–5340 m.

*Pasiphaea* Savigny, 1816

*Pasiphaea berentsae* n. sp.

Figs 7–9

**Type material.** New South Wales: HOLOTYPE: AM P26768, north-east of Norah Head, 33°11'S 152°24'E to 33°09'S 152°25'E, 720 m, demersal prawn trawl, *Kapala*

(K77-23-10), 7 Dec 1977; 1 ovig. ♀, cl 47.2 mm. PARATYPES: AM P26797, north-east of Broken Bay, 33°27'S 152°09'E to 33°25'S 152°11'E, 874 m, demersal prawn trawl, *Kapala* (K77-23-13), 8 Dec 1977; 1 ♀, cl 43.1 mm. AM P26798, north-east of Broken Bay, 33°27'S 152°09'E to 33°25'S 152°11'E, 874 m, demersal prawn trawl, *Kapala* (K77-23-13), 8 Dec 1977; 2 ♂, cl 29.0, 30.8 mm, 13 ♀, cl 33.0–44.1 mm. AM P26779, south-east of Broken Bay, 33°40–35'S 151°56–58'E, 714–732 m, demersal prawn trawl *Kapala* (K77-23-05), 6 Dec 1977; 5 ♀, cl 30.0–37.4 mm. USNM 211394, north-east of Broken Bay, 33°27'S 152°09'E to 33°25'S 152°11'E, 874 m, demersal prawn trawl, *Kapala* (K77-23-13), 8 Dec 1977; 1 ovig. ♀, cl 37.8 mm, 1 ♀, cl 43.2 mm.

**Diagnosis.** Carapace dorsally carinate. Abdominal somites 2–6 dorsally carinate. Posterior margin of telson deeply notched. Pereopod 1, merus

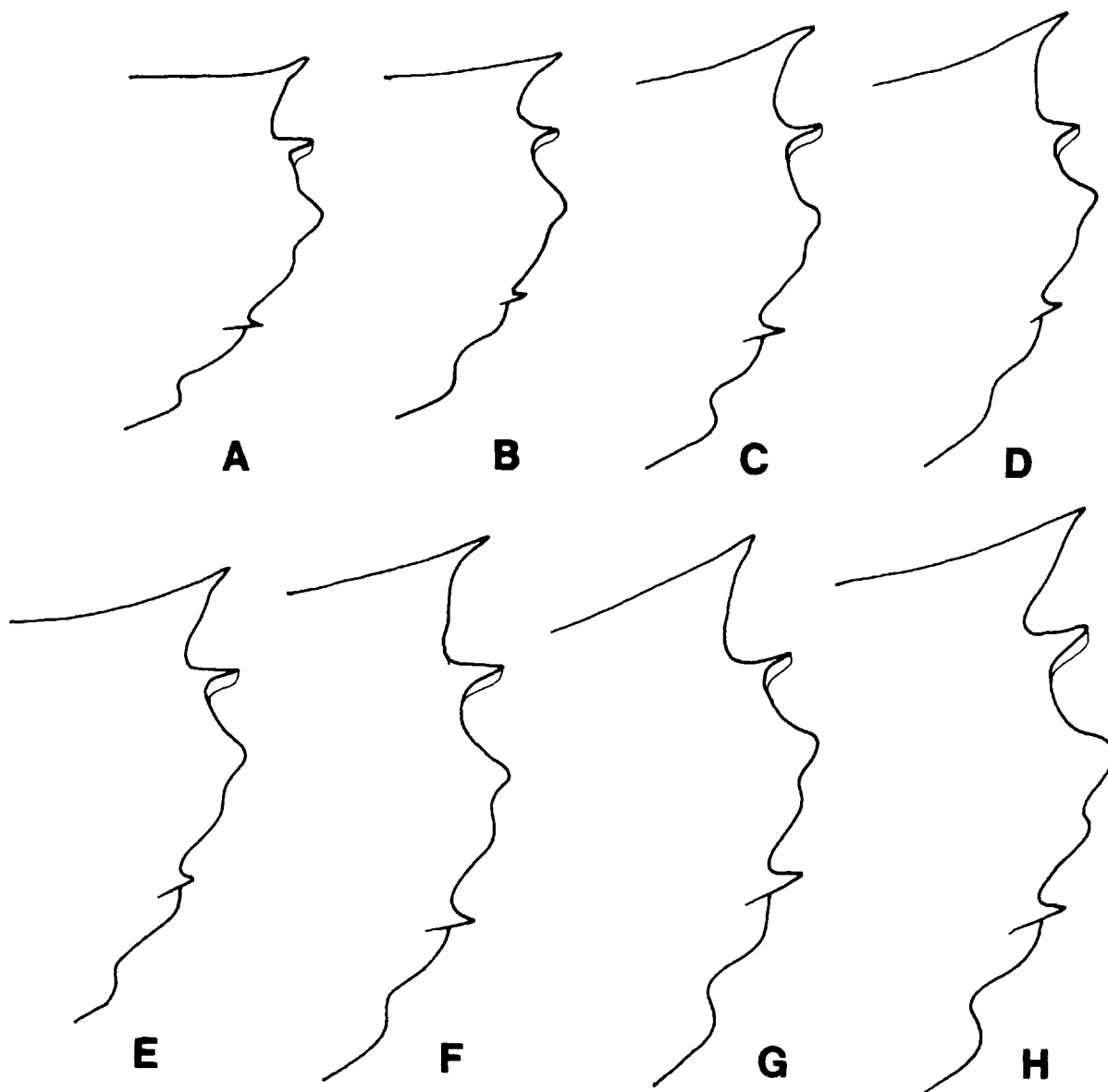


Fig. 7. *Pasiphaea berentsae* n. sp., anterior carapace variation. A, ♂ cl 30.8 mm; B, ♂ cl 29.0 mm; C, ♀ cl 33.0 mm; D, ♀ cl 40.5 mm; E, ovig. ♀ cl 37.8 mm; F, ♀ cl 33.0 mm; G, ♀ cl 42.5 mm; H, ♀ cl 44.1 mm.

armed with 0–3 spines; pereopod 2, merus armed with 12–17 spines, ischium with 0–1 spine, basis with 1–5 spines.

**Description.** Rostrum just reaching anterior carapace margin, directed obliquely upward, anteriorly narrowed into spine-like extremity, anterior margin oblique, slightly convex, straight, or slightly concave. Carapace dorsally carinate almost to posterior margin; with strong suprabranchial ridge extending almost to posterior margin; branchiostegal

spine marginal, strong, non-carinate. Abdominal somite 1 dorsally rounded; somites 2–6 dorsally carinate, all somites lacking posterodorsal spine. Pleuron 1 ventrally straight; pleuron 2 broadly rounded, pleura 3 and 4 ventrally straight, with rounded lobe-like extension anteriorly; pleuron 5 subrectangular, ventral margin faintly concave. Somite 6 1.5X length of somite 5, subequal to telson in length. Telson dorsally grooved, posterior margin deeply cleft, bearing 7 pairs of spines.

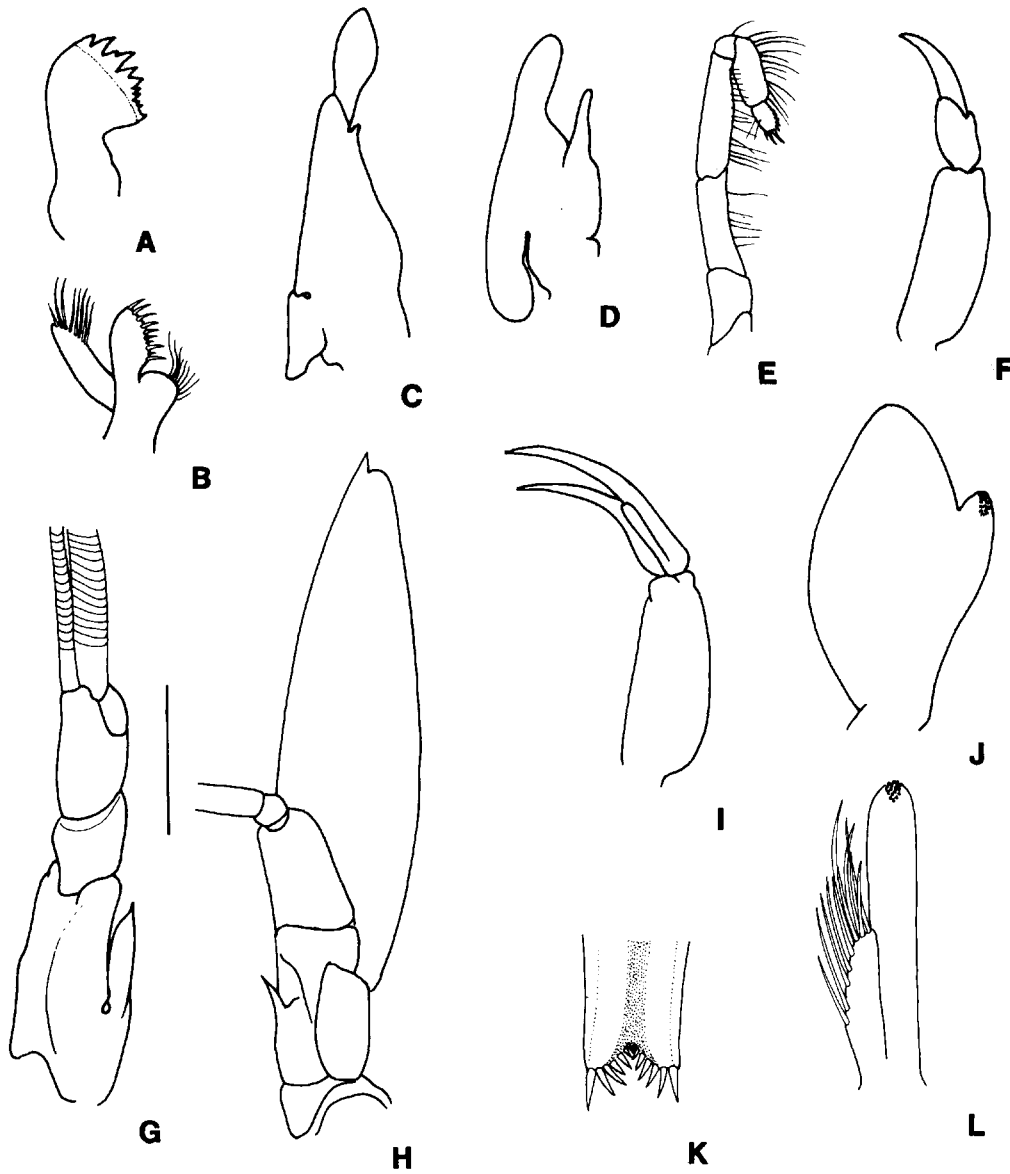


Fig. 8. *Pasiphae berentsae* n. sp. A, mandible; B, maxilla 1; C, maxilliped 1; D, maxilla 2; E, maxilliped 3; F, pleopod 1 ♂; G, antenna 1; H, antenna 2; I, pleopod 2 ♂; J, pleopod 1 ♂, endopod; K, apex of telson; L, pleopod 2 ♂, appendix masculina and appendix interna enlarged. (Scales: G=4 mm)

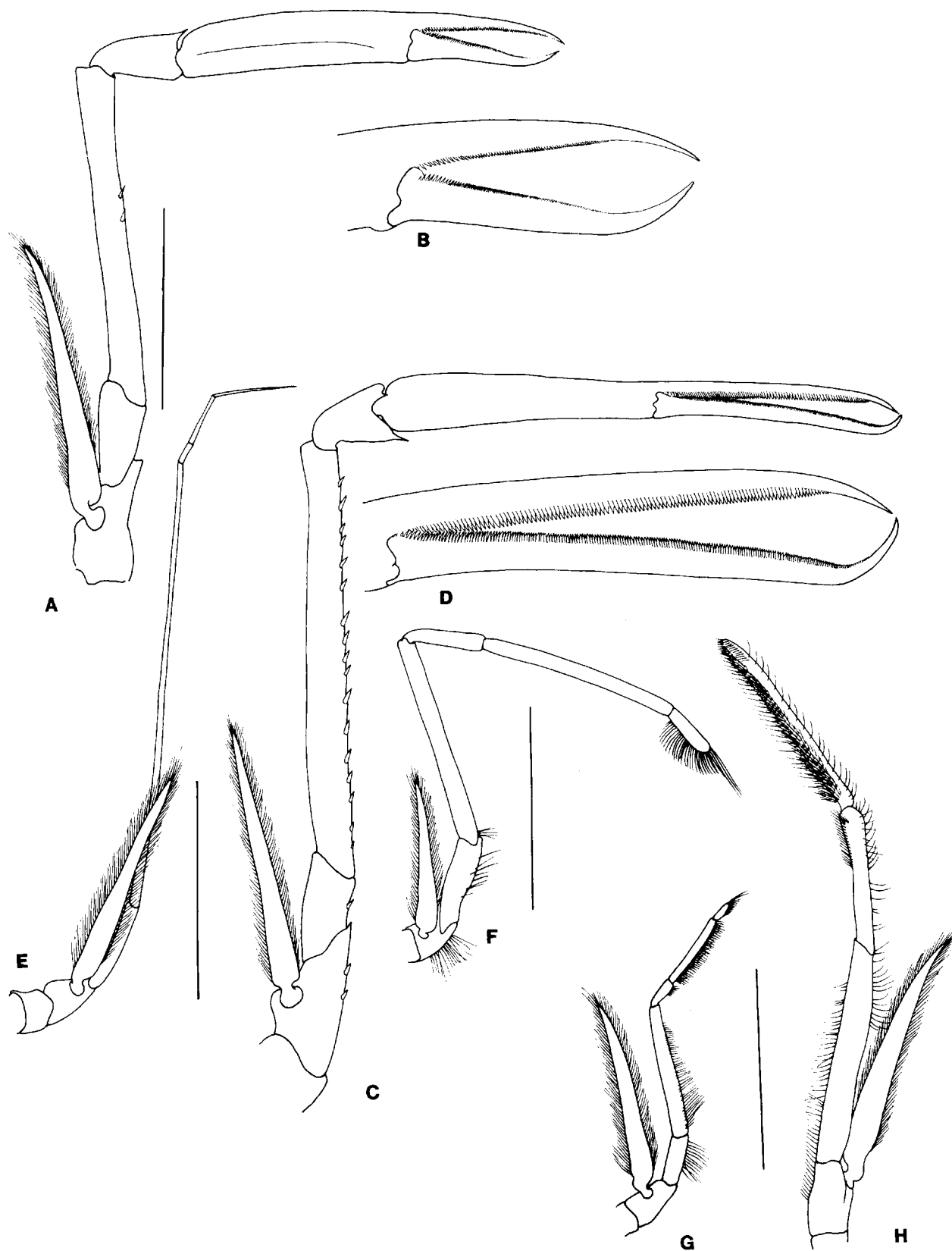


Fig. 9. *Pasiphae berentsae* n.sp. A, pereopod 1; B, pereopod 1, chela enlarged; C, pereopod 2; D, pereopod 2, chela enlarged; E, pereopod 3; F, pereopod 5; G, pereopod 4; H, maxilliped 3. (Scales: A, C, E-H = 10 mm).

Antenna 1, stylocerite twisted, distally acute, almost reaching distal margin of basal peduncular segment; segment 2 less than half length of basal segment, ventromesial margin with slight shoulder at about midlength. Antenna 2 overreaching peduncle of antenna 1 by slightly more than half of blade-length; scaphocerite with outer margin gently convex; distal spine extending well beyond apex of blade; strong elongate ventrodiscal spine on peduncle segment 2.

Mouthparts as illustrated. Maxilliped 3 not quite reaching distal spine of scaphocerite; distal segment apically subacute, about 1.4X length of segment 2, with dense bands of spines on ventral margin, and subterminal clump of ventrally directed spines; segment 2 with dense patch of ventrodiscal setae.

Pereopod 1 over-reaching scaphocerite by half length of fingers of chela; fingers about 0.6X length of palm; palm about 2.6X length of carpus; merus 4X length of carpus, with 0–3 spines on posterior margin.

Pereopod 2 over-reaching scaphocerite by length of fingers of chela; palm about 1.2X length of fingers; carpus slightly less than ¼ length of palm, with strong ventrodiscal spine; merus 7X length of carpus, with 12–17 spines on posterior margin; ischium with 0–1 posterior spine; basis with 1–5 posterior spines.

Pereopod 3 very slender, reaching to distal margin of merus of pereopod 1.

Pereopod 4 shorter than either pereopod 3 or 5, reaching to distal margin of carpus of pereopod 5; dactylus ovate, setose; propodus with dense band of setae on ventral margin. Pereopod 5 reaching to midlength of merus of pereopod 2; dactylus distally rounded, with fringe of setae on posteroventral margins; propodus almost 4X length of dactylus, 2.5X length of carpus.

Pleopod 1 of male, endopod roughly ovate, with rounded lobe bearing tiny hooks on mesial margin. Pleopod 2 of male with appendix masculina half length of appendix interna, bearing 12 elongate spines on mesial and distal margins.

Inner uropodal ramus exceeding telson by ¼ of its length; outer ramus exceeding inner by ¼ of its length.

**Remarks.** *Pasiphaea berentsae* differs from *P. meiringnaudei* Kensley, 1977, which it closely resembles, in having fewer spines on the segments of pereopod 2, in having a shorter stylocerite, a shallower telsonic notch, more spines on the appendix masculina, and in the female becoming ovigerous at a smaller size (cl 50 to 58 mm in the South African species).

While many of the diagnostic characters of this species agree with those of *P. tarda* Kroyer, the shape of the rostrum and the telsonic notch differ markedly.

The species is most easily separated from *P. barnardi* Yaldwyn, 1971, by the possession of spination on the bases of pereopod 2.

**Etymology.** The species is named for Penelope B. Berents of the Australian Museum, in thanks for her

assistance with the sorting and cataloguing of the *Kapala* collection.

**Distribution.** Off New South Wales, 720–874 m.

*Pasiphaea kapala* n. sp.

Figs 10–12

**Type material.** New South Wales: HOLOTYPE: AM P33133, north-east of Norah Head, 33°08'S 152°27'E to 33°10'S 152°24'E, 580 m, demersal prawn trawl, *Kapala* (K77-23-09), 7 Dec 1977; 1 ♂, cl 24.5 mm. PARATYPES: AM P26789, east of Broken Bay, 33°35'–33°S 152°00'–02'E, 823 m, demersal prawn trawl, *Kapala* (K77-23-12), 8 Dec 1977; 27 ♂, cl 22.5–28.2 mm, 23 ♀, cl 22.6–26.0 mm. USNM 211393, north-east of Yamba, 29°26'S 153°49'E to 29°20'S 153°50'E, 450 m, demersal prawn trawl, *Kapala* (K75-09-08), 12 Oct 1975; 20 ♂, cl 22.0–25.6 mm, 20 ♀, cl 22.0–25.8 mm.

**Additional material examined.** New South Wales: AM P20999, east of Broken Bay, 33°32'S 152°04'E to 33°38'S 152°00'E, 810 m, demersal prawn trawl, *Kapala* (K75-05-05), 19 Aug 1975; 1 ♀. AM P21070, east of Broken Bay, 33°32'S 152°04'E to 33°38'S 152°00'E, 810 m, demersal prawn trawl, *Kapala* (K75-05-05), 19 Aug 1975; 1 ♂. AM P21075, east of Broken Bay, 33°32'S 152°04'E to 33°38'S 152°00'E, 810 m, demersal prawn trawl, *Kapala* (K75-05-05), 19 Aug 1975; 1 ♂. AM P24766, east of Sydney, 33°35'S 151°59'E, 584 m, *Kapala* (K76-09-02), 24 June 1976; 1 ♀. AM P26807, north-east of Norah Head, 33°08'S 152°27'E to 33°10'S 152°24'E, 580 m, demersal prawn trawl, *Kapala* (K77-23-09), 7 Dec 1977; 10 ♂, 8 ♀. AM P25211, south-east of Broken Bay, 33°42'S 151°52'E to 33°39'S 151°54'E, 446 m, demersal prawn trawl, *Kapala* (K76-24-01), 20 Dec 1976; 1 ♂, 1 ♀. AM P33132, south-east of Wollongong, 34°31'S 151°20'E to 34°34'S 151°19'E, 684 m, demersal prawn trawl, *Kapala* (K77-21-01), 21 Nov 1977; 1 ♂. AM P33130, north-east of east of Broken Bay, 33°28'S 152°34'E to 33°36'S 152°35'E, 630 m, demersal prawn trawl, *Kapala* (K77-24-10), 14 Dec 1977; 2 juvs. AM P33135, north-east of Port Jackson, 33°47'S 151°55'E to 33°44'S 151°57'E, 806 m, demersal prawn trawl, *Kapala* (K78-26-16), 7 Dec 1978; 6 ♂, 1 ovig. ♀ cl 26.9 mm, 1 ♀. AM P33134, north-east of Point Danger, 28°03'S 154°04'E to 28°01'S 154°04'E, 724 m, demersal prawn trawl, *Kapala* (K78-23-08), 6 Nov 1978; 1 ♂. AM P33136, north-east of Jervis Bay, 34°55'S 151°13'E to 34°53'S 151°14'E, 810 m, demersal prawn trawl, *Kapala* (K78-27-05), 12 Dec 1978; 1 ♂, 2 ♀. AM P33137, north-east of North Solitary Island, 29°50'S 153°43'E to 29°48'S 153°44'E, 495 m, demersal prawn trawl, *Kapala* (K78-06-02), 25 Apr 1978; 1 ♂, 2 ovig. ♀ cl 26.1, 30.5 mm. AM P33131, east of Broken Bay, 33°32'S 152°06'E to 33°34'S 152°05'E, 820 m, demersal prawn trawl, *Kapala* (K79-20-13), 6 Dec 1979; 2 ♂. AM P21787, east of Clarence River, 29°26'–20'S 153°49'–50'E, 500 m, *Kapala* (K75-09-08), 12 Oct 1975; 22 ♂, 18 ♀. AM P26807, south-east of Newcastle, 33°08'–10'S 152°27'–24'E, 586 m, demersal trawl, *Kapala* (K77-23-09), 7 Dec 1977; 11 ♂, 7 ♀. AM P25211, east of Broken Bay, 33°43'–39'S 151°52'–54'E, 450 m, *Kapala* (K76-24-03), 20 Dec 1976; 1 ♂, 1 ♀. AM P24770, east of Broken Bay, 33°40'–37'S 151°54'–56'E, 500 m, *Kapala*, 20 July 1976; 1 ♂. AM P26810, east of Broken Bay, 33°35'–33'S, 152°00'–02'E, 823 m, demersal trawl, *Kapala* (K77-23-12), 8 Dec 1977; 1 ♂. AM P20999, east of Broken Bay, 33°32'–38'S 152°00'–04'E, 900 m, *Kapala* (K75-05-05), 19 Aug 1975; 1 ♀. AM

P24766, east of Sydney, 33°35'–30'S 151°59'–152°02'E, 400 m, *Kapala* (K76-09-02), 24 June 1976; 1 ovig. ♀. AM P21075, east of Broken Bay, 33°32'–38'S 152°00'–04'E, 900 m, *Kapala* (K75-05-05), 19 Aug 1975; 1 ♀. AM P21070, east of Broken Bay, 33°32'–38'S 152°00'–04'E, 900 m, *Kapala* (K75-05-05), 19 Aug 1975; 1 ♂. AM P35914, south-east of Broken Bay, 33°43'S 151°56'E to 33°39'S 151°58'E, 631 m, demersal fish trawl, *Kapala* (K84-16-03), 25 Sept 1984; 1 ovig. ♀, 3 ♀.

