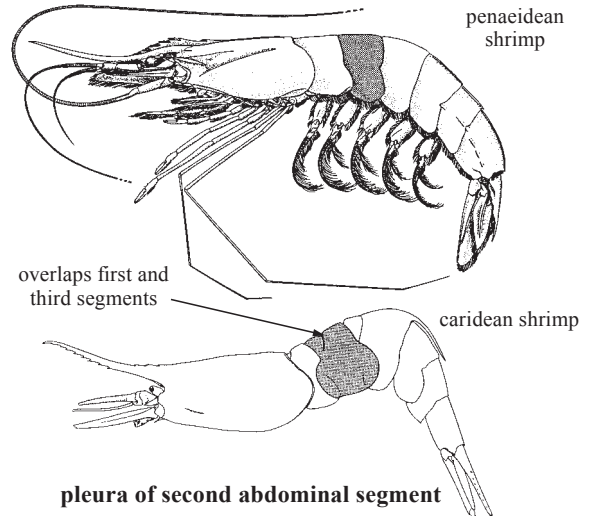
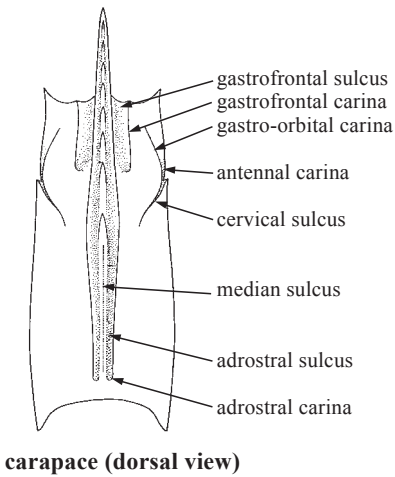
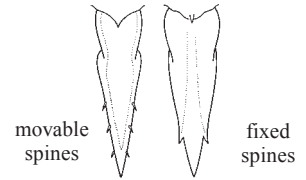
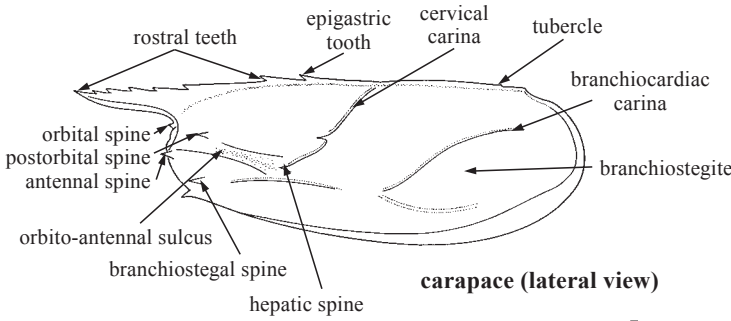
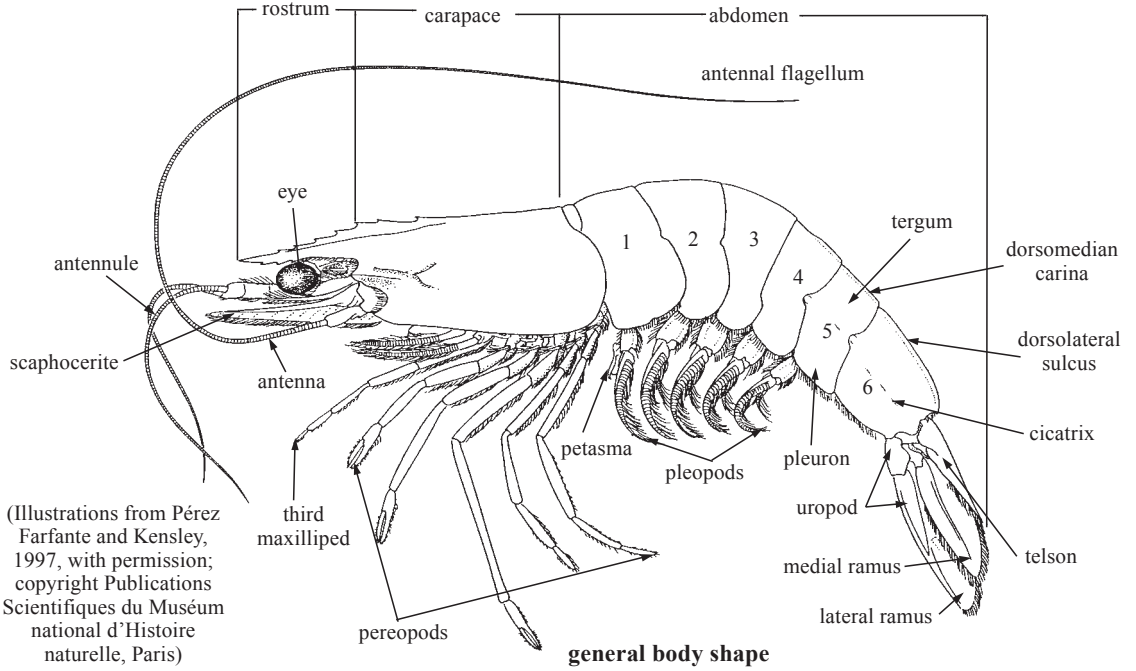
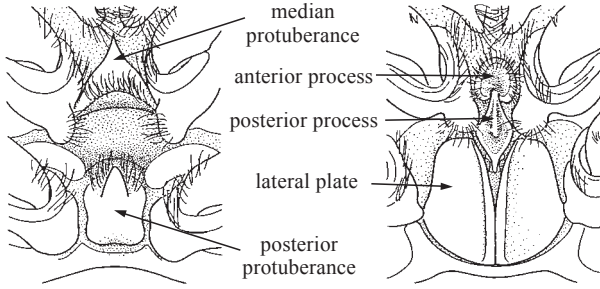