**Diagnosis.** Carapace dorsally rounded. All abdominal segments dorsally rounded. Posterior

margin of telson truncate to very slightly notched. Merus of pereopod 1 unarmed; merus of pereopod 2 with 7–8 spines on posterior margin.

**Description.** Rostrum barely, or not reaching anterior carapace margin, directed obliquely upward, often with faint convexity on anterior margin, anteriorly usually narrowly acute, lacking any posterior carina. Carapace dorsally rounded, branchiostegal spine marginal, short unkeeled; low rounded suprbranchial ridge present. All abdominal somites dorsally rounded, lacking mid-dorsal spine

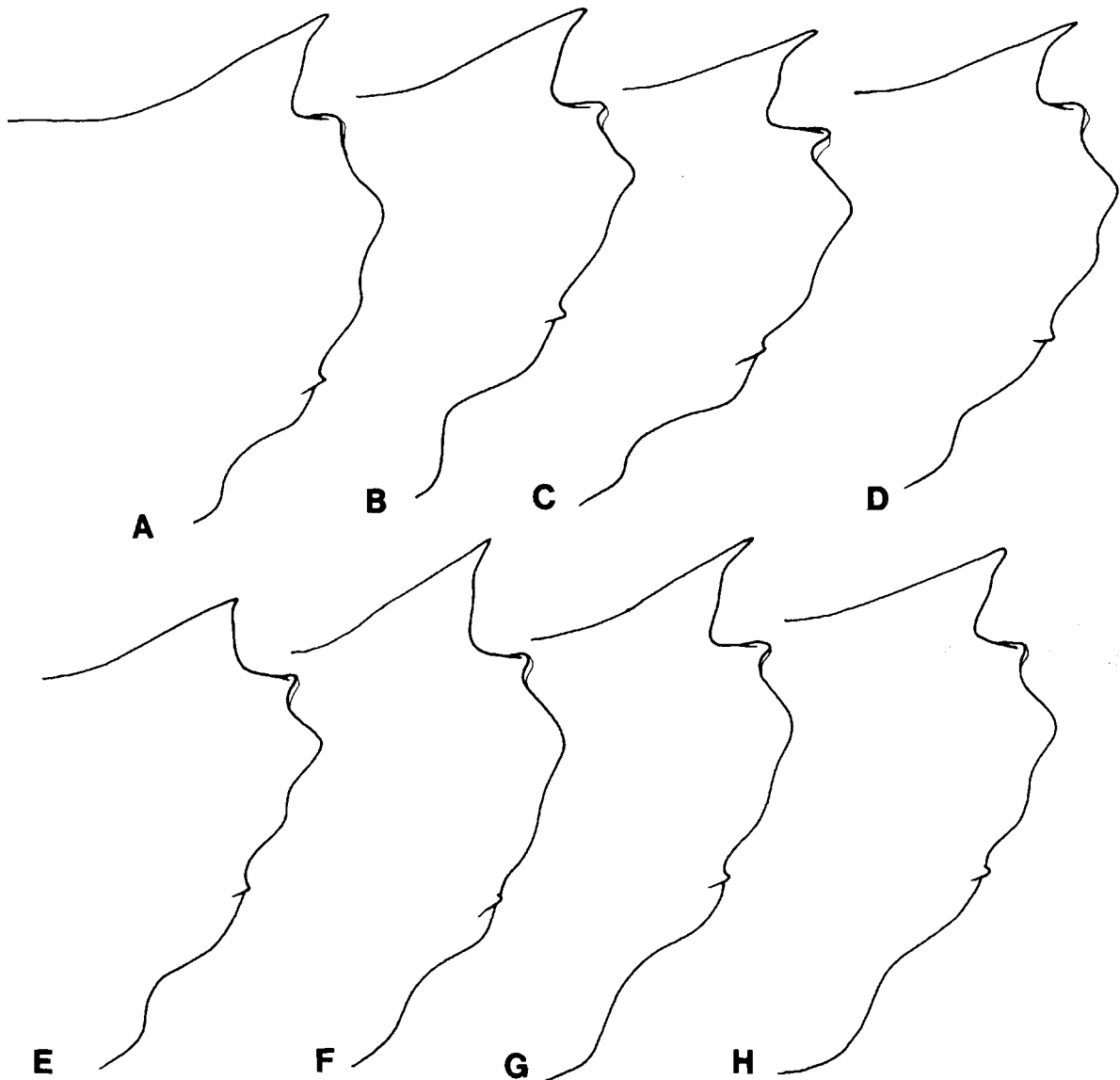


Fig. 10. *Pasiphae kapala* n.sp., anterior carapace variation. A, ♂ cl 24.5 mm; B, ♂ cl 24.0 mm; C, ♂ cl 23.8 mm; D, ♂ cl 22.6 mm; E, ♂ 23.0 mm; F, ♀ cl 24.5 mm; G, ♀ cl 25.0 mm; H, ♀ cl 22.6 mm.



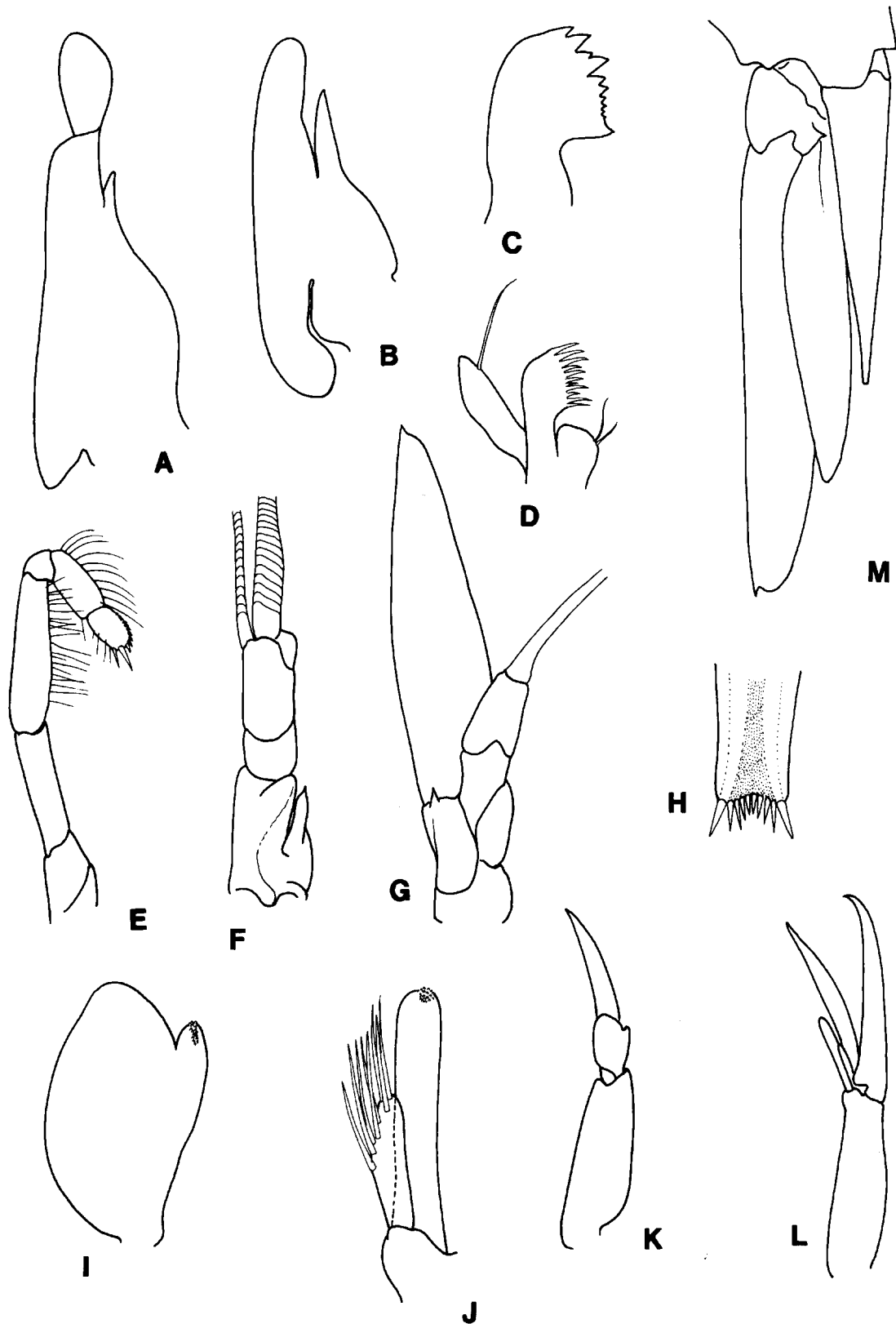


Fig. 11. *Pasiphae kapala* n.sp. A, maxilliped 1; B, maxilla 2; C, mandible; D, maxilla 1; E, maxilliped 3; F, antenna 1; G, antenna 2; H, apex of telson; I, pleopod 1 ♂, endopod; J, pleopod 2 ♂, appendix interna and appendix masculina enlarged; K, pleopod 1 ♂; L, pleopod 2 ♂.

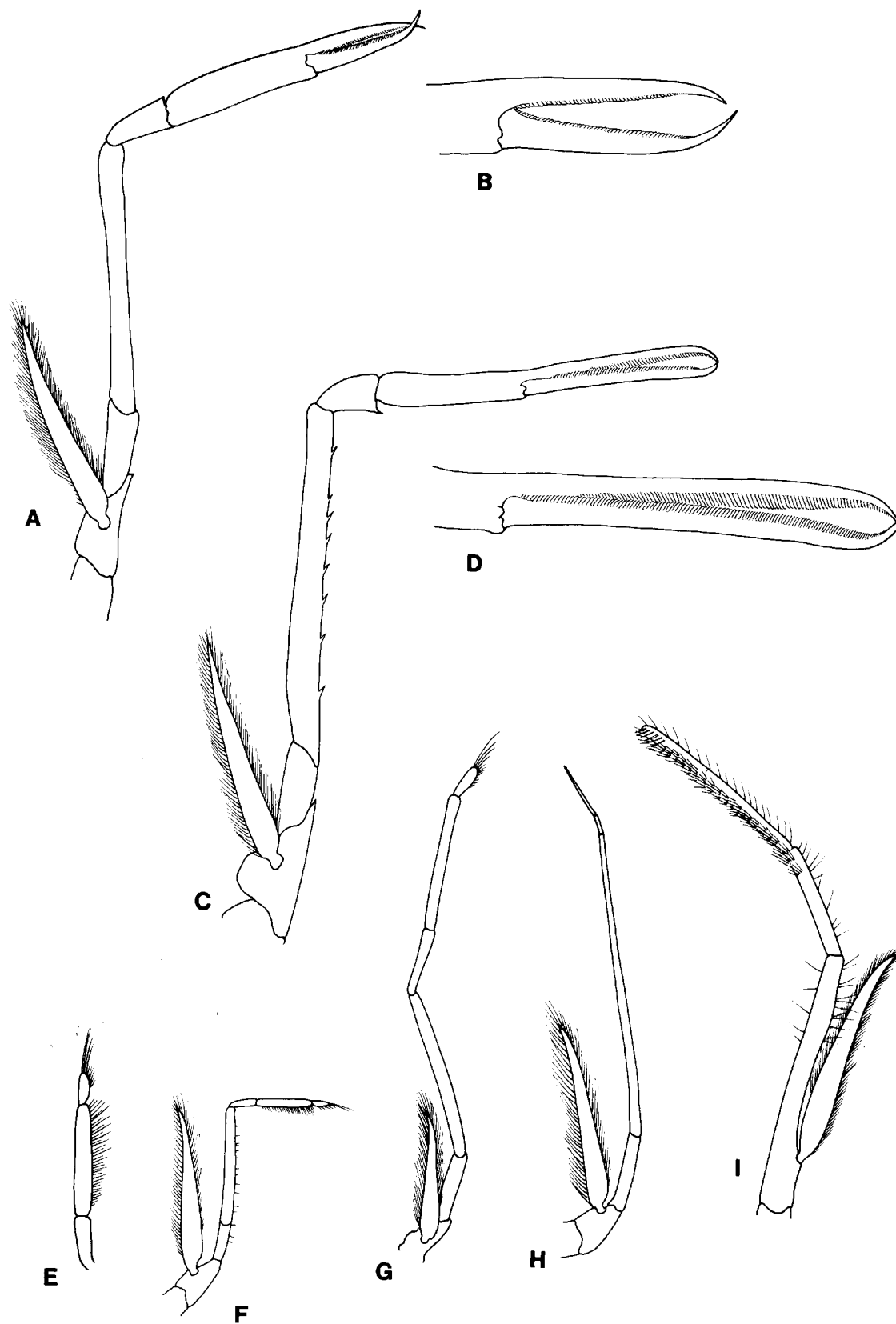


Fig. 12. *Pasiphae kapala* n. sp. A, pereopod 1; B, pereopod 1 chela enlarged; C, pereopod 2; D, pereopod 2, chela enlarged; E, pereopod 4, two distal articles enlarged; F, pereopod 4; G, pereopod 5; H, pereopod 3; I, maxilliped 3.

on posterior margin. Pleura of somites 1 and 2 ventrally broadly rounded; pleura of 3–5 with ventral margin almost straight, somewhat produced anteriorly into rounded lobe; somite 6, 1.4X longer than somite 5, only slightly shorter than telson. Latter with posterior margin truncate to very shallowly notched, bearing 5 pairs of spines.

Antenna 1 with stylocerite almost reaching distal margin of basal peduncular segment, twisted, distally acute; segment 2 about half length of segment 1, somewhat more than half length of segment 3.

Antenna 2, scaphocerite over-reaching antenna 1 peduncle by half its length, tapering distally to short triangular spine extending past apex of blade; peduncular segment 2 with ventrodorsal spine.

Mouthparts as illustrated. Maxilliped 3 not quite reaching distal spine of scaphocerite; terminal segment slightly rounded, with row of short spines on mesial surface, single row of setae on anterior margin; posterior margin with rows of short spines; penultimate segment 0.6X length of terminal segment.

Pereopod 1 over-reaching scaphocerite by  $\frac{2}{3}$  length of fingers of chela; fingers  $\frac{3}{4}$  length of palm; carpus half length of palm; merus subequal in length to chela, posterior margin unarmed.

Pereopod 2 over-reaching scaphocerite by  $\frac{2}{3}$  length of fingers of chela; fingers subequal in length to palm plus carpus; merus subequal in length to chela, with 7–8 spines on posterior margin.

Pereopod 3 very slender, reaching midlength of merus of pereopod 2; propodus  $\frac{1}{3}$  length of dactylus.

Pereopod 4 shorter than pereopods 3 or 5, reaching to distal end of carpus of pereopod 5; dactylus ovate, with setae increasing in length distally; propodus 3.5X length of dactylus, with close-set setae on posterior margin.

Pereopod 5 reaching anteriorly almost as far as distal end of pereopod 3; dactylus ovate, with setae increasing in length distally; propodus 4X length of dactylus; carpus half length of propodus.

Pleopod 1 in male with endopod roughly ovate, with rounded lobe bearing tiny hooks on mesial margin. Pleopod 2 in male with appendix masculina 0.5–0.6X length of appendix interna, bearing about 8 elongate spines on distal and outer margins; appendix interna with small patch of minute hooks on rounded apex.

Inner uropodal ramus over-reaching telsonic apex by about 0.3X its length; outer uropodal ramus over-reaching inner ramus by 0.25 of its length.

**Remarks.** The present species belongs to that group of species characterised by a rounded carapace and rounded abdominal somites, and a telsonic apex regarded as very faintly notched. The armature of the meri of pereopods 1 and 2 (0 and 7–8 spines respectively), however, separates this species from *P. poeyi* Chace, and *P. americana* Faxon (which has the branchiostegal spine arising posterior to the anterior margin), which have one to two spines on pereopod 2.

The meral armature also separates this species from a second group of species which usually has more than 0 and 1–2 spines on pereopods 1 to 2 respectively.

**Etymology.** The species is named for the research vessel of the New South Wales Department of Fisheries, the FRV *Kapala*.

**Distribution.** Off New South Wales, 446–900 m.

*Pasiphaea longitaenia* n. sp.

Figs 13, 14

**Type material.** New South Wales: HOLOTYPE: AM P35196, east of Long Reef Point, 33°43'S 151°56'E to 33°39'S 151°58'E, 626–637 m, demersal fish trawl, *Kapala* (K84-16-03), 25 Sept 1984; 1 ♂, cl 23.1 mm. PARATYPES: AM P24772, east of Broken Bay, 33°41'S 151°55'E, 457 m, demersal prawn trawl, *Kapala* (K76-24-01), 20 July 1976; 1 ♂, cl 22.3 mm, 2 ♀, cl 24.0, 26.0 mm. AM P24771, east of Broken Bay, 33°41'S 151°55'E, 457 m, demersal prawn trawl, *Kapala* (K76-24-01), 20 July 1976; 1 ♀ cl 24.1 mm (rostrum damaged). USNM 211395, east of Long Reef Point, 33°43'S 151°56'E to 33°39'S 151°58'E, 626–637 m, demersal fish trawl, *Kapala* (K84-16-03), 25 Sept 1984; 1 ♂, cl 26.5 mm.

**Diagnosis.** Carapace dorsally rounded. Abdominal somites 1–5 dorsally rounded, somite 6 dorsally carinate. Telson posteriorly truncate. Merus of pereopod 1 armed with about 9 spines; merus of pereopod 2 armed with about 19 spines on posterior margin.

**Description.** Rostrum low, triangular, not reaching anterior carapace margin. Carapace mid-dorsally rounded; branchiostegal spine short, marginal; faint rounded suprabranchial ridge present. Abdominal somites 1–5 dorsally rounded, somite 6 subcarinate. Pleura of somites 1 and 2 ventrally broadly rounded, of 3 and 4 with rounded anteriorly directed lobes; of 5 ventrally straight, posteroventrally rectangular; somite 5 about  $\frac{2}{3}$  length of somite 6, latter ending with slight mid-dorsal spine on posterior margin. Telson  $\frac{2}{3}$  length of somite 6, with shallow mid-dorsal longitudinal groove; posterior margin truncate, bearing single median, and 4 pairs of lateral spines, outermost pair longest.

Antenna 1, basal segment with slight shoulder at about midlength of ventromesial margin; stylocerite twisted, apically acute, reaching distal margin of basal segment; segment 2 about half length of basal segment.

Antenna 2 reaching by slightly more than half length of scaphocerite blade beyond antennular peduncle; distal scaphocerite spine reaching well beyond apex of blade; second peduncular segment with distal spine at outer and at mesial distal angles.

Mouthparts as illustrated. Maxilliped 3 reaching to distal  $\frac{3}{4}$  of scaphocerite, distal segment narrow, parallel-sided, apically subacute, with ventral fringe of spines, 1.6X length of penultimate segment.

Pereopod 1 reaching beyond scaphocerite by length of fingers of chela; fingers  $\frac{2}{3}$  length of palm; carpus

about  $\frac{1}{4}$  length of merus; latter armed with 9–12 spines on posterior margin; basis with posterodistal margin produced into strong spine.

Pereopod 2 reaching slightly beyond fingers of pereopod 1, and by  $\frac{2}{3}$  length of fingers beyond scaphocerite; fingers subequal in length to palm; merus shorter than chela, armed with 17–19 spines on posterior margin; basis with strong posterodistal spine.

Pereopod 3 very slender, anteriorly reaching carpus of pereopod 2.

Pereopod 4 shorter than pereopods 3 or 5, reaching proximal fourth of propodus of pereopod 5; propodus

3.5X length of dactylus, with posterior fringe of spine-setae.

Pereopod 5 reaching slightly beyond midlength of merus of pereopod 3; dactylus ovate, with setae increasing in length distally; propodus 6X length of dactylus, 2.5X length of carpus; merus 3X length of carpus.

Pleopod 1 of male, endopod elongate ovate, with rounded lobe on mesial margin bearing small patch of hooks. Pleopod 2 of male with appendix masculina about  $\frac{2}{3}$  length of appendix interna, bearing 10 spines on distal and outer margins; appendix interna distally rounded, with small terminal patch of minute hooks.

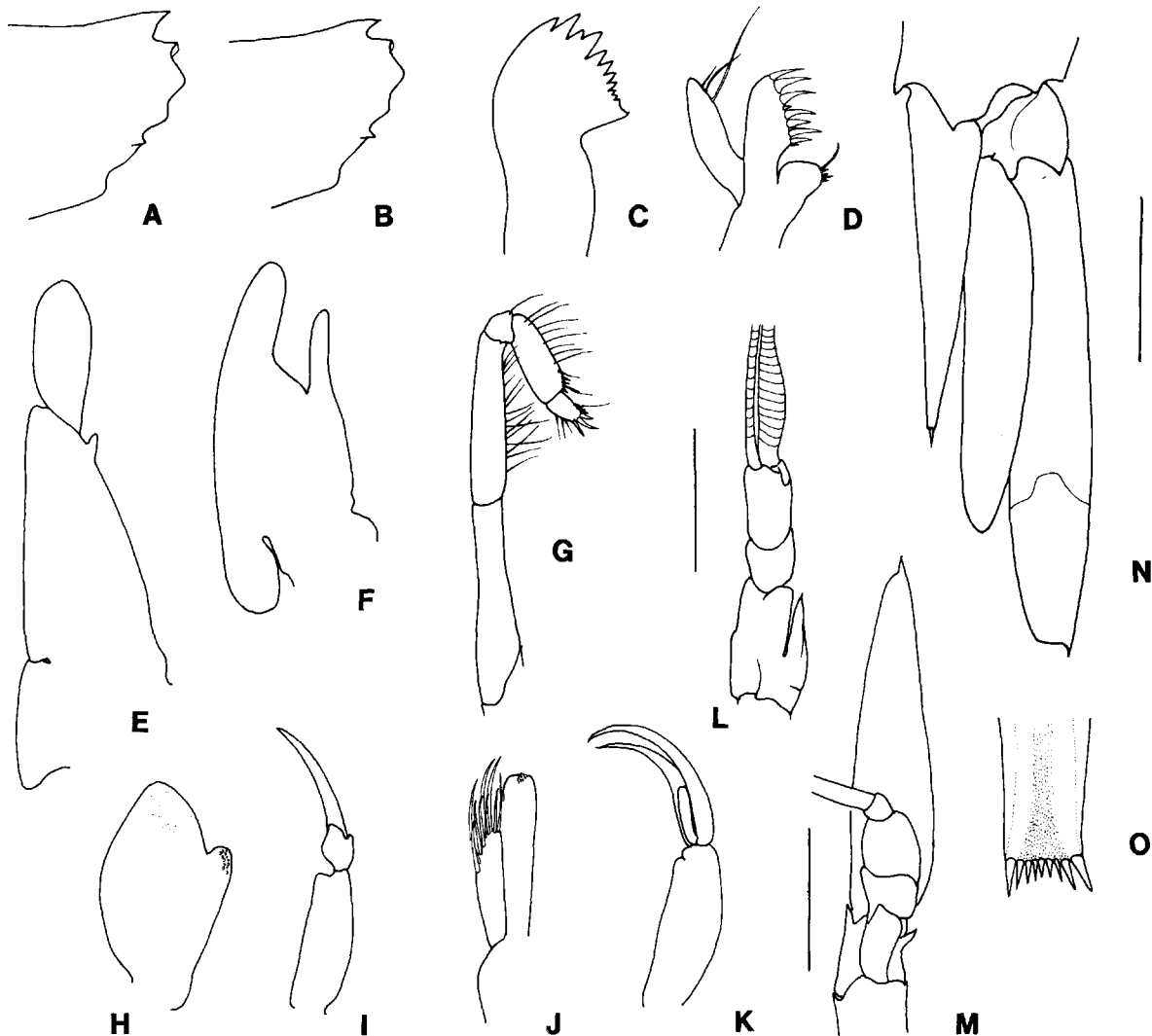


Fig. 13. *Pasiphae longitaenia* n.sp. A, anterior carapace, ♀ cl 26.0 mm; B, anterior carapace, ♀ cl 24.0 mm; C, mandible; D, maxilla 1; E, maxilliped 1; F, maxilla 2; G, maxilliped 3; H, pleopod 1 ♂, endopod; I, pleopod 1 ♂; J, pleopod 2 ♂, appendix interna and appendix masculina enlarged; K, pleopod 2 ♂; L, antenna 1; M, antenna 2; N, telson and uropod in lateral view; O, apex of telson. (Scales: L-N = 5 mm).

Inner uropodal ramus slightly less than  $\frac{3}{4}$  length of outer ramus, over-reaching telsonic apex by about  $\frac{1}{3}$  of its length; outer ramus with truncate-rounded distal margin.

**Remarks.** The carapace and abdominal features of this species mentioned in the diagnosis bear some similarity to *P. truncata* Rathbun, 1906, from Hawaii. The new species may be distinguished from the latter by the following points: the rostrum is more elongate, with the anterior margin more oblique than in the Hawaiian species; abdominal somite 6 is subcarinate (narrowly rounded) in *P. longitaenia*

acutely carinate in *P. truncata*; the fingers of pereopod 1 in *P. truncata* are three-fourths the length of the palm, two-thirds the length in *P. longitaenia*; the fingers of pereopod 2 are slightly longer than the palm in *P. truncata*, subequal to the palm in *P. longitaenia*; finally, the merus of pereopod 2 in *P. longitaenia* bears more spines (17–19 as against 13–16).

**Etymology.** The species name, the Latinised form of 'long reef', is derived from the type locality, Long Reef Point, N.S.W.

**Distribution.** Off New South Wales, 457–637 m.

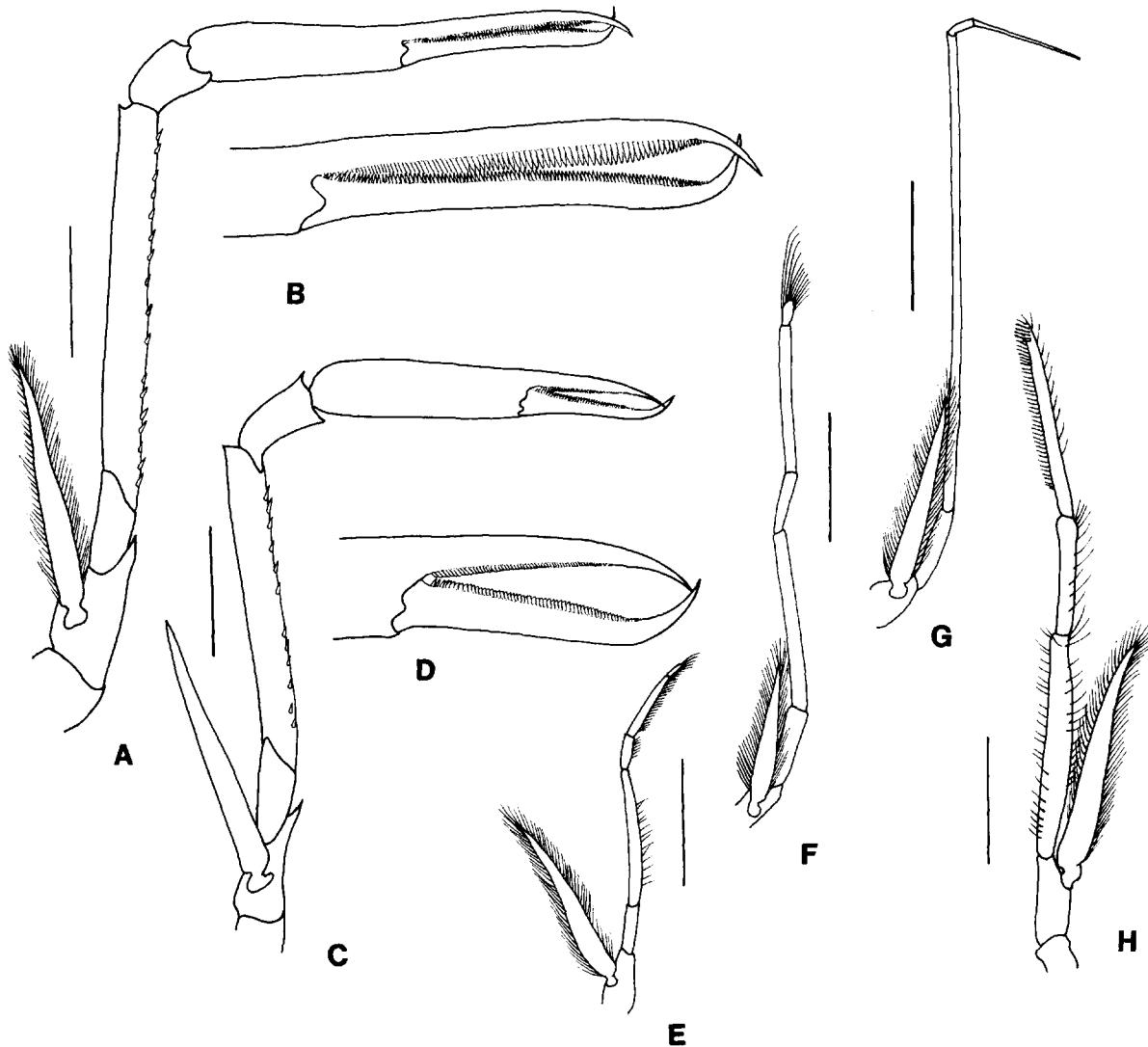


Fig. 14. *Pasiphae longitaenia* n.sp. A, pereopod 1; B, pereopod 1, chela enlarged; C, pereopod 2; D, pereopod 2, chela enlarged; E, pereopod 4; F, pereopod 5; G, pereopod 3; H, maxilliped 3. (Scales: A, C, E-H = 5 mm).

## Family EUGONATONOTIDAE

*Eugonatonotus* Schmitt, 1926*Eugonatonotus crassus* (A. Milne Edwards)

*Gonatonotus crassus* A. Milne Edwards, 1881: 10.—Kubo, 1937: 94–98, figs 1–3.

*Eugonatonotus crassus*.—Holthuis, 1955: 39–40, fig. 18; Thompson, 1966: 129–135.

**Material examined.** Queensland: AM P33141, north-east of Danger Point, 27°55'S 154°03'E to 27°57'S 154°03'E, 540 m, prawn trawl, *Kapala* (K78-23-09), 6 Nov 1978; 5 specimens.

**Diagnosis.** Rostrum subequal to carapace length, curved distally, with about 8 spines on both dorsal and ventral margins; pereopods 1 and 2 chelate, fingers of chelae short, armed with black horny spines; carpus of pereopod 2 entire; pereopods with exopods; carapace dorsally carinate with about 10 movable spines anteriorly, lateral carapace with 3 carinae; only third and fourth abdominal somites carinate, carina of third somite with spine at distal third, and pair of submedial spines on posterior margin, fourth and fifth somites with more than 2 spines on posterior margin.

**Remarks.** These specimens, all females (cl 34.8–38.7 mm), agree well with description and figures given by Kubo (1937). They differ in having the rostrum slightly longer (1.1–1.2) than the carapace and resembling the figure given by Kubo for the male rostrum rather than that for the female. Also, the ventral spine on the second segment of the antennal peduncle reaches a third rather than halfway along the scaphocerite, and the telson is slightly shorter, rather than subequal to the uropods. These few differences may be explained by the larger size of our specimens; in Kubo's specimens the carapace length of the largest female was 22 mm. In our specimens there are 10–12 movable spines dorsally on the carapace, while on the rostrum there are 8–10 dorsal spines and 7–8 ventral spines.

This species has not previously been recorded from eastern Australia.

**Distribution.** Western Pacific, western Atlantic.

## Family RHYNCHOCINETIDAE

*Lipkius* Yaldwyn, 1960*Lipkius holthuisi* Yaldwyn

*Lipkius holthuisi* Yaldwyn, 1960: 16, figs 1–16.—Thompson, 1966: 129, 130, 136, 138.

**Material examined.** New South Wales: AM P21000, east of Broken Bay, 33°32'S 152°04'E to 33°38'S 152°00'E, 810 m, demersal prawn trawl, *Kapala* (K75-05-05), 19 Aug 1975; 1 ♀ cl 32.5 mm (rostrum damaged). AM P26559, east of Broken Bay, 33°35'S 152°01'E to 33°32'S 152°03'E, 810 m, demersal prawn trawl, *Kapala* (K76-24-03), 20 Dec 1976; 1 ♀ cl 33.2 mm (rostrum damaged).

**Diagnosis.** Rostrum long, slender, immovable,

armed with movable teeth proximally, more widely spaced fixed teeth distally. Carapace lacking carinae. Rudimentary exopods on pereopods 1–3. Anteriorly projecting, ventral, bifid plate between bases of pereopods 2–5.

**Distribution.** Cook Strait to Chatham Rise, New South Wales; 400–810 m.

## Family CAMPYLONOTIDAE

*Campylonotus* Bate, 1888*Campylonotus rathbunae* Schmitt

*Campylonotus rathbunae* Schmitt, 1926: 373–377, pl. 67, figs 1–5.—Yaldwyn, 1960: 20–27, figs 2–4.

**Material examined.** New South Wales: AM P19093, east of Long Reef, 33°51'S 151°51'E to 33°45'S 151°55'E, 675 m, trawl, *Kapala* (K72-06-03), 19 Oct 1972; 1 specimen. AM P24774, east of Brush Island, 35°28'S 150°50'E to 35°33'S 150°47'E, 567–594 m, fish trawl, *Kapala* (K76-11-12), 8 July 1976; 1 ovig. ♀. Victoria: AM P33142, south-east of Gabo Island, 37°48'S 150°13'E to 37°45'S 150°15'E, 486 m, fishtrawl, *Kapala* (K77-10-08), 13 July 1977; 1 ovig. ♀. AM P20802, south-east of Gabo Island, 37°36'S 150°17'E to 37°43'S 150°15'E, 540 m, fish trawl, *Kapala* (K75-03-04), 11 July 1975; 1 ovig. ♀. AM P33143, P26803, south-east of Gabo Island, 37°43'S 150°17'E to 37°40'S 150°17'E, 630 m, prawn trawl, *Kapala* (K77-22-04), 30 Nov 1977; 24 specimens. Western Australia: AM P21956, Great Australian Bight, 33°28'S 127°15'E to 33°31'S 127°19'E, 640–650 m, otter trawl, J.R. Paxton on *Dmitry Mendeleev*, 28 Feb 1976; 7 specimens.

**Diagnosis.** Rostrum narrow with 2 large basal teeth, first of which standing at or behind middle of carapace, ventral margin of rostrum with 3–4 teeth; pereopods 1 and 2 chelate; pereopod 2 subequal, carpus entire; pereopods without exopods. Carapace with 2 lateral carinae. Abdomen armed with posterior dorsal spines on segments 3–5, and on anterior part of third segment by prominent tubercle, segments 1, 2, and 6 without carinae.

**Remarks.** This species has been figured and described in detail by Yaldwyn (1960). The only previous record from Australian waters was from the Great Australian Bight (Schmitt, 1926).

These specimens were collected between 33°S and 38°S and between 127°E and 150°E in trawls at depths to 650 m.

**Distribution.** Southern and southeast Australia, southeast New Zealand; 400–650 m.

## Family HIPPOLYTIDAE

*Lebbeus* White, 1847*Lebbeus yaldwyni* n. sp.

Figs 15–17

**Type material.** New South Wales: HOLOTYPE: AM P26561, east of Sydney, 33°43'S 151°51'–53'E, 450 m, *Kapala* (K77-04-13), 6 May 1977; 1 ovig. ♀, cl 11.5 mm.

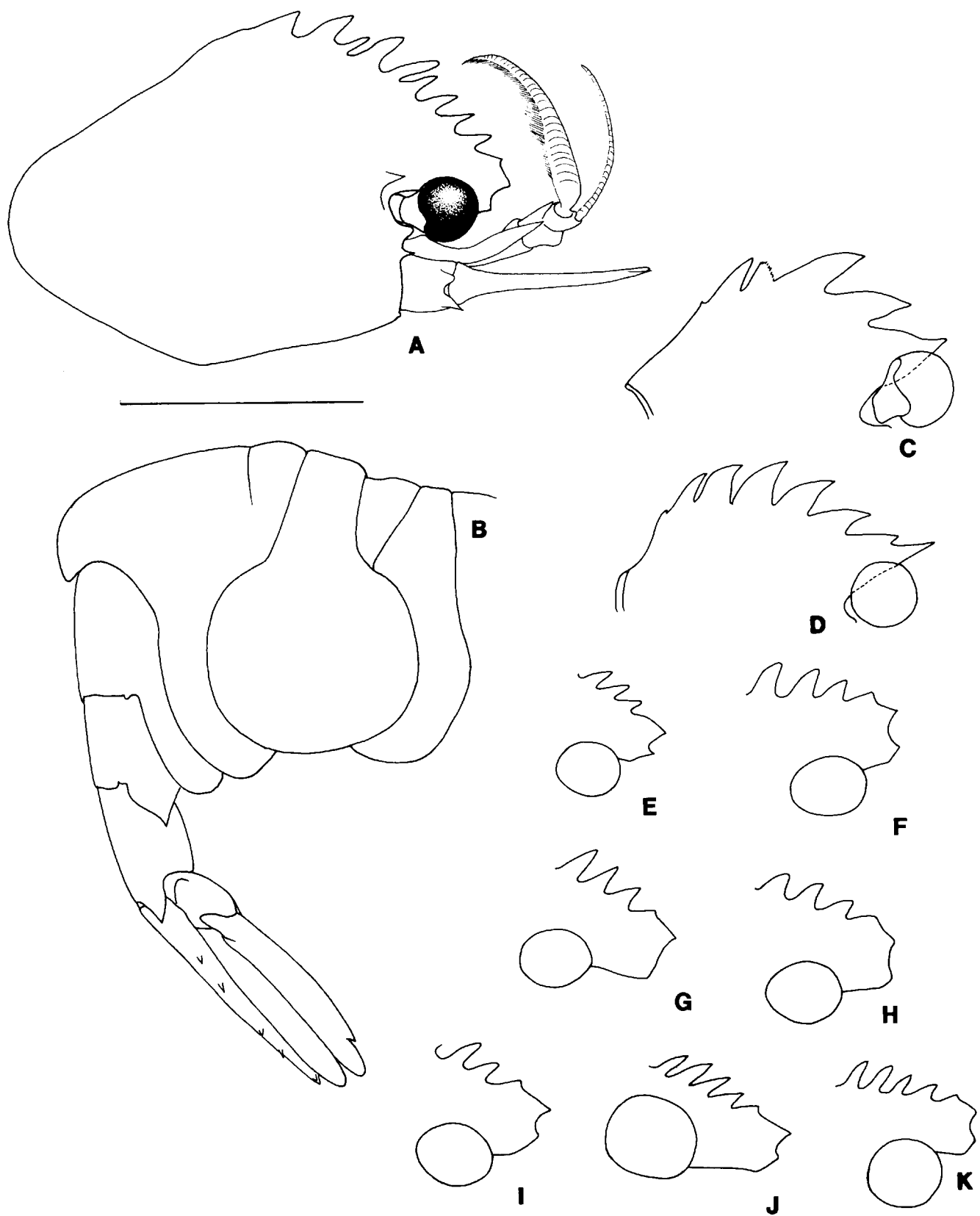


Fig. 15. *Lebbeus yaldwyni* n.sp. A, carapace in lateral view; B, abdomen in lateral view. *Lebbeus compressus* Holthuis: C, dorsal carapace of holotype; D, Specimen from Tosa, Japan, cl 8.9 mm. Rostral variation in *L. yaldwyni* n.sp. E-I, AM P26840; J, AM P24769; K, AM P26561. (Scales: A, B = 10 mm).



**Fig. 16.** *Lebbeus yaldwyni* n.sp. **A**, mandible; **B**, maxilla 1; **C**, maxilla 2; **D**, maxilliped 1; **E**, maxilliped 2; **F**, maxilliped 3; **G**, antenna 1; **H**, antenna 2; **I**, pleopod 1 ♂; **J**, pleopod 2 ♂; **K**, pleopod 2 ♂, appendix interna and appendix masculina enlarged; **L**, telson and right uropod. (Scales: A-E = 1 mm, F = 5 mm, G,H = 2 mm, I,J = 3 mm, L = 5 mm).



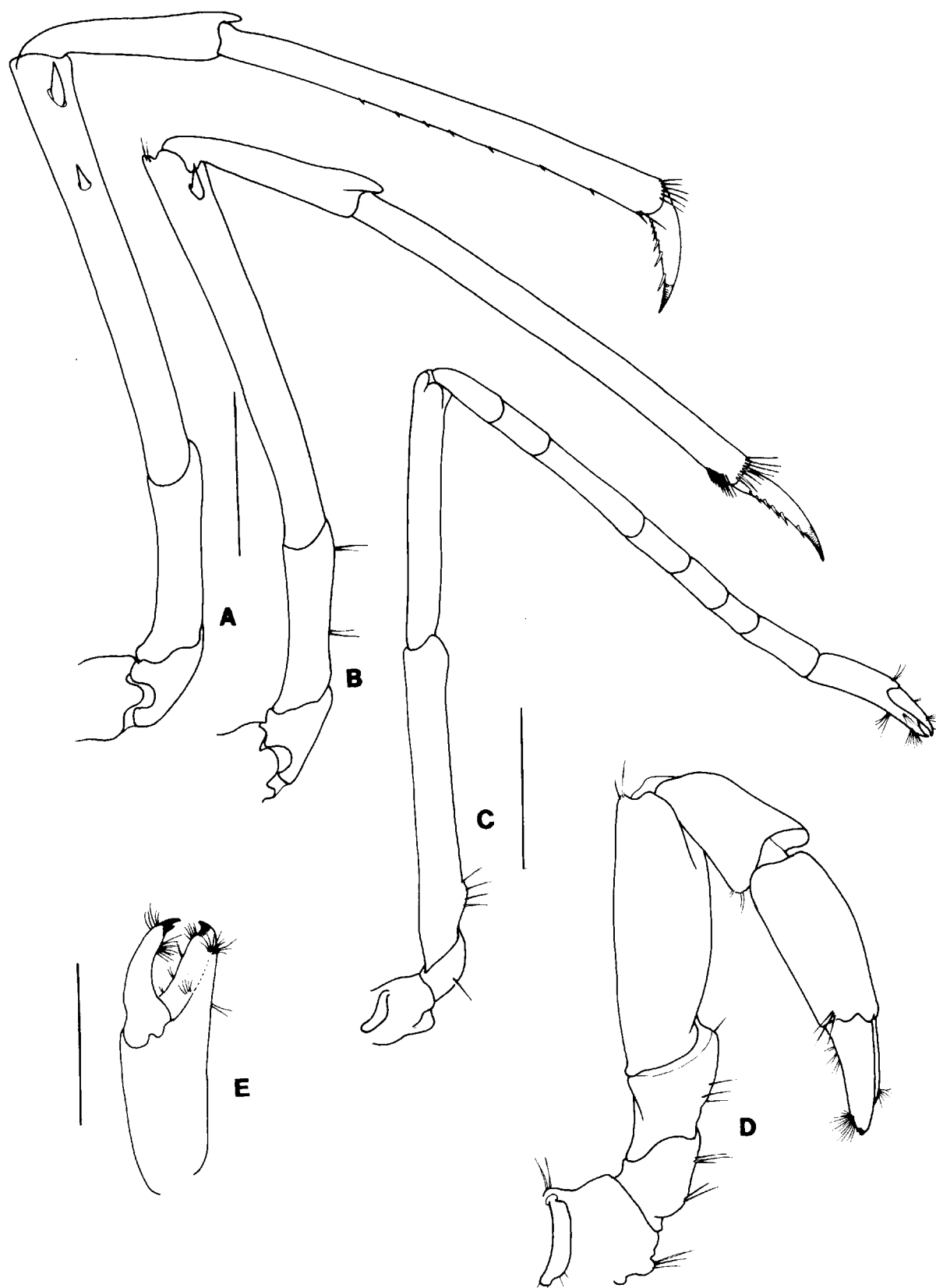


Fig. 17. *Lebbeus yaldwyni* n.sp. A, pereopod 3; B, pereopod 5; C, pereopod 2; D, pereopod 1; E, chela of pereopod 1. (Scales: A-E = 3 mm).

PARATYPES: AMP33109, east of Sydney, 33°43'S 151°51'—53'E, 450 m, *Kapala* (K77-04-13), 6 May 1977; 1 ovig. ♀, cl 11.7 mm. AM P24769, east of Batemans Bay, 34°44'S 150°37'E to 35°47'S 150°35'E, 420 m, *Kapala* (K76-11-08), 7 July 1976; 1 ♂, cl 5.1 mm. AM P21825, east of Sydney, 33°51'S 151°45'E to 33°47'S 151°48'E, 470 m, *Kapala* (K75-12-01), 11 Dec 1975; 1 ♀, cl 7.8 mm. AM P26840, east of Brush Island, 35°31'S 150°45'—47'E, 190 m, demersal prawn trawl, *Kapala* (K77-21-04), 22 Nov 1977; 5 ♀, cl 8.5—11.6 mm. USNM 221396, east of Brush Island, 35°31'S 150°45'—47'E, 190 m, *Kapala* (K77-21-04), 22 Nov 1977; 2 ♀, cl 11.0—11.3 mm.

**Diagnosis.** Carapace high-crested, dentate to posterior margin; rostrum a continuation of carapace crest, broad anterior to eye, apically variable from truncate-concave to acutely triangular, but reaching only short distance anterior to eye. Antennal, supra-orbital, and pterygostomian spine present, branchiostegal spine absent. Abdominal somites dorsally rounded. Mandibular palp of 2 articles. Maxilliped 3 lacking exopod. Pereopod 2, carpus of 7 articles. Pereopods lacking arthrobranchs.

**Description.** Carapace with broad dentate mid-dorsal crest extending almost from posterior margin onto rostrum, sloping anteroventrally; rostral-postrostral tooth count: 9—11/0—1. Rostrum variable, anteriorly obliquely truncate or hollowed, reaching almost to distal margin of basal antennular article. Carapace with single strong marginal supraorbital spine, marginal antennal spine, pterygostomian angle with rounded papilla (not quite a spine); lateral carapace with faint hepatic groove; low rounded suprabranchial ridge present.

All abdominal somites dorsally rounded. Pleura of somites 1—4 ventrally rounded, of somite 2 subcircular, of somite 4 elongate-oval; posteroventral angle of pleuron 5 acute. Somite 3 dorsally strongly hooded and curved, with rounded mid-dorsal suggestion of ridge in posterior three-fourths. Somite 5  $\frac{3}{4}$  length of somite 6. Latter with almost rectangular posteroventral corner; lobe overlapping lateral base of telson acute-spinose. Telson dorsally gently convex, with 3—5 pairs of dorsolateral spines, tapering to convex posterior margin bearing short outer, and longer inner pair of spines, with several fine setae between longer pair of spines.

Cornea of eye much wider than eyestalk, well pigmented.

Antennular stylocerite lanceolate, distally acute, extending well beyond distal margin of basal peduncular article. Distal margin of basal article bearing row of plumose setae; mesial margin with spine at distal two-thirds; second article with strong triangular spine at outer distal angle; third article with strong triangular spine directed anteriorly; inner flagellum slender, shorter than ventral flagellum; latter robust, tapering distally, of about 20 setigerous articles.

Antennal scaphocerite with outer margin almost straight, ending strong spine not extending beyond

rounded distal margin of blade; latter widest at proximal third; basal antennal article bearing strong ventral spine; flagellum extending posteriorly to level of third abdominal somite.

Mandibular palp of 2 articles, distal setose article slightly longer than proximal article; incisor flattened, slender, tapering to acute apex, bearing 4 or 5 fine distal serrations; molar stout, grinding surface oblique-truncate.

Maxilla 1, maxilla 2, maxilliped 1, and maxilliped 2 as figured.

Maxilliped 3 extending beyond scaphocerite by half length of distal article, distal article flattened, parallel-sided for most of its length, with single row of 19—20 corneous spines on mesial margin.

Pereopod 1 reaching distal  $\frac{2}{3}$  of scaphocerite, robust, fingers slightly shorter than palm; corneous acute tip of fixed finger fitting between 2 corneous apical spines of dactyl.

Pereopod 2 extending beyond scaphocerite by length of chela; carpus almost 1.75X length of merus, composed of 7 articles; ischium slightly longer than merus.

Pereopod 3 over-reaching scaphocerite by half length of propodus plus dactyl; dactyl with corneous apical spine and 6 smaller spines on flexor margin; propodus with 5 or 6 spines on distal half of flexor margin; carpus slightly less than half length of propodus, unarmed; merus with distal spine on outer surface, smaller spine at about distal two-thirds.

Pereopods 4 and 5 each extending anteriorly slightly less than pereopod 3, of similar proportions to pereopod 3, each with single distal spine on outer surface of merus.

Pereopods 1—5 each with single pleurobranch; epipod present on pereopods 1 and 2.

Uropodal basis with outer distal lobe apically narrowly rounded; outer ramus slightly longer than inner, with fixed marginal tooth and movable spine at about distal three-fourths.

**Colour.** Carapace with 4—6 curved lateral scarlet stripes running from ventral margin onto rostral-postrostral crest; latter with few additional stripes or blotches. Abdominal pleuron 1 with 3 broad bands; pleuron 2 with 2 bands; pleuron 3 with 1 band; somite 1 and 2 with single band running from pleuron; somite 3 with 3 bands. Remainder of abdomen pale pink-white. Bases of antennae, maxilliped 3, pereopod 1 up to carpus, and pereopods 2—5 bases orange red; distal articles of appendages transparent pink.

**Remarks.** From Holthuis' discussion (1947) of the species of *Lebbeus*, and Wicksten & Méndez' (1982) key to the eastern Pacific species, the present material would belong to the group possessing epipods on the first two pairs of pereopods. This group includes *L. brandtii* (Brazhnikov, 1907), *L. grandimanus* (Brazhnikov, 1907), *L. polaris* (Sabine, 1824) (= *L. unalaskensis* Rathbun, 1902), *L. scrippi*

Wicksten & Méndez, 1982, and *L. splendidus* Wicksten & Méndez, 1982.

*Lebbeus polaris* (Sabine) possesses a more elongate rostrum than the present species, and does not have a high-crested carapace. *Lebbeus brandtii* (Brazhnikov) has a short rostrum lacking, or with only one ventral tooth. *Lebbeus grandimanus* (Brazhnikov) has a relatively narrow rostrum, seen in lateral view, with four postorbital teeth not forming a crest. The two eastern Pacific species, *L. scrippsi* and *L. splendidus* Wicksten & Méndez both have narrow non-crested rostra with few dorsal teeth.

*Lebbeus compressus* Holthuis, 1947 (= *Spirontocaris gibberosa* Yokoya, 1933), a species possessing a toothed and crested carapace, has epipods on pereopod 1 only. (The holotypic male of this species, from 232 m at Siwoya-Zaki, Japan, was examined. Having a carapace length of 4.8 mm, the specimen probably dried out at some stage, and the carapace was damaged. It is possible that the epipod of pereopod 2 has been lost on both sides, because of this poor condition, but this seems unlikely). While Yokoya (1933) stated that the rostrum of his holotype was "broken off", there is no sign of damage in the rostral area. In fact, the rostrum is an acutely triangular, forwardly directed spine, quite unlike the present species.

**Etymology.** The species is named for Dr John Yaldwyn, director of the National Museum of New Zealand, and eminent carcinologist.

*Merhippolyte* Bate, 1888

*Merhippolyte chacei* n. sp.

Figs 18, 19

**Type material.** New South Wales: HOLOTYPE: AM P19092, 33°43'–37'S 151°55'–152°02'E, 686 m, bottom trawl, *Kapala* (K72-06-04), 19 Oct 1972; 1 ♀, cl 13.2 mm, (tip of rostrum damaged).

**Additional material examined.** AM P25038, east of Brush Island, 35°41'–44'S 150°38'–40'E, 549 m, *Kapala* (K76-19-04), 10 Nov 1976; 1 ♀, cl 9.5 mm.

**Diagnosis.** Rostrum almost 1.5X length of carapace, with 4–5 dorsal teeth, 7 ventral teeth, deepest just anterior to eye, anterior half dorsally unarmed. Pterygostomian angle rounded. Pleuron of abdominal somite 4 with small posteroventral tooth. Ocellus largely fused with cornea of eye. Epipods present on pereopods 1–4. Pereopod 2 reaching well beyond scaphocerite.

**Description.** Rostrum almost 1.5X carapace length, broadest just anterior to eye, anterior half dorsally unarmed, upswept, apex bifid; formula: 4–5/7; 2 postorbital spines present. Carapace with strong antennal spine; pterygostomian angle rounded. All abdominal somites dorsally rounded; pleura of somites 1–3 ventrally rounded; pleuron 4 broad, with small but distinct posteroventral tooth; pleuron 5 acute, triangular; somite 5 half length of

somite 6; posteroventral angle of somite 6 with small tooth; posterolateral lobe overlapping telsonic base triangular, acute. Telson dorsally gently convex, with 2 pairs dorsolateral spines in posterior half; posterior margin broadly triangular, with 3 pairs of spines, second pair longest.

Cornea of eye much wider than eyestalk, well pigmented; dorsal ocellus half fused to cornea.

Antennular stylocerite lanceolate, with small basal tooth on outer margin, reaching distal margin of basal antennular peduncle article; small tooth on ventromesial margin at about distal two-thirds; second and third peduncular articles unarmed; dorsal flagellum subequal to carapace and rostrum in length; ventral flagellum somewhat longer.

Antennal scaphocerite with outer margin straight, distal spine not reaching rounded apex of blade; basal segment with small ventrodorsal tooth; blade over-reaching antennular peduncle by about half its length.

Mandibular palp of 3 setose articles, second article broadest; incisor flattened, tapering, with 5 faint distal serrations; molar robust, distally obliquely truncate.

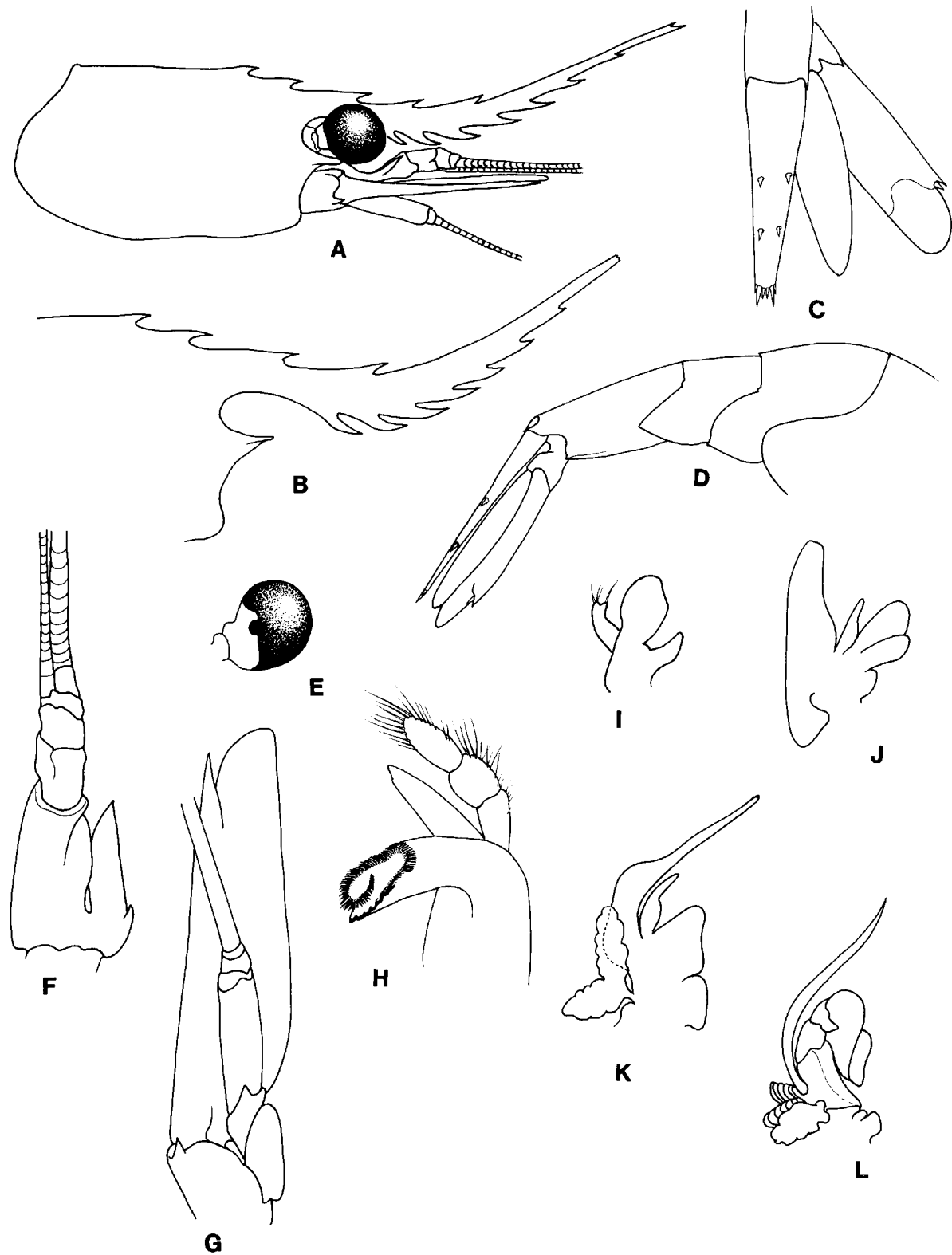
Maxilla 1, maxilla 2, maxilliped 1, and maxilliped 2 as figured.

Maxilliped 3 just over-reaching antennal blade; distal article strongly setose-spinose.

Epipods present on pereopods 1–4. Pereopod 1 reaching distal third of scaphocerite, shorter but more robust than following pereopods; fingers slightly shorter than palm; chela subequal in length to carpus; ischium produced on flexor margin into distally acute setose blade-like crest; basis with less conspicuous extension of flexor margin. Pereopod 2 over-reaching scaphocerite by distal third of carpus plus chela; fingers slightly shorter than palm; carpus consisting of 14 articles. Pereopods 3–5 similar, dactyls with strong distal corneous spine and 7 shorter spines on flexor margin; merus with 3 articulated spines on outer surface.

Uropodal basis with acute lobe overlapping outer ramus; latter extending slightly beyond inner ramus and telsonic apex, with fixed and articulated spine on outer margin at about distal three-fourths.

**Remarks.** Crosnier & Forest (1973) summarise the main differences between the five species of *Merhippolyte* described to that date. Taking the present species and working through the features listed in their Table 6, it can be seen that *M. chacei* differs from all the earlier species in several respects. The rostral formula of 4–5/7 is distinctive. The rounded pterygostomian angle only resembles *M. americana* Holthuis, 1961, and *M. kauaiensis* (Rathbun, 1906). The fourth abdominal pleuron only resembles that of *M. agulhasensis* Bate, 1888. The ocellus being largely fused with the cornea resembles *A. americana* and *M. ancistrota* Crosnier & Forest. Epipods on pereopods 1 to 4 are seen in *M. agulhasensis* and *M. calmani* Kemp & Sewell, 1912.



**Fig. 18.** *Merhippolyte chacei* n. sp. **A**, paratype in lateral view; **B**, rostrum of holotype; **C**, telson and uropod in dorsal view; **D**, abdominal somites 4-6 and tailfan in lateral view; **E**, eye; **F**, antenna 1; **G**, antenna 2; **H**, mandible; **I**, maxilla 1; **J**, maxilla 2; **K**, maxilliped 1; **L**, maxilliped 2.

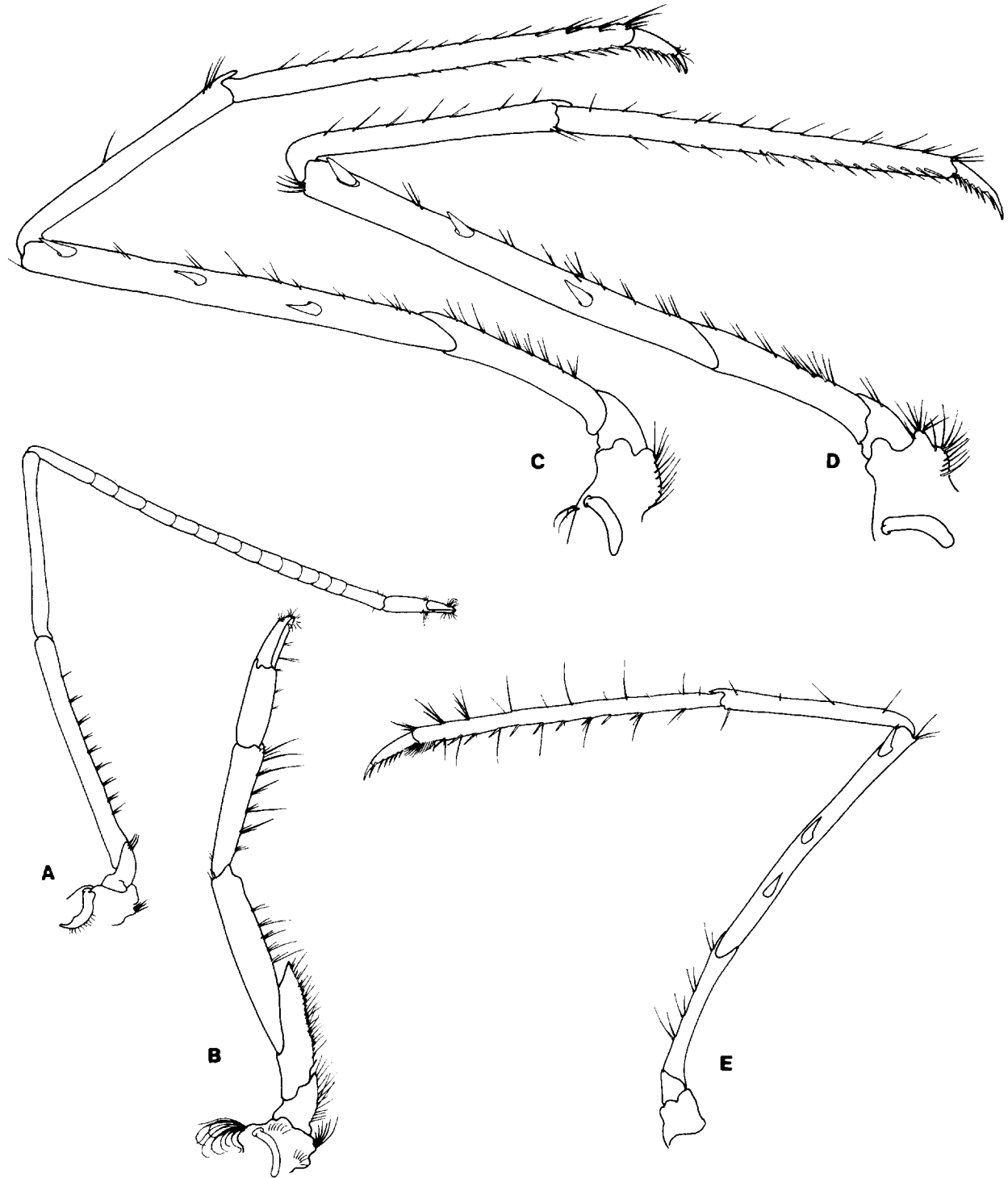


Fig. 19. *Merhippolyte chacei* n.sp. A, pereopod 2; B, pereopod 1; C, pereopod 4; D, pereopod 3; E, pereopod 5.

Further differences include the deeper rostral shape than that seen in *M. agulhasensis*, the ventrally produced ischium of pereopod 1, not seen in *M. calmani*, and pereopod 2 extending well beyond the scaphocerite, unlike *M. kauaiensis* where pereopod 2 is shorter than the scaphocerite by the length of the chela.

**Etymology.** The species is named for Fenner A. Chace, Jr. of the Smithsonian Institution, whose contributions to shrimp taxonomy are of inestimable value.

### Family PANDALIDAE

*Chlorotocus* A. Milne Edwards, 1882

*Chlorotocus novaezealandiae* (Borradaile)

*Thalassocaris novae-zealandiae* Borradaile, 1916: 84, fig. 2.  
*Chlorotocus novaezealandiae*.—Crosnier & Forest, 1973: 186; Chace, 1985: 11.

**Material examined.** New South Wales: AM P32492, north-east of Batemans Bay, 35°28'—26'S 150°44'—43'E, 40 m, trawl, *Kapala* (K76-01-03/04), 25 Mar 1976; 28 specimens (12 ovig. ♀).

**Diagnosis.** Rostrum just falling short of, just reaching, or just extending beyond, third antennular peduncle article; slender, with dorsal and ventral teeth (10—13/3—5). Carapace lacking lateral carinae; with antennal and branchiostegal spine. Pleuron of abdominal somite 5 with small posteroventral tooth. Somite 6 with short submarginal posteroventral tooth. Pereopods 1—4 each with epipod. Pereopod 1 not reaching scaphocerite apex. Pereopod 2, legs subequal, similar; chela with gape, dactylus with proximal lobe on 'cutting' margin; carpus of 2 articles.

**Remarks.** *Chlorotocus novaezealandiae* differs from the very similar and very widespread *C. crassicornis* (Costa) in two major characters: the rostrum (just reaching or barely over-reaching the distal antennular peduncle article in *C. novaezealandiae*, reaching well beyond in *C. crassicornis*), and size (ovigerous females of *C. novaezealandiae* 10.8—14.0 mm; of *C. crassicornis* 16.5—20.0 mm). The distribution of the anterior rostral teeth provides a subtle feature, becoming obsolete and close-set in the New Zealand species, but being evenly spaced in the more widespread species.

This is the first record of the species outside New Zealand waters.

**Distribution.** New Zealand; New South Wales; 140 m.

*Heterocarpus* A. Milne Edwards, 1881

*Heterocarpus sibogae* de Man

*Heterocarpus ensifer* Bate, 1888: 638—640, pl. 112, fig. 4.—Alcock, 1901: 107. (Not *Heterocarpus ensifer* A. Milne Edwards, 1881.)

*Heterocarpus sibogae* de Man, 1917: 283—284; 1920: 156, 169—171, pl. 14, figs 42—44.—Schmitt, 1926: 380—381; Calman, 1939: 206; Crosnier & Forest, 1973: 191—192 (in discussion); Chace, 1985: 36, figs 13m, 18—20.

**Material examined.** Queensland: AM P25147, east of Fraser Is., 360 m, *Markwell Enterprise*, Jan 1977; 7 specimens (4 ovig. ♀). AM P33025, north-east of Danger Point, 27°55'S 154°03'E to 27°57'S 154°03'E, 540 m, prawn trawl, *Kapala* (K78-23-09), 6 Nov 1978; 4 specimens (1 ovig. ♀). AM P33211, north-east of Danger Point, 28°01'S 154°00'E to 27°58'S 154°00'E, 540 m, prawn trawl, *Kapala* (K78-17-10), 17 Aug 1978; 10 specimens (1 ovig. ♀). AM P33026, north-east of Danger Point, 28°02'S 153°59'E to 27°59'S 153°59'E, 540 m, prawn trawl, *Kapala* (K78-09-05), 2 June 1978; 41 specimens (7 ovig. ♀). New South Wales: AM P33027, east of mouth of Clarence River, 29°41'S 153°45'E to 29°32'S 153°47'E, 405 m, prawn trawl, *Kapala* (K75-09-04), 10 Oct 1975; 4 specimens (3 ovig. ♀). AM P33028, north-east of Solitary Island, 29°47'S 153°44'E to 29°49'S 153°43'E, 432 m, prawn trawl, *Kapala* (K78-16-07), 2 Aug 1978; 14 specimens (5 ovig. ♀). AM P17906, north-east of Coffs Harbour, 29°49'S 153°42'E to 29°59'S 153°38'E, 369 m, prawn trawl, *Kapala* (K71-09-04), 12 May 1971; 4 specimens (2 ovig. ♀). AM P33208, north-east of North Solitary Island, 29°51'S 153°42'E to 29°55'S 153°42'E, 405 m, prawn trawl, *Kapala* (K78-06-06), 26 Apr 1978; 17 specimens (6 ovig. ♀). AM P26575, east of Woolli, 29°52'S 153°43'E to 29°51'S 153°43'E, 495 m, trawl, *Kapala* (K77-13-10), 23 Aug 1977; 18 specimens (4 ovig. ♀). AM P33209, north-east of North Solitary Island, 29°56'S 153°43'E to 29°53'S 153°41'E, 360 m, prawn trawl, *Kapala* (K78-06-01) 25 Apr 1978; 5 specimens (1 ovig. ♀). AM P19639, offshore between Newcastle and Sydney, 33°00'S 152°31'E to 33°44'S 151°50'E, 360—351 m, trawl, *Kapala*, July 1972; 1 specimen. AM P17905, east of Sydney, 33°39'S 152°55'E to 33°50'S 152°46'E, 360 m, trawl, *Kapala* (K71-05-04), 6 Apr 1971; 3 specimens. AM P33210, east of Sydney, 33°41'S 151°53'E to 33°39'S 151°56'E, 477 m, prawn trawl, *Kapala* (K80-21-05), 16 Dec 1980; 4 specimens. AM P25207, east of Sydney, 33°43'S 151°52'E to 33°39'S 151°54'E, 441—453 m, trawl, *Kapala* (K76-24-01), 20 Dec 1976; 5 specimens. AM P33032, east of Sydney, 33°46'S 151°49'E to 33°44'S 151°51'E, 432—418 m, prawn trawl, *Kapala* (K80-21-04), 16 Dec 1980; 1 specimen. AM P19094, east of Sydney, 33°51'S 151°51'E to 33°45'S 151°55'E, 675 m, prawn trawl, *Kapala* (K72-06-03), 19 Oct 1972; 1 specimen. AM P21040, P21047, north-east of Wollongong, 34°16'S 151°26'E to 34°22'S 151°23'E, 360 m, prawn trawl, *Kapala* (K75-05-01), 8 Aug 1975; 5 specimens (1 ovig. ♀). AM P21054, north-east of Wollongong, 34°21'S 151°24'E to 34°14'S 151°28'E, 396 m, prawn trawl, *Kapala* (K75-05-02), 8 Aug 1975; 13 specimens (3 ovig. ♀). AM P33029, north-east of Wollongong, 34°21'S 151°23'E to 34°19'S 151°25'E, 432 m, demersal trawl, *Kapala* (K78-27-13), 13 Dec 1978; 6 specimens (1 ovig. ♀). AM P33030, east of Port Kembla, 34°28'S 151°19'E to 34°34'S 151°17'E, 405 m, prawn trawl, *Kapala* (K75-05-07), 20 Aug 1975; 2 specimens (1 ovig. ♀). AM P33031, east of Shoalhaven Bight, 34°50'S 151°15'E, 828 m, dredge, *Kapala* (K78-27-04), 12 Dec 1978; 1 specimen.

**Diagnosis.** Rostrum about equal to carapace length in adult, with 9—26 dorsal and 6—13 ventral

spines. Postrostral crest starting about halfway along carapace. Carapace with strong antennal, lateral, and posterior intermediate keels. Abdominal somites 2–4 strongly carinate, somites 3 and 4 with strong posterior dorsal spine. First pair of pereopods lacking chelae; second pair of pereopods markedly unequal, carpus consisting of 6–11 articles in shorter, 17–30 in longer.

**Remarks.** *Heterocarpus sibogae* is distinguished from the very similar *H. ensifer* A. Milne Edwards by the carination of the abdominal somites. In all the specimens in this series there is, on the second abdominal segment, a high carina which often projects anteriorly and is subacute at its posterior angle. There is a less pronounced carina on the posterior half of the first segment and a ridge anteriorly. We have examined specimens of *H. ensifer* (AM P9865) from Hawaii and they have only a very low indistinct ridge on both the first and second abdominal segments.

In large specimens, including ovigerous females, the rostrum is usually 0.8 to 1.1 times the carapace length while in smaller specimens (cl 17–19 mm) the rostrum is 1.3 to 1.4 times the carapace length. The rostral formula varies from 12/7 to 18/10 in the Australian material.

The species was previously recorded from southwest of Gabo Island, Victoria, by Schmitt (1926).

**Distribution.** Andaman Sea; Indonesia; southern Philippine Islands; Japan; New Caledonia; New Hebrides; Fiji; western Samoa; eastern Australia; 247–828 m.

#### *Heterocarpus woodmasoni* Alcock

*Heterocarpus Wood-Masoni* Alcock, 1901: 108.—Alcock & McArdle, 1901, pl. 51 fig. 2; de Man, 1920: 154, 156–159, pl. 13, figs 36–36c; Calman, 1939: 204.

*Heterocarpus woodmasoni*.—Kensley, 1972: 50 (in key), fig. 23D; Chace, 1985: 13q.

**Material examined.** Queensland: AM P25145, east of Fraser Island, 360 m, *Markwell Enterprise*, Jan 1977; 8 specimens.

**Diagnosis.** Rostrum longer than carapace length, with 7–12 dorsal, and 4–9 ventral spines postrostral crest starting at about anterior quarter of carapace. Carapace with antennal and lateral keels. Abdominal somites 1 and 2 dorsally rounded, somites 3–5 dorsally carinate, somite 6 with paired longitudinal carinae; somite 3 with prominent mid-dorsal hooked spine. Second pair of pereopods markedly unequal, carpus consisting of 20–26 articles in longer, 9–12 articles in shorter.

**Remarks.** *Heterocarpus woodmasoni* is distinguished from other species of the genus by the presence of a prominent hooked spine dorsally on the third abdominal somite. In the ovigerous females in this series the rostrum is 1.3 to nearly 1.5 times the

carapace length and the rostral formula is 8/6 or 8/7.

**Distribution.** Indian Ocean, Andaman Sea to Indonesia, Philippines, and South China Sea; 291–655 m.

#### *Plesionika* Bate, 1888

##### *Plesionika alcocki* (Anderson)

*Pandalus alcocki* Anderson, 1896: 92–93.—Alcock & McArdle, 1901, pl. 52, figs 2, 4; Alcock, 1901: 97–98.  
*Plesionika alcocki*.—Calman, 1939: 197; Chace, 1985: 55.

**Material examined.** Queensland: AM P35878, P34383, north-east of Point Danger, 28°03'S 154°04'E to 28°01'S 154°04'E, 724 m, demersal prawn trawl, *Kapala* (K78-23-08), 6 Nov 1978; 9 specimens (4 ovig. ♀). New South Wales: AM P25144, north-east of Broken Bay, 33°30'S 152°05'E to 33°27'S 152°07'E, 810 m, demersal prawn trawl, *Kapala* (K76-24-04), 21 Dec 1976; 3 specimens (2 ovig. ♀). AM P35876, east of Broken Bay, 33°32'S 152°06'E to 33°34'S 152°05'E, 808 m, demersal prawn trawl, *Kapala* (K79-20-13), 6 Dec 1979; 5 ovig. ♀. AM P20994, P20998, east of Broken Bay, 33°32'S 152°00'E, 810 m, demersal prawn trawl, *Kapala* (K75-05-05), 19 Aug 1975; 3 specimens. AM 26783, east of Broken Bay, 33°34'S 152°02'E to 33°31'S 152°04'E, 895 m, demersal prawn trawl, *Kapala* (K77-23-07), 6 Dec 1977; 1 specimen. AM P25151, east of Broken Bay, 33°35'S 152°01'E to 33°32'S 152°03'E, 810 m, demersal prawn trawl, *Kapala* (K76-24-03), 20 Dec 1976; 9 specimens (4 ovig. ♀). AM P35877, east of Broken Bay, 33°35'S 152°00'E to 33°33'S 152°02'E, 810 m, demersal prawn trawl, *Kapala* (K77-23-12), 8 Dec 1977; 2 specimens (1 ovig. ♀). AM P19087, south-east of Broken Bay, 33°43'S 151°56'E to 33°40'S 151°59'E, 765 m, demersal prawn trawl, *Kapala* (K72-07-14), 6 Dec 1972; 1 ovig. ♀. AM P19088, south-east of Broken Bay, 32°42'S 151°55'E to 33°40'S 151°57'E, 810 m, demersal prawn trawl, *Kapala* (K72-07-16), 7 Dec 1972; 1 specimen. AM P35872, north-east of Port Jackson, 33°47'S 151°55'E to 33°44'S 151°57'E, 806 m, demersal trawl, *Kapala* (K78-26-16), 7 Dec 1978; 11 specimens (6 ovig. ♀).

**Diagnosis.** Rostrum immovable, longer than carapace, dorsally unarmed anterior to crest, ventral margin with fewer than 20 fairly widely spaced teeth; rostral crest of 5 sharp teeth, posterior 3 teeth small and movable. Third abdominal somite unarmed posteriorly; fourth abdominal somite without posteroventral denticle on pleuron; fifth abdominal somite with posteroventral denticle on pleuron. Telson with 4 pairs of dorsolateral spines. Eyes well developed, lacking ocellus. Second pair of pereopods subequal, chelate, carpus consisting of 26–32 articles. Third maxilliped with exopod. Pereopods 1–4 with strap-like epipods.

**Remarks.** The rostrum of the adults in these specimens is just under 1.5 times the carapace length; on the ventral margin there are about eight well spaced teeth, with a further four to five very small teeth near the apex. The second pair of pereopods are subequal in length and exceed the scaphocerite by the length of the chela and the first carpal joint. There are small tufts of setae on the chelae.

In both sexes pereopods three to five have a distinct dactyl which is about one-eighth of the propod length in the fifth pereopod and about one-fifth of the propod length in the third pereopod; there are setae at the bases of the dactyls.

The rostrum of *P. alcocki* is similar to that of *P. martia* (A. Milne Edwards) in being smooth dorsally in front of the rostral crest but *P. alcocki* is distinguished from *P. martia* by having a much shorter rostrum with fewer teeth in the rostral crest and fewer more widely spaced teeth ventrally.

These specimens were collected between 28°S and 34°S in trawls to 900 m depth.

**Distribution.** Indian Ocean; western Pacific; 500–1412 m.

### *Plesionika bifurca* Alcock & Anderson

*Plesionika bifurca* Alcock & Anderson, 1894: 155.—Alcock & McArdle, 1901, pl. 51, fig. 6; de Man, 1920: 115, 136–138, pl. 12, figs 31, 31b; Calman, 1939: 199; Chace, 1985: 56, fig. 24.

*Pandalus (Plesionika) bifurca*.—Alcock, 1901: 98.

**Material examined.** New South Wales: AM P26809, P26800, north-east of Norah Head, 33°08'S 152°27'E to 33°10'S 152°24'E, 580 m, demersal prawn trawl, *Kapala* (K77-23-09), 7 Dec 1977; 2 specimens. AM P26758, north-east of Norah Head, 33°11'S 152°24'E to 33°09'S 152°25'E, 720 m, demersal prawn trawl, *Kapala* (K77-23-10), 7 Dec 1977; 4 ovig. ♀. AM P25120, east of Broken Bay, 33°35'S 152°01'E to 33°32'S 152°03'E, 810 m, demersal prawn trawl, *Kapala* (K76-24-03), 20 Dec 1976; 1 specimen. AM P19084, south-east to east of Broken Bay, 33°43'S 151°55'E to 33°37'S 152°02'E, 675 m, demersal prawn trawl, *Kapala* (K72-06-04), 19 Oct 1972; 2 specimens. AM P19085, south-east of Broken Bay, 33°44'S 151°55'E to 33°40'S 151°58'E, 720 m, demersal prawn trawl, *Kapala* (K72-07-04), 9 Nov 1972; 1 ovig. ♀. AM P19083, east to north-east of Port Jackson, 33°51'S 151°51'E to 33°45'S 151°55'E, 675 m, demersal prawn trawl, *Kapala* (K72-06-03), 19 Oct 1972; 2 specimens.

**Diagnosis.** Rostrum immovable, slightly more than half carapace length, rostral crest of 4 teeth behind orbital margin and 2–3 teeth anterior to these on dorsal margin; ventral margin with 3–6 teeth and small subapical tooth. Third abdominal somite dorsally rounded, unarmed posteriorly; fourth abdominal somite without posteroventral denticle; fifth abdominal somite with a posteroventral denticle. Telson with 5 pairs of dorsolateral spines. Eyes well developed, lacking ocellus. Third maxilliped with exopod. Second pair of pereopods chelate, unequal, carpus of shorter with 10–15 articles, of longer with 15–24 articles. Pereopods 1–4 with strap-like epipods.

**Remarks.** In these specimens the rostrum length is up to two-thirds (0.57–0.67) the carapace length. There are four teeth in the rostral crest behind the orbital margin and two or three anteriorly. On the ventral margin of the rostrum there are usually four or

five teeth and one subapical but in two specimens there are only three teeth and in one specimen six teeth as well as the subapical tooth. The telson is about one and one-third times the length of the sixth abdominal segment.

The short rostrum with few widely spaced teeth distinguishes *P. bifurca* from other species of *Plesionika* so far recorded off New South Wales.

These specimens were collected between 33°S and 34°S in trawls to depth of 810 m.

**Distribution.** Indo-west Pacific to South China Sea and Japan; 245–1412 m.

### *Plesionika edwardsi* (Brandt)

*Pandalus Edwardsii* Brandt, 1851: 122.

*Pandalus longirostris* Borradaile, 1899: 413, pl. 37, figs 10, 10a–h.

*Plesionika longirostris*.—Barnard, 1950: 681–682, fig. 126n; Crosnier, 1976: 234, fig. 4a; Kensley, 1981b: 28 (in list).

*Plesionika edwardsii*.—Crosnier & Forest, 1973: 202, figs 63b, 64b; Chace, 1985: 62, fig. 26.

**Material examined.** New South Wales: AM P35890, south-east of Point Danger, 28°17'S 153°53'E to 28°13'S 153°52'E, 198 m, demersal prawn trawl, *Kapala* (K78-17-14), 17 Aug 1978; 8 specimens (6 ovig. ♀). AM P17902, north-east of Norah Head, 33°11'S 152°20'E to 33°14'S 152°16'E, 277 m, demersal prawn trawl, *Kapala* (K71-08-01), 27 Apr 1971; 1 specimen. AM P18101, north-east of Norah Head, 33°11'S 152°20'E to 33°16'S 152°18'E, 274 m, demersal prawn trawl, *Kapala* (K71-14-05), 12 Aug 1971; 15 specimens (12 ovig. ♀). AM P26838, north-east of Batemans Bay, 35°29'S 150°46'E to 35°44'S 150°36'E, 216 m, demersal fish trawl, *Kapala* (K77-11-01/02/03), 2 Aug 1977; 1 specimen. AM P34385, P35889, south-east of Batemans Bay, 35°50'S 150°34'E to 35°46'S 150°36'E, 360 m, demersal fish trawl, *Kapala* (K79-11-04), 7 Aug 1979; 11 specimens (4 ovig. ♀).

**Diagnosis.** Rostrum immovable, about twice carapace length, with about 4 sharp teeth basally and more than 20 teeth along dorsal margin; ventral margin with more than 30 teeth. Third abdominal somite dorsally rounded, unarmed posteriorly; fourth abdominal somite without posteroventral denticle; fifth abdominal somite with posteroventral denticle. Eyes well developed, ocellus present. Third maxilliped with exopod, last and penultimate articles subequal. Second pair of pereopods chelate, subequal, carpus consisting of 21–25 articles. Pereopods 1–4 with reduced strap-like epipods.

**Remarks.** In these specimens the rostrum is about twice (1.8–2.3) the carapace length; dorsally the rostrum has four large teeth basally and 21 to 28 anteriorly; ventrally there are 36 to 44 closely-set teeth. The telson is subequal to or slightly less than (1.0–0.9) the length of the sixth abdominal somite.

These specimens were collected between 28°13'S and 35°50'S in trawls to a depth of 360 m.



**Distribution.** Eastern and western Atlantic, Mediterranean, Gulf of Mexico, Indo-west Pacific; 50–689 m.

*Plesionika grahami* n. sp.

Figs 20, 21

**Type material.** New South Wales: HOLOTYPE: AM P35897, north-east of Port Jackson, 33°44'S 151°49'E to 33°42'S 151°50'E, 405 m, trawl, *Kapala*, 28 Sept 1975; 1 ♂, cl 18.4 mm. PARATYPES: AM P35896, east of North Solitary Island, 29°53'S 153°42'E to 29°55'S 153°42'E, 411 m, demersal prawn trawl, *Kapala* (K78-06-06), 26 Apr 1978; 4 specimens (1 ovig. ♀). AM P21583, north-east of Port Jackson, 33°44'S 151°49'E to 33°42'S 151°50'E, 405 m, trawl, *Kapala*, 28 Sept 1975; 2 specimens. AM P26576, north-east of North Solitary Island, 29°52'S 153°43'E to 29°51'S 153°43'E, 500 m, demersal prawn trawl, *Kapala* (K77-13-10), 23 Aug 1977; 2 specimens. AM P21030, north-east of Wollongong, 34°21'S 151°24'E to 34°14'S 151°28'E, 400 m, demersal prawn trawl, *Kapala* (K75-05-02), 8 Aug 1975; 1 specimen. USNM 211400, off Sydney, 33°46'S 151°50'E to 33°42'S 151°53'E, 414 m, demersal prawn trawl, *Kapala* (K80-06-01), 24 May 1980; 7 specimens.

**Additional material examined.** New South Wales: AM P35904, south-east of Cape Byron, 28°41'S 153°51'E to 28°44'S 153°51'E, 149 m, demersal prawn trawl, *Kapala* (K78-17-21), 18 Aug 1978; 1 specimen. AM P35899, north-east of North Solitary Island, 29°47'S 153°44'E to 29°49'S 153°43'E, 425 m, demersal prawn trawl, *Kapala* (K78-16-07), 2 Aug 1978, 5 specimens. AM P17897, transect from north-east of Newcastle to north-east of Port Jackson, 32°46'S, 152°46'E to 33°44'S, 151°53'E, 540 m, demersal prawn trawl, *Kapala*, Apr 1971; 1 specimen. AM P17996, transect from north-east of Newcastle to east of Port Jackson, 32°46'S 151°48'E to 33°53'S 152°42'E, 191–540 m, demersal prawn trawl, *Kapala*, Apr 1971; 1 specimen. AM P26821, south-east of Newcastle, 32°59'S 152°34'E to 33°02'S 152°42'E, 360 m, demersal prawn trawl, *Kapala* (K77-23-08), 7 Dec 1977; 1 specimen. AM P35898, south-east of Broken Bay, 33°40'S 151°54'E to 33°33'S 151°58'E, 450 m, demersal prawn trawl, *Kapala* (K74-15-25/26) 5 Dec 1974; 1 specimen. AM P35900, south-east of Broken Bay, 33°41'S 151°53'E to 33°39'S 151°56'E, 477 m, prawn trawl, *Kapala* (K80-21-05), 16 Dec 1980; 2 specimens. AM P25210, south-east of Broken Bay, 33°42'S 151°52'E to 33°39'S 151°44'E, 446 m, demersal prawn trawl, *Kapala* (K76-24-01), 20 Dec 1976; 1 specimen. AM P35903, north-east of Port Jackson, 33°46'S 151°49'E to 33°44'S 151°51'E, 425 m, prawn trawl, *Kapala* (K80-21-04), 16 Dec 1980; 2 specimens. AM P19086, east to north-east of Port Jackson, 33°51'S 151°51'E to 33°45'S 151°55'E, 675 m, demersal prawn trawl, *Kapala* (K72-06-03), 19 Oct 1972; 2 specimens. AM P18014, south-east of Wollongong, 34°30'S 151°19'E to 34°38'S 151°13'E, 522 m, demersal prawn trawl, *Kapala* (K71-11-03), 6 July 1971; 1 specimen. AM P24827, north-east of Batemans Bay, 35°28'S 150°50'E to 35°33'S 150°47'E, 594 m, demersal fish trawl, *Kapala* (K76-11-12), 8 July 1976; 4 specimens. AM P35905, north-east of Batemans Bay, 35°34'S 150°44'E to 35°30'S 150°47'E, 400 m, prawn trawl, *Kapala* (K75-12-03), 15 Dec 1975; 1 specimen (bopyrid in right branchial chamber). AM P18015, north-east of Batemans Bay, 35°35'S 150°43'E to 35°35'S 150°50'E,

360 m, demersal prawn trawl, *Kapala* (K71-13-05), 2 Aug 1971; 1 specimen. AM P35901, north-east of Point Danger, 28°06'S 153°58'E to 28°03'S 153°58'E, 404 m, demersal prawn trawl, *Kapala* (K78-09-04), 1 June 1978; 1 ♀. AM P35902, north-east of Point Danger, 27°55'S 154°03'E to 27°57'S 154°03'E, 629 m, demersal prawn trawl, *Kapala* (K78-23-08), 6 Nov 1978; 1 specimen.

**Diagnosis.** Rostrum over-reaching antennal scale, armed dorsally with 6 or 7 teeth on rostral crest, 3 or 4 posterior to orbital margin, 3 posterior-most teeth articulated; 3 subapical teeth present; armed ventrally with 18–22 teeth. Orbital margin ventrally rounded, posteriorly concave, dorsally sinuous. Abdomen with somite 3 posteriorly unarmed, dorsally compressed but not carinate. Somite 4 and 5, pleura with posteroventral tooth. Somite 6 about 13/5 longer than maximum height, with posteroventral tooth. Telson 12/5 length of somite 6. Eye somewhat compressed; ocellus large, subcircular, narrowly joined to cornea. Stylocerite just over-reaching antennular peduncle article 2. Scaphocerite 4.2X longer than wide; distal tooth not over-reaching apex of blade. Maxilliped 3 with epipod; penultimate article 2/3 length of terminal article. Pereopods 1–4 each with epipod. Legs of pereopod 2 unequal, left long and slender, carpus of about 114 articles, right with 25 articles. Pereopod 3 over-reaching scaphocerite by length of dactyl and distal 1/3 of propodus; dactyl about 1/5 length of propodus, accessory spine almost as long as main terminal spine. Pleopod 3 exopod almost half length of carapace.

**Description.** Rostrum extending well beyond scaphocerite, distally strongly upturned, about 1.6X carapace length; dorsally with supraorbital crest of 6 or 7 teeth, posterior 2 or 3 of which articulated; remainder of dorsal margin unarmed except for 3 small subterminal teeth; 3–4 teeth posterior to orbital margin; none of teeth barbed; ventral margin armed with 18–22 basally close-set teeth, becoming more widely spaced anteriorly; no postrostral carina or ridge. Orbital margin dorsally sinuous. Antennal spine stronger than pterygostomial spine.

Abdomen with somite 3 posteriorly unarmed, lacking median carina, but somewhat bilaterally compressed, forming ill-defined rounded ridge. Pleuron of somite 3 posteroventrally rounded; those of somites 4 and 5 with posteroventral tooth. Somite 6 about 1.6X length of somite 5, 1.5X longer than wide. Telson about 1.5X length of somite 6, with 4 pairs of dorsolateral spines.

Eye subpyriform, maximum diameter 2/7 length of carapace; ocellus large, subcircular, narrowly connected to cornea.

Antennular stylocerite slender, acute, barely or just over-reaching distal margin of peduncular article 2.

Scaphocerite with lateral margin straight to very slightly convex, 5/2X length of carapace, about 4.2X longer than wide, distal tooth just falling short of apex of blade.

Mouthparts as illustrated. Maxilliped 3 with epipod, over-reaching scaphocerite by  $\frac{1}{3}$  of distal article, armed with 1 distal and 4 subterminal spines; penultimate article about  $\frac{2}{3}$  length of terminal article.

Pereopods 1–4 each with straplike epipod. Pereopod 1 over-reaching scaphocerite by little more than chela, fingers small, movable finger very slightly over-reaching fixed finger. Second pereopods unequal; left elongate, slender, carpus of about 114 articles; right more robust, carpus of 26 articles. Pereopods 3 and 4 over-reaching scaphocerite by dactyl and  $\frac{1}{3}$  of propodus, with 3 spines on carpus, 7–8 spines on outer and 4 spines on mesial surface of merus. Pereopod 5 over-reaching scaphocerite by slightly more than length of dactyl, armed with 3 spines on outer surface of carpus, 7–9 on outer, and 1–3 on mesial surface of merus, single distal spine on ischium. Endopod of pleopod 1 in male with mesial margin sinuous, small rounded distal lobe bearing hooks. Appendix masculina of pleopod 2 in male longer than appendix interna, with about 16 spines on mesial and distal margin.

Mesial uropodal ramus over-reaching telson, outer ramus slightly longer, with more elongate articulated spine mesial to fixed distolateral tooth.

**Remarks.** Using the invaluable key to the Indo-Pacific species of *Plesionika* provided by Chace (1985), the present species keys out to *P. rostricrescentis* (Bate), a species known from the

Philippines and Indonesia, Japan, New Guinea, and Tonga. However, comparison with the description and with material from the Philippines and Indonesia reveals several major differences, especially in the rostrum and second pereopods (see Table 6).

**Etymology.** The species is named for Mr Ken Graham, biologist with the Fisheries Division of the NSW Department of Agriculture, who has been responsible for the collection of much of the material described in this report while working on board the FRV *Kapala*.

	<i>P. rostricrescentis</i>	<i>P. grahami</i>
rostral crest spines	7–9	6
movable crest spines	5–6	3
ventral rostral teeth	9–15	18–22
carpal articles, pereopod 2		
longer	88	114
shorter	17–21	26
pereopods 3–5		
carpal spines	2	3
meral spines	2 inner, 5 outer	4 inner, 7–8 outer
telson/somite 6 length	1.5	1.2–1.4
Maximum carapace length	18 mm	18–21.8 mm

Table 6. Comparison of *Plesionika rostricrescentis* and *P. grahami*.

#### *Plesionika martia* (A. Milne Edwards)

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

*Plesionika martia*.—Schmitt, 1926: 377–380; Crosnier,

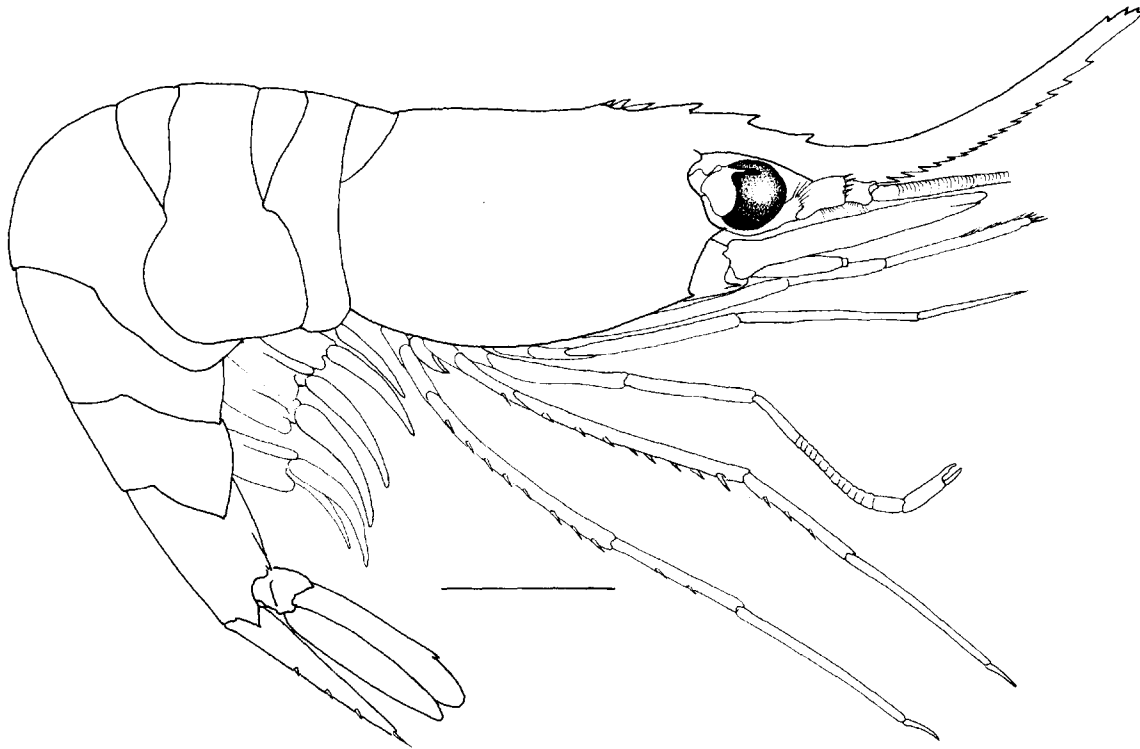


Fig. 20. *Plesionika grahami* n.sp. Lateral view. (Scale = 10 mm).

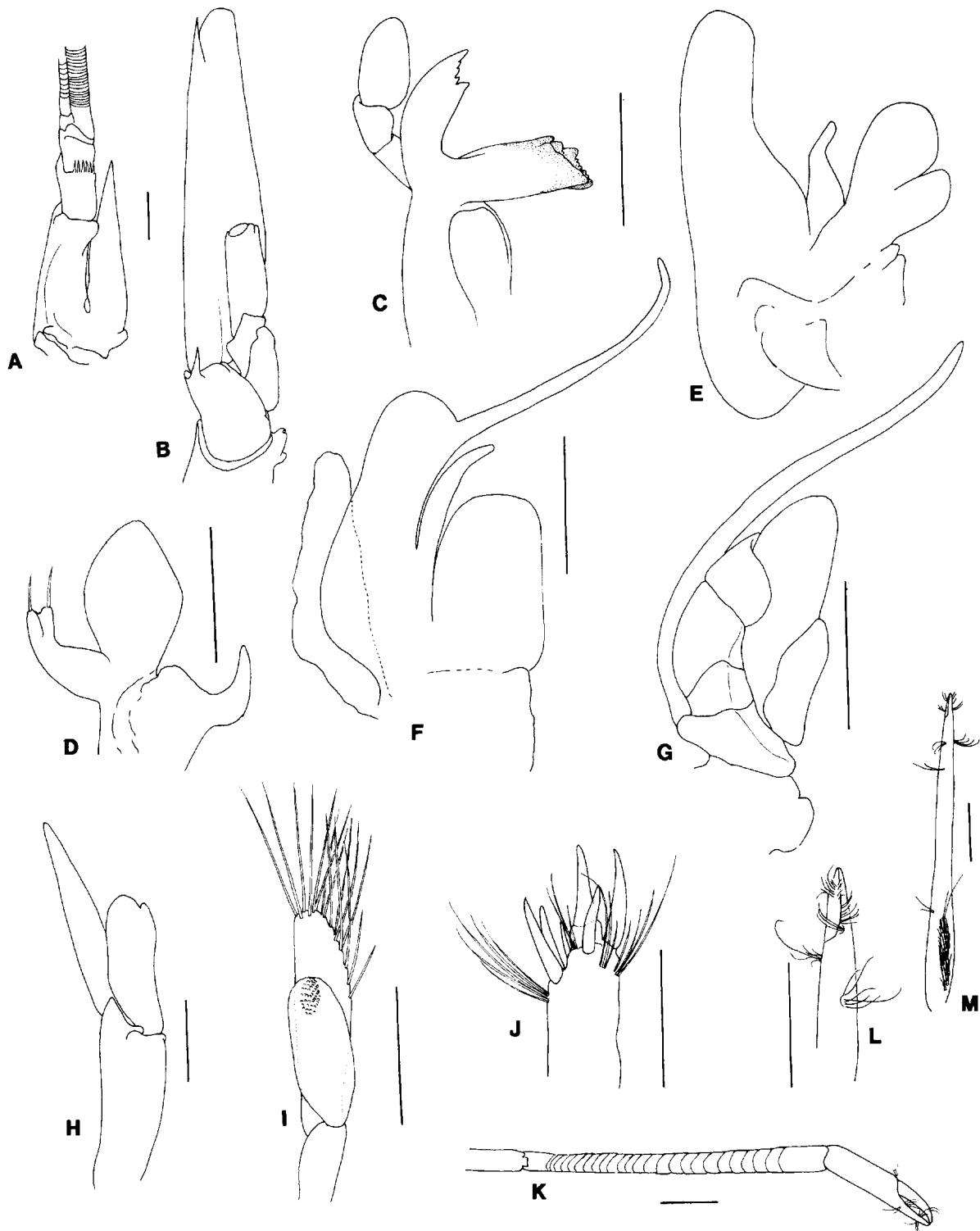


Fig. 21. *Plesionika grahami* n.sp. A, antenna 1; B, antenna 2; C, mandible; D, maxilla 1; E, maxilla 2; F, maxilliped 1; G, maxilliped 2; H, pleopod 1 ♂; I, pleopod 2 ♂, appendix interna and appendix masculina; J, apex of dactyl of maxilliped 3; K, right pereopod 2; L, pereopod 1 chela enlarged; M, pereopod 1, dactylus and propodus. (Scales: A-H, K = 2 mm, I-J, L-M = 1 mm).

1970: 235; Kensley, 1972: 50, fig. 23H; 1981b: 28; Crosnier & Forest, 1973: 212–217, figs 63d, 64c, 66.

**Material examined.** Queensland: AM P35865, north-east of Point Danger, 28°01'S 154°00'E to 27°58'S 154°00'E, 542 m, demersal prawn trawl, *Kapala* (K78-17-10), 17 Aug 1978; 7 specimens (2 ovig. ♀). AM P35866, north-east of Point Danger, 28°03'S 154°04'E to 28°01'S 154°04'E, 724 m, demersal prawn trawl, *Kapala* (K78-23-08), 6 Nov 1978; 3 specimens. New South Wales: AM P35867, east of Yamba, 29°26'S 153°49'E to 29°20'S 153°50'E, 450 m, demersal prawn trawl, *Kapala* (K75-09-08), 12 Oct 1975; 14 specimens (11 ovig. ♀). AM P35868, south-east of Cape Hawke, 32°22'S 152°51'E to 32°17'S 153°01'E, 463 m, demersal prawn trawl, *Kapala* (K75-08-03) 12 Oct 1975; 13 specimens (6 ovig. ♀). AM P17899, transect from north-east of Newcastle to east of Port Jackson, 32°46'S 151°48'E to 33°53'S 152°42'E, 191–540 m, demersal prawn trawl, *Kapala*, Apr 1971; 4 specimens. AM P19640, transect from east of Newcastle to north-east of Port Jackson, 33°00'S 152°31'E to 33°44'S 151°50'E, 355 m, demersal prawn trawl, *Kapala*, July 1972; 2 specimens (ovig. ♀). AM P17898, north-east of Norah Head, 33°11'S 152°20'E to 33°14'S 152°16'E, 277 m, demersal prawn trawl, *Kapala* (K71-08-01), 27 Apr 1971; 2 ovig. ♀. AM P35869, east of Broken Bay, 33°35'S 152°00'E to 33°33'S 152°02'E, 810 m, demersal prawn trawl, *Kapala* (K77-23-12), 8 Dec 1977; 1 specimen. AM P25209, south-east of Broken Bay, 33°42'S 151°52'E to 33°33'S 151°54'E, 446 m, demersal prawn trawl, *Kapala* (K76?24-01), 20 Dec 1976; 11 specimens (5 ovig. ♀). AM P18992, south-east of Broken Bay, 33°42'S 151°55'E to 33°40'S 151°57'E, 810 m, demersal prawn trawl, *Kapala* (K72-07-16), 7 Dec 1972; 8 specimens. AM P18983, south-east of Broken Bay, 33°43'S 151°56'E to 33°40'S 151°59'E, 765 m, demersal prawn trawl, *Kapala* (K72-07-14), 6 Dec 1972; 1 specimen. AM P21586, north-east of Port Jackson, 33°44'S 151°49'E to 33°42'S 151°50'E, 405 m, trawl, *Kapala*, 28 Sept 1975; 4 specimens. AM P18978, south-east of Broken Bay, 33°44'S 151°55'E to 33°40'S 151°58'E, 720 m, demersal prawn trawl, *Kapala* (K72-07-04), 9 Nov 1972; 1 specimen. AM P21041, P21049, north-east of Wollongong, 34°16'S 151°26'E to 34°22'S 151°23'E, 356 m, prawn trawl, *Kapala* (K75-05-01), 8 Aug 1975; 2 ovig. ♀. AM P21046, north-east of Wollongong, 34°21'S 151°24'E to 34°14'S 151°28'E, 400 m, demersal prawn trawl, *Kapala* (K75-05-02), 8 Aug 1975; 3 specimens (2 ovig. ♀). AM P35870, north-east of Wollongong, 34°24'S 151°25'E to 34°23'S 151°25'E, 738 m, prawn trawl, *Kapala* (K76-23-01), 13 Dec 1976; 1 specimen. AM P34386, south-east of Broken Bay, 33°43'S 151°54'E to 33°39'S 151°55'E, 531–423 m, prawn trawl, *Kapala* (K83-14-07), 27 Oct 1983; 3 ♂, 2 ovig. ♀.

**Diagnosis.** Rostrum immovable, about twice carapace length, rostral crest of 7–9 sharp teeth, dorsal margin anterior to crest smooth, ventral margin with 37 or more teeth. Third abdominal somite dorsally rounded, unarmed posteriorly; fourth abdominal somite without posteroventral denticle; fifth abdominal somite posteroventrally sharp, usually with denticle. Telson with 4 pairs of dorsolateral spines. Eyes well developed, ocellus present. Third maxilliped with exopod. Pereopods 1–4 with strap-like epipod. Second pair of pereopods

chelate, subequal, carpus consisting of 18–36 articles.

**Remarks.** In these specimens the rostrum is about twice the carapace length in the adults and up to 2.5 times the carapace length in smaller (cl 13–16 mm.) specimens. Most of the specimens have seven or eight spines dorsally on the rostrum but the range over all the specimens is from six to ten spines. The number of spines ventrally on the rostrum ranges from 37 to 60. The dactyl of the third pereopod is slightly less than a third the length of the propod. The length of the sixth abdominal segment is about twice the maximum height.

The rostrum of this species is, like that of *P. alcocki*, smooth on the dorsal margin ahead of the rostral crest but *P. martia* is distinguished from *P. alcocki* by its longer rostrum, more teeth in the rostral crest and more teeth more closely spaced on the ventral margin of the rostrum.

These specimens were collected between 28°S and 34°25'S in trawls to a depth of 810 m.

**Distribution.** Western and eastern Atlantic and throughout the Indo-West Pacific; 277–900 m.

#### *Plesionika reflexa* Chace

*Plesionika reflexa* Chace, 1985: 108, fig. 49.

**Material examined.** Queensland: AM P35875, north-east of Point Danger, 27°55'S 154°03'E to 27°57'S 154°03'E, 629 m, demersal prawn trawl, *Kapala* (K78-23-09), 6 Nov 1978; 2 specimens. AM P34384, north-east of Point Danger, 28°01'S 154°00'E to 27°58'S 154°00'E, 542 m, demersal prawn trawl, *Kapala* (K78-17-10), 17 Aug 1978; 3 specimens (1 ovig. ♀). New South Wales: AM P35873, transect from north-east of Newcastle to east of Port Jackson, 32°46'S 151°48'E to 33°53'S 152°42'E, 191–540 m, demersal prawn trawl, *Kapala*, April 1971; 1 specimen. AM P21587, north-east of Port Jackson, 33°44'S 151°49'E to 33°42'S 151°50'E, 405 m, trawl, *Kapala* (no stn), 28 Sept 1975; 1 specimen. AM P35874, north-east of Port Jackson, 33°46'S 151°49'E to 33°44'S 151°51'E, 425 m, demersal prawn trawl, *Kapala* (K80-21-04), 16 Dec 1980; 3 specimens. AM P21042, north-east of Wollongong, 34°16'S 151°26'E to 34°22'S 151°23'E, 356 m, demersal prawn trawl, *Kapala* (K75-05-01), 8 Aug 1975; 1 specimen.

**Diagnosis.** Rostrum immovable, posteriorly curved ventrally, anteriorly curved dorsally, about twice carapace length or longer, 5 or 6 sharp teeth proximally, remainder of dorsal margin smooth except for subapical spine, ventral margin with more than 30 teeth. Third abdominal somite with posteromedian spine slightly recurved dorsally. Eyes well developed. Maxilliped 3 with exopod. Second pair of pereopods subequal, chelate, carpus consisting of more than 3 segments. Pereopod 3 with dactyl between 0.29 and 0.4 length of propodus. Pereopods 1–4 with strap-like epipods.

**Remarks.** These specimens agree in general with the specimens figured by Suseeland & Mahomed (1968), and Crosnier & Forest (1973), as *P. ensis* (A.

Milne Edwards), but differ slightly in some of the characters. In the largest specimen (cl. 21.7mm) the rostrum is less than twice (1.8) carapace length. In all the other specimens in which the rostrum is complete or nearly so, the rostrum is more than twice (2.2–2.5) the carapace length. The denticulation on the ventral margin of the rostrum usually starts behind the anterior dorsal tooth opposite the first article of the antennal peduncle. The first and second pereopods are subequal in length and reach to about 2–4 mm behind the apex of the scaphocerite. The third pereopod is the longest, and reaches to at least the apex of the scaphocerite or more usually exceeds it by the dactyl. The dactyl of the third pereopod is about one-third the length of the propod. The length of the sixth abdominal somite is at least 2.5 times (2.5–2.9) its proximal height, and more than twice (2.2–2.5) the length of the fifth somite. The telson is about three-fourths (0.75–0.8) as long as the sixth somite. In two critical characters, the length of the dactyl of pereopod 3 compared with the propodus, and the slight recurving of the mid-dorsal spine of abdominal somite 3, the present material agrees with the description of *P. reflexa* Chace.

These specimens were collected between 27°55'S and 34°22'S in trawls down to 629 m.

**Distribution.** South China Sea; Indonesia; Philippines; 191–629 m.

#### *Plesionika spinipes* Bate

*Plesionika spinipes* Bate, 1888: 646–648, pl. 113, fig. 2.—Chace, 1985: 46 (in key).

*Parapandalus spinipes*.—de Man, 1920: 142–146, pls 12, 13, figs 33, 33e; Calman, 1939: 201–202; Crosnier, 1970: 236 (in discussion).

**Material examined.** New South Wales: AM P35888, north-east of North Solitary Island, 29°47'S 153°41'E to 29°49'S 153°40'E, 234 m, demersal prawn trawl, *Kapala* (K78-05-07), 19 Apr 1978; 1 ovig. ♀. AM P26839, north-east and east of Batemans Bay, 35°29'S 150°46'E to 35°44'S 150°36'E, 216 m, demersal fish trawl, *Kapala* (K77-11-01/02/03), 2 Aug 1977; 1 specimen. Queensland: AM P35871, north-east of Point Danger, 28°02'S 153°57'E to 28°05'S 153°57'E, 360 m, demersal fish trawl, *Kapala* (K78-09-03), 1 June 1978; 20 specimens (13 ovig. ♀).

**Diagnosis.** Rostrum about twice carapace length, with fewer than 50 close-set dorsal teeth, and 22–31 more widely spaced ventral teeth. Eyes well developed, ocellus present. Pereopods 1–4 lacking epipods. Pleura of abdominal somites 4 and 5 each with posteroventral denticle.

**Remarks.** These specimens agree with that figured by de Man (1920) as *Parapandalus spinipes* (Bate). The rostrum is complete in only a few specimens; in these it is nearly twice (1.7–2.0) the carapace length. The rostral teeth are similarly spaced on the dorsal and ventral margins in the distal two-thirds, while basally the dorsal spines are more closely spaced. Both the fourth and fifth abdominal somites

have a posteroventral denticle as in the figure of *P. spinipes* provided by de Man (1920); in *P. serratifrons* (Borradaile) the fourth abdominal somite lacks a denticle.

Crosnier (1976) gives a table, based principally on literature, for distinguishing *P. spinipes*, *P. serratifrons* and *P. narval*. For our specimens the measurements used are: rostral formula: 41–51/25–35; minimum width of abdominal somite 6/length of this somite: 0.37–0.4; maximum height of abdominal somite 6/length of this somite: 0.56–0.6; length of telson/length of abdominal somite 6: 1.15–1.2; length of dactyl of pereopod 5/basal width of this dactyl: 4.

There is agreement in the first three sets of figures, with those given by Crosnier (1976), but the telson is less than 1.5 times the length of abdominal somite 6, and the pereopodal dactyls are not as slender. Unfortunately, in many specimens the telson and rostrum are damaged and pereopodal dactyls are detached; we therefore provide details of the relative lengths of maxilliped 3 and pereopods 1 and 2 of our specimens. These agree with de Man's description and figures for *P. spinipes*; these appendages are longer in relation to the scaphocerite in *P. serratifrons*. In ovigerous females (cl 19 mm) maxilliped 3 exceeds the scaphocerite only by the terminal article; the penultimate article is about 1.75 times the length of the terminal article, while the exopod reaches about halfway along the antepenultimate article. Pereopod 1 exceeds the scaphocerite by the terminal article and about one-third of the carpus; it exceeds maxilliped 3 by about half the terminal article. Pereopod 2 exceeds the scaphocerite by the chela and the large terminal article of the carpus. The carpus has 21–23 articles. In a smaller specimen (cl 12.5 mm) the relative lengths are slightly different; maxilliped 3 exceeds the scaphocerite by slightly more than the terminal article, and the exopod does not quite reach halfway along the antepenultimate article.

Pereopod 1 exceeds the scaphocerite by the dactyl and just less than half the carpus, and exceeds maxilliped 3 by three-fourths of the terminal article. Pereopod 2 exceeds the scaphocerite by the chela and distal three articles of the carpus.

**Distribution.** Indo-West Pacific.

#### *Stylopandalus* Coutiere, 1905

##### *Stylopandalus richardi* (Coutiere)

*Pandalus (Stylopandalus) richardi* Coutiere, 1905: 1113. *Parapandalus richardi*.—Crosnier & Forest, 1973: 224–225, fig. 69b; Kensley, 1981a: 59, 1981b: 28. *Stylopandalus richardi*.—Chace 1985: 136, fig. 62.

**Material examined.** New South Wales: AM P35879, north-east of Norah Head, 33°05'S 153°05'E to 33°13'S 153°05'E, 630 m, midwater trawl, *Kapala* (K79-19-03), 28 Nov 1979; 1 ovig. ♀. AM P35880, east to north-east of

Norah Head, 33°20'S 153°04'E to 33°12'S 153°13'E, 630 m, midwater trawl, *Kapala* (K79-19-05), 28 Nov 1979; 5 specimens (4 ovig. ♀). AM P35881, south-east of Norah Head, 33°20'S 152°32'E to 33°24'S 152°31'E, 360 m, midwater trawl, *Kapala* (K77-24-09), 14 Dec 1977; 1 ovig. ♀. AM P35882, north-east to east of Broken Bay, 33°28'S 152°34'E to 33°36'S 152°35'E, 630 m midwater trawl, *Kapala* (K77-24-10), 14 Dec 1977; 2 ovig. ♀. AM P35883, north-east of Broken Bay, 33°31'S 152°20'E to 33°28'S 152°22'E, 569 m, midwater trawl, *Kapala* (K77-24-02), 12 Dec 1977; 1 ovig. ♀. AM P35884, east of Broken Bay, 33°33'S 152°18'E to 33°31'S 152°18'E, 216 m, midwater trawl, *Kapala* (K77-24-01), 12 Dec 1977; 2 specimens (1 ovig. ♀). AM P35885, P34387, north-east of Wollongong, 34°10'S 151°59'E to 34°09'S 152°05'E, 0—about 60 m, midwater trawl, *Kapala* (JP71-3), 24 Mar 1971; 19 specimens (4 ovig. ♀). AM P26558, north-east of Wollongong, 34°10'S 152°04'E to 34°12'S 152°02'E, 540 m, midwater trawl, *Kapala* (K77-18-01), 26 Oct 1977; 4 specimens (1 ovig. ♀). AM P35886, north-east to east of Wollongong, 34°20'S 151°56'E to 34°25'S 151°54'E, 630 m, midwater trawl, *Kapala* (K77-24-12), 14 Dec 1977; 2 specimens (1 ovig. ♀). AM P26602, north-east of Cape Howe, 37°24'S 150°30'E to 37°28'S 150°33'E, 540 m, midwater trawl, *Kapala* (K77-19-03), 1 Nov 1977; 2 specimens (1 ovig. ♀). AM P35887, north-east of Wollongong, 34°10'S 152°04'E to 34°12'S 152°02'E, 540 m, midwater trawl, *Kapala* (K77-18-01), 26 Oct 1977; 1 specimen.

**Diagnosis.** Rostrum immovable, 2.5–3X carapace length, both dorsal and ventral margins with rather well spaced teeth along their length, 2 larger teeth at base of the rostrum. Carapace with no distinct longitudinal carina except behind rostral crest. Third abdominal segments armed posteriorly with minute medial spine; both fourth and fifth abdominal segments without a posteroventral denticle; length of sixth abdominal segment about 3X its maximum height. Eyes well developed. Third maxilliped with exopod. Second pair of pereopods chelate, subequal, carpus consisting of 7–13 articles. Pereopods 1–4 without epipods.

**Distribution.** Indo-west Pacific, Philippines, north and south Atlantic; surface to 3600 m.

#### Family PHYSETOCARIDIDAE

*Physetocaris* Chace, 1940

##### *Physetocaris microphthalmalma* Chace

*Physetocaris microphthalmalma* Chace, 1940: 196, figs 62, 63.—Holthuis, 1955: 128, fig. 93; Crosnier & Forest, 1973: 228, fig. 72.

**Material examined.** New South Wales: AM P33107, north-east of Broken Bay, 33°31'S 152°20'E to 33°38'S 152°22'E, 569 m, midwater trawl, *Kapala* (K77-24-02), 12 Dec 1977; 1 specimen.

**Diagnosis.** Integument thin and fragile. Rostrum a broadly triangular inflated prolongation of carapace, latter inflated, with 2 lateral carinae. Abdomen lacking dorsal carinae or spines. Telson

dorsally deeply sulcate, apically broadly truncate. Eyes reduced, set on outer surface of stalk. Mandible lacking palp and incisor process. First pereopods simple. Second pereopods chelate, carpus of 4 articles. Exopods absent from third maxilliped and all pereopods.

**Distribution.** Eastern and western Atlantic, north-west Pacific; surface to 1600 m.

#### Family GLYPHOCRANGONIDAE

*Glyphocrangon* A. Milne Edwards, 1881

##### *Glyphocrangon assimilis* de Man

*Glyphocrangon assimilis* de Man, 1918: 294; 1920: 217, 227–230, pl. 19, figs 57–57h.—Calman, 1939: 217; Chace, 1984: 9.

**Material examined.** Queensland: AM P33151, north-east of Danger Point, 28°03'S 154°04'E to 28°01'S 154°04'E, 720 m, demersal prawn trawl, *Kapala* (K78-23-08), 6 Nov 1978; 2 specimens. New South Wales: AM P33152, east of Broken Bay, 33°34'S 152°04'E to 33°31'S 152°06'E, 720 m, demersal prawn trawl, *Kapala* (K79-20-04), 4 Dec 1979; 2 specimens (1 ovig. ♀). AM P26823, east of Broken Bay, 33°35'S 152°00'E to 33°33'S 152°02'E, 810 m, demersal prawn trawl, *Kapala* (K77-23-12), 8 Dec 1977; 1 ovig. ♀.

**Diagnosis.** Integument not pubescent. Rostrum dorsoventrally compressed, shorter than carapace, with 2 pairs of lateral spines. Carapace with 4 prominent lateral carinae; anterior antennal carina present, with anterior spine behind and slightly ventral to antennal spine, carina extending only halfway to lateral groove, with 2 tubercles in line behind it; anterior lateral carina with small anterior spine well posterior to orbital margin.

**Remarks.** These specimens agree well with the description and figures given by de Man (1920).

The length of the rostrum is about four-fifths (0.77–0.81) of the carapace length in the largest male and the two females (cl 16.5–18.5 mm), while in the two smaller males (cl 13, 15 mm) it is subequal (0.96–1.0).

The submedian carinae are made up of distinct tubercles. The anterior intermediate carina consists of four to five distinct tubercles of which at least the two most anterior are acute. The posterior intermediate carina is variable, sometimes consisting of four to five tubercles, in other cases of three broad tubercles, or a ridge with two notches or even an unnotched ridge. None of the other carapace carinae are tuberculate. The anterior antennal carina has an anterior spine behind and slightly below the antennal spine and the carina extends backwards only halfway to the lateral groove, with two to three small tubercles in line between the end of the carina and the groove. This character distinguishes this species from *G. dentatus* Barnard and *G. gilesii* Wood-Mason, in both of which the carina extends all the way to the lateral

groove. The anterior lateral carina has an anterior spine and the carina extends back to the lateral groove. Neither the posterior antennal nor the posterior lateral carina has an anterior spine.

The carapace surface between the submedian carinae is smooth and between the other carinae there are only very small tubercles which are near the posterior border in the males, and scattered over the posterior two-thirds in the females.

The antennal spine is longer than the branchiostegal spine. There are dorsal carinae present on all the abdominal segments.

These specimens were collected from 28°S to 33°40'S and at depths between 720 and 810 metres. This species has not been recorded previously from Australia.

**Colour.** The colour in life is white with the submedian, intermediate, and abdominal carinae orange red. The rostrum, antennal, and branchiostegal spines are coloured pale orange only at the tips.

**Distribution.** Zanzibar, Bali Sea, eastern Australia; 538–810 m.

*Glyphocrangon holthuisi* n. sp.

Figs 22, 25C

**Type material.** New South Wales: HOLOTYPE: AM P35906, south-east of Cape Byron, 28°41'S 153°52'E to 28°44'S 153°51'E, 153 m, prawn trawl, *Kapala* (K78-17-21), 18 Aug 1978; 1 ovig. ♀, cl 25.1 mm. PARATYPES: AM P33157, south-east of Cape Byron, 28°41'S 153°52'E to 28°44'S 153°51'E, 153 m, prawn trawl, *Kapala* (K78-17-21), 18 Aug 1978; 16 ovig. ♀. Queensland: PARATYPES: USNM 211397, north-east of Danger Point, 28°01'S 154°00'E to 27°58'S 154°00'E, 540 m, prawn trawl, *Kapala* (K78-17-10), 17 Aug 1978; 5 ♂, cl 19.2–22.0 mm, 5 ovig. ♀, 21.2–24.9 mm.

**Additional material examined.** AM P33153, north-east of Danger Point, 27°55'S 154°03'E to 27°57'S 154°03'E, 540 m, prawn trawl, *Kapala* (K78-23-09), 6 Nov 1978; 8 ♂, cl 15.2–21.8 mm, 17 ovig. ♀, cl 18.5?–25.2 mm, 5 ♀, cl 14.0–18.4 mm. AM P33154, north-east of Danger Point, 28°01'S 154°00'E to 27°58'S 154°00'E, 540 m, prawn trawl, *Kapala* (K78-17-10) 17 Aug 1978; 34 ovig. ♀, 64 ♂. AM P33155, north-east of Danger Point, 28°02'S 153°59'E to 27°59'S 153°59'E, 540 m, prawn trawl, *Kapala* (K78-09-05), 2 June 1978; 63 specimens (16 ovig. ♀). AM P33156, north-east of Danger Point, 28°03'S 154°04'E to 28°01'S 154°04'E, 720 m, prawn trawl, *Kapala* (K78-23-08), 6 Nov 1978; 11 specimens.

**Diagnosis.** Integument firm, finely tomentose. Rostrum anteroventrally tricarinate, with 2 pairs of lateral spines and faint mid-dorsal ridge. Posterior first (submedian carina) of 3 or 4 discrete tubercles. Anterior second (intermediate) carina with anterior tubercle acute; posterior second (intermediate) carina tuberculate. Anterior third (antennal) carina absent; posterior third (antennal) carina anteriorly right-angled to rarely acute, usually consisting of 2 elongate and 1 short posterior tubercles. Anterior

fourth (lateral) carina expanded into large ventically compressed undivided lamina, apically acute, obliquely directed; posterior fourth (lateral) carina divided into 2 elongate anterior, and 2 or 3 smaller apically acute posterior tubercles. Branchial region with tubercles between carinae. Smooth antennal spine very faintly mesially curved, more than half length of branchiostegal spine. All abdominal somites with mid-dorsal carina, notched on somite 6. Scaphocerite lacking marginal tooth. Maximum carapace length 25.2 mm (ovigerous female).

**Description.** Integument finely tomentose. Rostrum in adults about two-thirds (0.59–0.71) carapace length, armed with 2 pairs of lateral teeth, anterior pair at about proximal two-fifths; faint mid-dorsal ridge present with transverse septa sometimes present anteriorly, but often indistinct; anteroventrally tricarinate. Submedian (1st) carina composed of elongate laterally compressed tubercles, acute or subacute at the anterodorsal angle, anterior carina with 6 tubercles, posterior carina with 3–4 tubercles. Anterior intermediate (2nd) carina usually with all 4 tubercles dentiform (as in submedian carina), posterior carina with 4 (sometimes 3 or 5) tubercles, usually not dentiform. Anterior antennal (3rd) carina absent. Posterior antennal (3rd) carina usually unarmed anteriorly, rarely with small tooth, carina divided by 2 or 3 notches. Anterior lateral (4th) carina not continuous with branchiostegal spine, expanded into large, ventically compressed, undivided lamina, apically acute, directed forward beyond level of the posterior margin of the orbit. In adults, width across tips of these spines less than (0.93–0.96), or rarely equal to, carapace length. Posterior lateral (4th) carina usually with 3 notches but varying from 2–4, and rarely with only 1 notch or entire; usually with small anterior spine but quite often with only a sharp angle.

Tubercles between carapace carinae small, usually acute, rows often irregular. Usually 3 rows of tubercles between third and fourth carinae, tubercles of central row largest, with row of small tubercles above and below. Area of carapace immediately posterior to eye usually with 3–5 tubercles (occasionally with 6–7 or with only 1–2).

Antennal spine curved mesially, smooth, about three-fourths (0.74–0.91) as long as the branchiostegal spine. Tip of branchiostegal spine not exceeding propodus of pereopod 1, nor reaching distal end of penultimate segment of maxilliped 3.

Abdomen with median dorsal carinae on all somites, somite 1 with distinct anterior tubercles in addition to row of narrow tubercles along posterior margin, lateral-dorsal carina on somite 1 with anterior height equal to about half basal length of carina. Somite 5 with 2 marginal spines on pleuron. Somite 6 with 1 posterior marginal spine on pleuron, width of somite across these spines only slightly greater than (1.1–1.25) anterior width of somite 6.

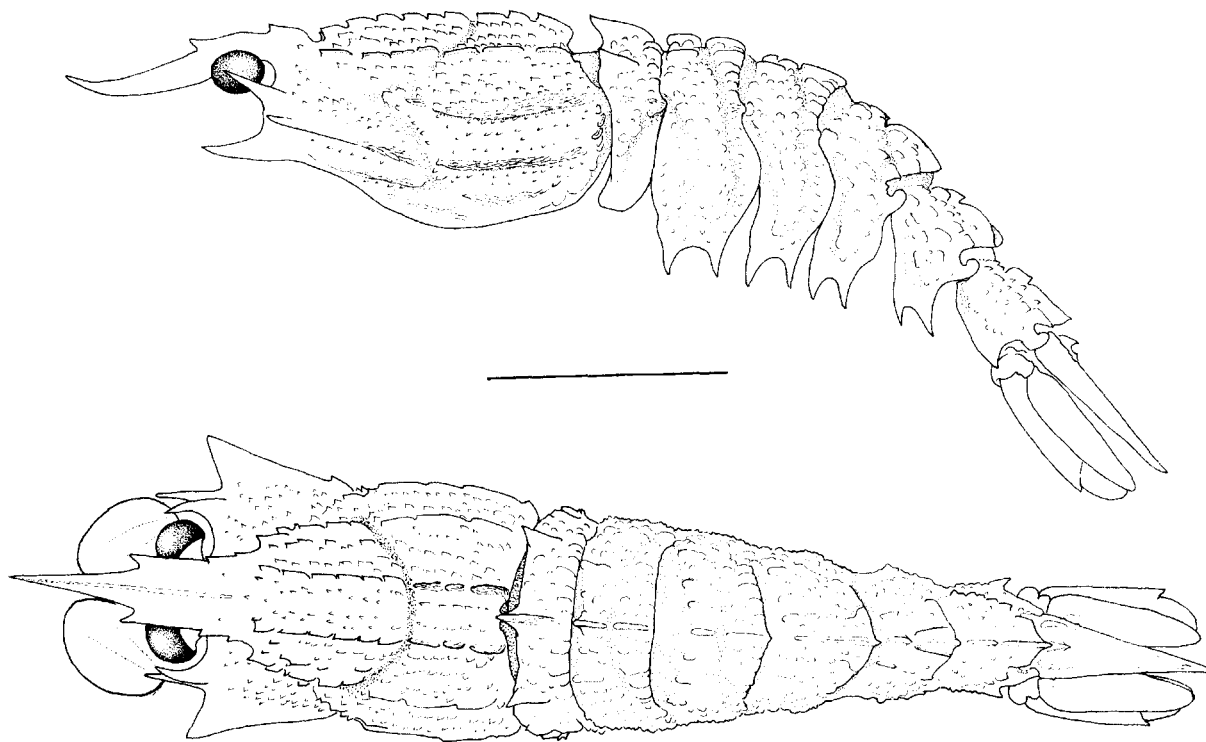


Fig. 22. *Glyphocrangon holthuisi* n.sp. Lateral and dorsal view. (Scale = 10 mm).

Telson with about  $1/5$  of its length extending beyond uropods.

Antennal scale about one and three-fourths (1.68–1.81) times as long as broad, nearly twice as long as broad in small specimens (cl 15 mm). Maxilliped 3 extending as far as, or very slightly past, end of antennal peduncle. Pereopod 2 shorter on left side (19–20 carpal articles) than on right side (29 carpal articles). Left pereopod 2 on just reaching to end of antennal scale; on right, exceeding antennal scale by chela and about 8 carpal articles. Pereopod 3 reaching as far forward as pereopod 2 on left side. Pereopod 4 reaching to about end of propod of pereopod 3. Pereopod 5 reaching about  $2/3$  along propod of pereopod 4. Pereopods 3 to 5 with propod about  $1\frac{1}{4}$  to  $1\frac{1}{2}$  as long as carpus; dactyl about  $1/3$  to  $2/5$  length of propod.

**Etymology.** The species is named for Dr L. B. Holthuis, of the Rijksmuseum van Natuurlijke Historie, Leiden, in recognition not only of his valuable work on the genus *Glyphocrangon*, but also of his incomparable contributions to the knowledge of crustaceans.

**Remarks.** See Remarks section of *G. novacastellum*.

### *Glyphocrangon lowryi* n. sp.

Figs 23, 25D

**Type material.** Queensland: HOLOTYPE: AM P33158, north-east of Danger Point, 28°03'S 154°04'E to 28°01'S 154°04'E, 720 m, prawn trawl, *Kapala* (K78-23-08), 6 Nov 1978; 1 ovig. ♀, cl 31.5 mm.

**Diagnosis.** Integument firm, lacking tomentum. Rostrum with 2 pairs lateral spines, with rounded mid-dorsal ridge, anteriorly with faint transverse septa, anteroventrally bicarinate. Anterior third (antennal) carina absent, posterior third carina with acute flattened flared spine. Anterior fourth (lateral) carina anteriorly expanded into large vertically compressed undivided apically acute lamina; carapace width across these tips subequal to carapace length. Tubercles of submedian carina laterally compressed; tubercles between carapace carinae high, laterally compressed.

**Description.** Integument naked. Rostrum in adult female greater than half carapace length (tip broken, estimated between 0.5 and 0.6), armed with 2 pairs of lateral teeth, anterior pair at about proximal third; medial ridge present, tuberculate proximally with 2 pairs of submedial tubercles near base;



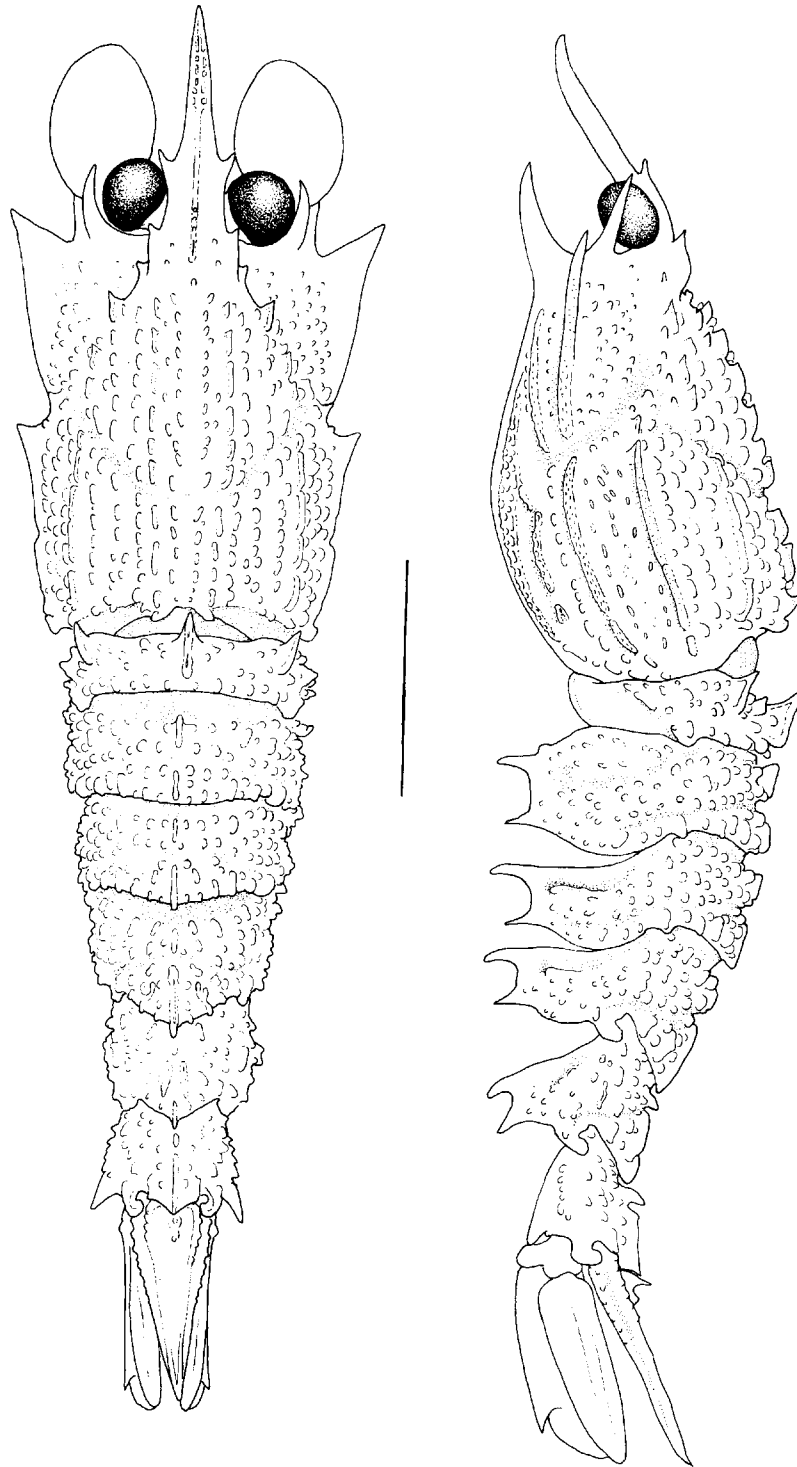


Fig. 23. *Glyphocrangon lowryi* n.sp. Lateral and dorsal view. (Scale = 10 mm).

indistinct transverse septa anteriorly; 2 lateral, but no anteromedial ridge ventrally on rostrum. Submedian (1st) carina composed of elongate laterally-compressed tubercles, only a few anterior tubercles subacute anteriorly, remainder blunt, anterior carina with 6 tubercles; posterior carina with 4 or 5 tubercles. Anterior intermediate (2nd) carina of 4 tubercles, some hardly distinguishable from large tubercles between the carinae, 2 anterior tubercles anterodorsally; posterior carina of 4 blunt elongate tubercles. Anterior antennal (3rd) carina absent; posterior antennal carina with spine anteriorly, carina with 2 notches, one at about midlength, one near posterior extremity. Carapace width across spines of posterior pair about nine-tenths (0.89) of carapace length (0.92 cl in immature specimens, cl 17.8 mm). Anterior lateral (4th) carina not continuous with branchiostegal spine, expanded into large compressed undivided apically acute lamina, directed forward beyond level of posterior margin of orbit. In ovigerous female, width across these spines slightly less (0.97) than carapace length. Posterior lateral carina entire except for one notch at about posterior sixth, anteriorly unarmed and curving slightly dorsally. Tubercles between carinae high, laterally compressed, not as elongate as carinae tubercles, often in regular rows. About 5 tubercles on carapace immediately behind eye, high tubercle lateral to posterior lateral rostral spine. Antennal spine weakly curved mesially, smooth, about  $\frac{3}{4}$  length of branchiostegal spine. Tip of branchiostegal spine just exceeding propod of pereopod 1, reaching distal margin of penultimate segment of maxilliped 3.

Abdomen with median dorsal carina on all somites, somite 1 with prominent anterior tubercles in addition to row of tubercles along posterior margin, lateral dorsal carina on somite 1 with anterior height equal to basal length of carina. Somite 5 with 2 marginal spines on pleuron. Somite 6 with 1 posterior marginal spine on pleuron, width across these spines more than one and one-third (1.42) times anterior width of somite 6 (1.5X in immature specimen, cl 14.2 mm). Telson with less than  $\frac{1}{5}$  of its length extending beyond apex of uropods; submedian carina tuberculate on proximal quarter, marginal carina tuberculate on proximal half.

Antennal scale about one and one-half (1.6) times as long as broad, extending about  $\frac{1}{5}$  of its length beyond antennal peduncle. Pereopod 2 shorter on left (20 carpal articles) than on right side (29 carpal articles). On left side, pereopod 2 exceeding antennal scale by chela and 1 carpal article, on right side exceeding antennal scale by chela and about 10 carpal articles. Pereopod 3 exceeding antennal scale by length of dactyl. Pereopod 4 reaching about halfway along dactyl of pereopod 3. Pereopod 5 reaching to base of dactyl of pereopod 4. Propod of pereopods 3 and 4 more than one and one-third (1.4) times as long as carpus; on pereopod 5,  $\frac{1}{3}$ X as long. Dactyl of

pereopod 3 about one-third (0.3) length of propod; dactyl of pereopods 4 and 5 more than one-third (0.41 and 0.37 respectively) length of propod.

**Colour.** The preserved ovigerous female has orange tips on the apical and lateral spines of the rostrum, on the antennal and branchiostegal spines, and on the tip of the anterior lateral carina. Also the last segment of maxilliped 3, and the propod and dactyl of pereopod 1 are orange. On abdominal somites 1–4 the tips of the carinae and spines on the pleura are orange, as is the tip of the telson.

**Etymology.** The species is named for Dr James K. Lowry, head of the Crustacean Section of the Australian Museum, in thanks for his hospitality to, and many stimulating discussions with, the first author.

**Remarks.** See Remarks section at end of *G. novacastellum*.

#### *Glyphocrangon novacastellum* n. sp.

Figs 24, 25E

**Type material.** New South Wales: HOLOTYPE: AM P26766, south-east of Newcastle, 33°08'S 152°27'E to 33°09'S 152°25'E, 720 m, demersal trawl, *Kapala* (K77-23-10), 7 Dec 1977; 1 ovig. ♀, cl 25.0 mm. PARATYPES: AM P20995, P20996, east of Broken Bay, 33°32'S 152°00'E to 33°38'S 152°04'E, 823 m, demersal trawl, *Kapala* (K75-05-05), 6 Dec 1979; 2 ♂, cl 15.9–16.0 mm, 10 ovig. ♀, 21.1–24.6 mm, 1 ♀, cl 15.9 mm. AM P33160, east of Broken Bay, 33°32'S 152°06'E to 33°34'S 152°05'E, 810 m, demersal prawn trawl, *Kapala* (K79-20-13), 6 Dec 1979; 1 ovig. ♀, cl 24.3 mm. AM P19096, east of Long Reef, 33°43'S 151°55'E to 33°37'S 152°02'E, 675 m, bottom trawl, *Kapala* (K72-06-04), 19 Oct 1972; 1 ovig. ♀, cl 20.7 mm. USNM 211399, off Shoalhaven Bight, 34°55'S 151°13'E to 34°53'S 151°14'E, 810 m, demersal trawl, *Kapala* (78-27-05), 12 Dec 1978; 1 ♂, cl 18.3 mm, 2 ovig. ♀, cl 20.1 mm, 2 ♀, cl 16.2–18.3 mm. USNM 211398, south-east of Newcastle, 33°08'S 152°27'E to 33°10'S 152°24'E, 576 m, demersal trawl, *Kapala* (K77-23-09), 7 Dec 1977; 1 ovig. ♀, cl 25.0 mm.

**Additional material examined.** New South Wales: AM P33161, east of Broken Bay, 33°34'S 152°04'E to 33°31'S 152°06'E, 720 m, prawn trawl, *Kapala* (K79-20-04), 4 Dec 1979; 1 ♀, cl 16.0 mm. AM P26822, east of Broken Bay, 33°34'S 152°02'E to 33°31'S 152°04'E, 891 m, demersal trawl, *Kapala* (K77-23-07), 6 Dec 1977; 1 specimen. AM P19099, east of Sydney, 33°42'S 152°50'E to 33°48'S 152°54'E, 765 m, bottom trawl, *Kapala* (K72-07-15), 7 Dec 1972; 1 ♂, cl 22.6 mm.

**Diagnosis.** Body integument very firm, covered with fine tomentum. Rostrum dorsally with septa very faint to obsolete, anteroventrally tricarinate. Carapace tubercles low, rounded. Carapace with 4 prominent lateral carinae; anterior antennal (3rd) carina absent, posterior antennal carina usually with small anterior spine; anterior lateral (4th) carina expanded anteriorly into large vertically compressed, undivided lamina, apically acute, carapace width across tips of these spines slightly greater than

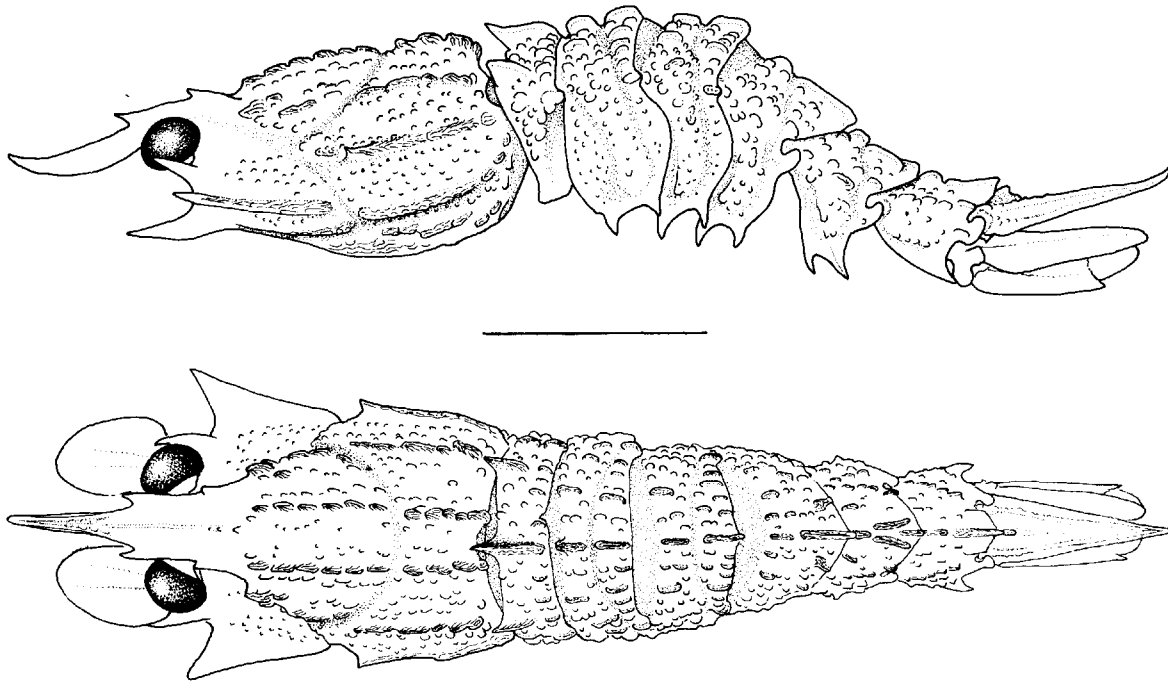


Fig. 24. *Glyphocrangon novacastellum* n.sp. Lateral and dorsal view. (Scale = 10 mm).

carapace length; tubercles of submedian carinae not laterally compressed, but broad and striate; tubercles between carinae low and blunt.

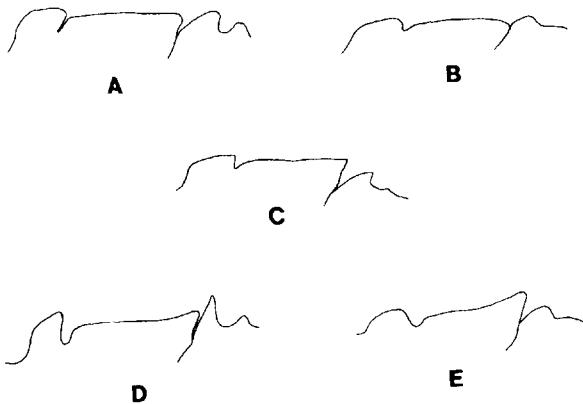


Fig. 25. Dorsal profile of pleonite 6 and anterior telson. A, *G. investigatoris*, Indonesia, USNM 205134; B, *G. regalis*, Indonesia, USNM 205128; C, *G. holthuisi*, paratype USNM 211397; D, *G. lowryi*, holotype AM P33158; E, *G. novacastellum*, paratype AM P26806.

**Description.** Integument weakly pubescent. Rostrum in adults about seven-tenths (0.68–0.75) carapace length, armed with 2 pairs of lateral teeth, anterior pair at about proximal two-fifths. Longitudinal ridge present along dorsal surface with transverse septa sometimes faintly present in anterior part but often indistinct. Longitudinal ridge also on ventral surface anteriorly, flanked by lateral ridges. Submedian (1st) carina composed of low subconical tubercles (not laterally compressed), directed obliquely forwards; anterior carina of 6 tubercles, posterior carina of 4 tubercles. Anterior intermediate (2nd) carina with first tubercle dentiform or subdentiform (as in submedian carina), remaining 3 or 4 tubercles low, sometimes indistinct. Posterior intermediate carina with 3–4 dentiform tubercles. Anterior antennal (3rd) carina absent. Posterior antennal (3rd) carina divided by 2, or occasionally 3, notches and armed with small acute spine anteriorly. Anterior lateral (4th) carina not continuous with branchiostegal spine, expanded into large vertically compressed, undivided lamina, directed forwards beyond level of posterior margin of orbit, apex acute and curved upwards slightly. Width across tips of these spines in adults equal to or usually greater (1.0–1.2) than carapace length. Posterior lateral carina entire or with 1 or 2, often shallow, notches, rarely

with 3 notches; usually unarmed, occasionally with small inconspicuous anterior tooth.

Tubercles between carapace carinae low, blunt, often in irregular rows. Row of tubercles midway between 3rd and 4th carinae with row of small, less distinct tubercles above and below. Carapace immediately posterior to eye smooth or with 1 or 2 small tubercles (occasionally up to 4 tubercles).

Antennal spine curved slightly mesially, smooth, about two-thirds (0.64–0.69) as long as branchiostegal spine. Tip of branchiostegal spine exceeding propod of pereopod 1 and reaching at least to end of penultimate segment of maxilliped 3.

Abdomen with median dorsal carinae on all somites. Somite 1 with anterior tubercles low; anterior height of dorsolateral carina greater than half and often subequal to basal length of carina. Somite 5 with 2 marginal spines on pleuron. Somite 6 with one posterior marginal spine on pleuron, directed slightly laterally with width across tips of these spines more than one and one-third (1.36–1.47) times anterior width of somite 6.

Telson with about one-fifth to one-quarter (0.18–0.29) of its length extending beyond apex of uropods.

Antennal scale more than one and one-half (1.62–1.77) times as long as broad. Maxilliped 3 extending as far as or very slightly beyond end of antennal peduncle. Pereopod 2 shorter on left hand side (20–21 carpal articles) than on right hand side (30–31, or 27 in juvenile, carpal articles). Length of pereopod 2 in relation to antennal scale seeming to vary with sex and age. Pereopod 2 on the LHS reaching about  $\frac{2}{3}$  of way along antennal scale in young specimen (cl 16 mm), not quite reaching to apex of scale in ovigerous females but slightly exceeding antennal scale in male of cl 23 mm. On RHS, pereopod 2 exceeding apex of antennal scale by chela and about 9 carpal articles in both male and ovigerous female but in specimen of cl 16 mm, only reaching apex of antennal scale. Pereopod 3 of ovigerous female reaching to end of antennal peduncle, i.e., nearly to end of antennal scale, pereopod 4 slightly shorter than 3, pereopod 5 reaching to end of propod of pereopod 4. In male of 23 mm (P19099), pereopod

3 extending past end of antennal peduncle and antennal scale; pereopod 4 slightly shorter than 3; pereopod 5 reaching halfway along propod of pereopod 4. On pereopods 3–5, propod about  $1\frac{1}{3}X$  as long as carpus, dactyl between  $\frac{2}{5}$  and  $\frac{3}{5}$  length propod.

**Colour.** Colour in life white with orange markings. Antennae orange, also distal third of rostrum, spines around orbit, submedian and intermediate carinae and small tubercles between carinae. On abdomen, dorsal carinae, a few dorsal tubercles, and posterior dorsal margin of each segment orange, also telsonic submedian and marginal carinae.

**Remarks.** The three new species of *Glyphocrangon* described here have the following features in common: the anterior antennal carina is not continuous with the antennal spine; there are two pairs of lateral rostral teeth; the pleuron of abdominal somite 5 has two teeth; the anterior lateral carina is expanded into a vertically compressed acute lamina; the posterior antennal carina ends anteriorly in a small tooth, or lacks a tooth; the intercarinal areas are tuberculate; the eyes are pigmented. These features would place all three into the *G. regalis*-*G. investigatoris* group of species. (Chace (1984) notes that only one feature separates *G. smithii* from *G. regalis*, viz. the small acute tooth on the posterior antennal carina in the former, but expressed uncertainty about the constancy of this character). Table 7 summarises the differences between the three new species and *G. regalis* and *G. investigatoris*. The features used show considerable constancy for the number of specimens examined (which admittedly for *G. lowryi* is only one, but 25 and 229 for *G. novacastellum* and *G. holthuisi* respectively).

While some degree of uncertainty must be admitted regarding the validity of these new species, there would nevertheless seem to be a complex of at least five (or six) closely related taxa. By formally naming the three taxa separated here, attention is drawn to the differences. Future workers with more material available will thus be prompted to verify or demolish these findings.

Character	<i>G. regalis</i>	<i>G. investigatoris</i>	<i>G. holthuisi</i>	<i>G. lowryi</i>	<i>G. novacastellum</i>
Carapace integument	pubescent	glabrous	pubescent	glabrous	pubescent
Rostrum: dorsal septa	present, faint	present, strong	absent	present, fairly strong	present, faint
Rostrum: anteroventrum	tricarinate	flattened	tricarinate	bicarinate	tricarinate
Carapace: tubercles	rounded	rounded	acute, low	acute, flattened	rounded, low
Submedian carina: tubercles	broad, reticulate	broad, rounded	narrow	narrow, flattened	broad, striated
Posterior antennal carina	anteriorly with distinct tooth	anteriorly with right-angle	anteriorly with right-angle	anteriorly with strong tooth	anteriorly with small tooth
Dorsal profile, pleonite 6	see Fig. 25	see Fig. 25	see Fig. 25	see Fig. 25	see Fig. 25

Table 7. Comparison of five species in the *Glyphocrangon regalis* complex.

**Etymology.** The specific name is derived from Newcastle, the coastal city closest to the holotypic locality.

### Family CRANGONIDAE

*Pontocaris* Bate, 1888

*Pontocaris lacazei* (Gourret)

*Pontocaris lacazei*.—Crosnier & Forest, 1973: 250, fig. 81; Chace, 1984: 42.

**Material examined.** New South Wales: AM P21031, north-east of Wollongong, 34°16'–22'S 151°26'–23'E, 356 m, demersal prawn trawl, *Kapala* (K75-05-01), 8 Aug 1975; 2♀. AMP5589, off Botany Bay, 34°00'S 151°11'E, 60–102 m, State Trawler *Goonambee*, Aug 1921; 2♀. AMP7864, off Botany Bay, 33°59'S 151°12'E, Trawler *Thistle*, Oct 1924; 1♀. AM P16278, off Cronulla, 100 m, dredged; 1♀. AM P24473, north-east of Brush Island, 35°30'S 151°48'E, 329 m, *Kapala* (K76-08-01), 8 June 1976; 1♀.

**Diagnosis.** Rostrum with one pair of basal teeth. Second lateral carine interrupted by hepatic groove. Median carina armed with 4 teeth. Tubercles absent between median and first lateral carina. Abdominal somite 4 with pair of dorsolateral carinae diverging posteriorly.

**Distribution.** Eastern Atlantic, Mediterranean, South Africa, Indo-Pacific to Philippines, Japan, Hawaii, New Zealand; 30–759 m.

*Pontocaris rathbunae* (de Man)

*Aegeon Rathbunae* de Man, 1918: 304; 1920: 300, pl. 24, fig. 74b, pl. 25, fig. 74a.

*Pontocaris rathbunae*.—Chace, 1984: 44.

**Material examined.** New South Wales: AM P28798, off Ulladulla, 35°30'S 150°48'E, 512 m, prawn trawl, *Kapala* (K79-11-06), 8 Aug 1979; 1♀. AM P20211, east to north-east of Port Jackson, 33°51'S 151°51'E to 33°45'S 151°55'E, 675 m, demersal prawn trawl, *Kapala* (K72-06-03), 19 Oct 1972; 1 ovig. ♀. AM P21782, south-east of Yamba, 29°41'S 153°45'E to 29°32'S 153°47'E, 403 m, demersal prawn trawl, *Kapala* (K75-09-04), 10 Oct 1975; 1 ovig. ♀.

**Diagnosis.** Rostrum with pair of basal teeth. Second lateral carina not interrupted by hepatic groove. Median carina with 5 teeth. No tubercles between median and first lateral carina. Abdominal somite 4 with 3 pairs of posterior diverging dorsolateral carinae.

**Distribution.** Off Indonesia, Hawaii; 11–1600 m.

### Zoogeography

The present collection comprises 73 species of shrimps, almost all of which have come from depths ranging between 200 and 800 m. Some of these, such as the species of the genus *Gennadas*, are true pelagics, but the majority are benthic inhabitants.

That 46 species (63%) should prove to be new records for the Australian fauna, is not surprising; as noted in the introduction, very little collecting at these depths has been done. That 11 undescribed species (15%) were encountered further illustrates the relatively unknown character of the fauna. Obviously, without further information on distribution, it is not possible to comment on the zoogeographical affinities of these new species. Several, such as the species of *Pasiphaea* and *Glyphocrangon* probably have distributions beyond the east coast of Australia; others such as the benthic *Lebbeus yaldwyni* probably have a more restricted range and could well be regarded as part of an endemic fauna.

The largest component of this fauna, seen from a zoogeographic viewpoint, is that which occurs in all the major oceans. This group of 32 species (five of which also occur in the Mediterranean Sea) includes most of the true mesopelagics as well as some of the deeper-dwelling benthics — 11 penaeoids, 12 species of oplophorids, two pasiphaeids, and four pandalids. To some extent, the composition of this group off New South Wales could have been predicted.

The next largest component of the fauna is a group of 27 species having an Indo-West Pacific distribution. These include 11 species of shallow- and bottom-dwelling penaeoids, e.g. *Solenocera* and *Hymenopenaeus*, and six species of pandalids. There may also be a southern subgroup in this component, as three species, viz. *Campylonotus rathbunae*, *Chlorotocus novaezeelandiae* and *Lipkius holthuisi*, have only been collected in the region of New Zealand and southern Australia.

The deepwater shrimp fauna off New South Wales would seem to be, in terms of composition and numbers, comparable to that of southern Africa (see Kensley, 1981b). About 90 deepwater shrimp species have been recorded from this region, which includes parts of both the southern Atlantic and south-western Indian ocean. Undoubtedly, further collecting would yield an even larger fauna off New South Wales, given that this region is close to centers of high diversity such as those around the Philippines and Indonesia.

**ACKNOWLEDGEMENTS.** Our thanks are due to Dr D.D. Francois of the New South Wales State Fisheries, now the fisheries Division of the NSW Department of Agriculture, and his staff. We are especially grateful to Mr Ken Graham and the crew of the FRV *Kapala* for making this material available for study. Mr Greg Millen, formerly of the Australian Museum, is responsible for the excellent colour photographs. Thanks are due to Ms Diane Brown (Fletcher) and Dr J.C. Yaldwyn for preliminary identifications of some of the material. Ms Penny Berents of the Australian Museum and Ms Marilyn Schotte of the Smithsonian Institution assisted greatly in the final stages of preparation of the manuscript. Dr Fenner A. Chace, Jr., of the

Smithsonian Institution, and Dr Isabel Pérez Farfante of the National Marine Fisheries Service, provided invaluable criticism, access to unpublished notes, and useful discussions during the course of this study. The first author is indebted to the Australian Museum Trust for funding which allowed him to take up a Visiting Fellowship at the Australian Museum in 1983, and also to Dr David Challinor, Under Secretary for Science at the Smithsonian Institution, for making additional funds available for travel to Sydney in 1985.

The comments and criticisms of Dr Alain Crosnier and a second anonymous reviewer added considerably to this paper. We owe them sincere thanks.

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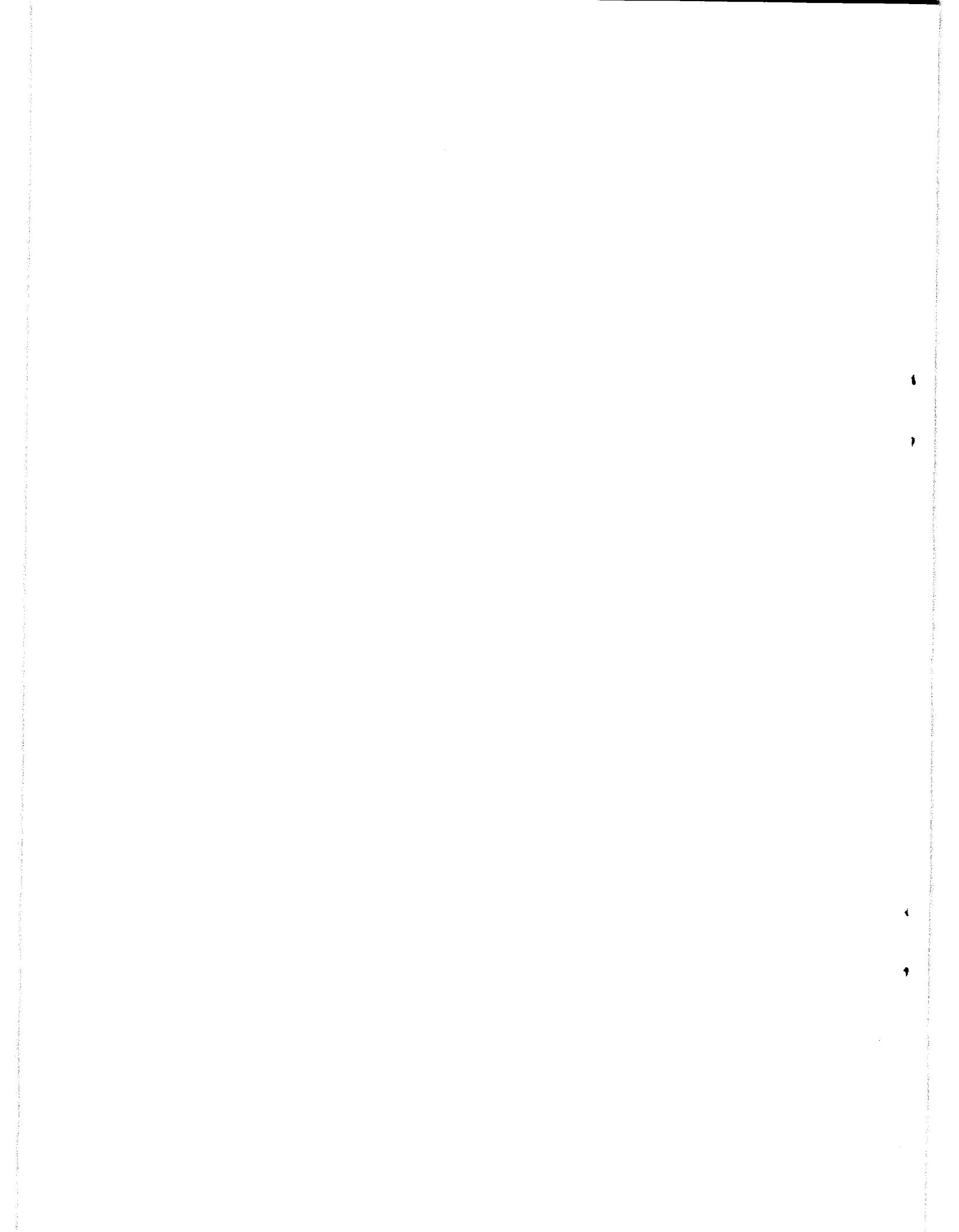
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Accepted 18 May 1987





A. *Pasiphaea berentsae*, Paratype, AM P26797.



B. *Lebbeus yaldwyni*, Paratype, AM P24769.



C. *Plesionika grahami*, Paratype, AM P21030.



D. *Glyphocrangon novacastellum*, Paratype, AM P20995.

ERRATUM: Frontispiece, C. Glyphocrangon novacastellum, Paratype, AM P20995.

D. Plesionika grahami, Paratype, AM P21030.