# SHRIMPS

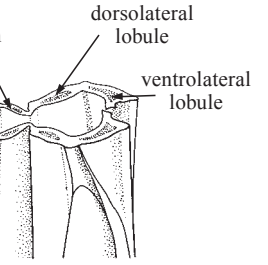
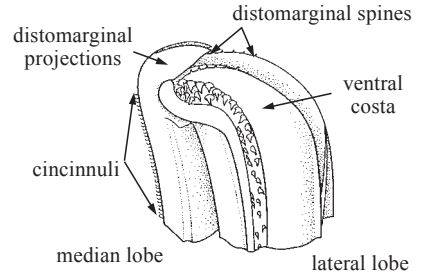
by M. Tavares, Universidade Santa Úrsula, Brazil

### TECHNICAL TERMS AND MEASUREMENTS

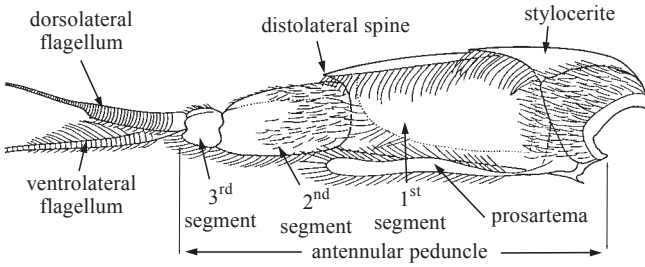




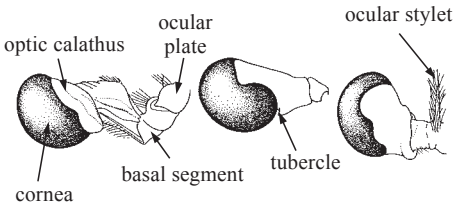
**thelycum**



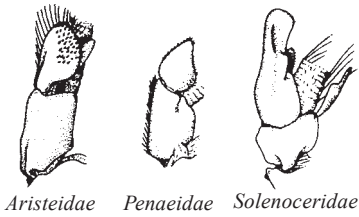
**petasma**



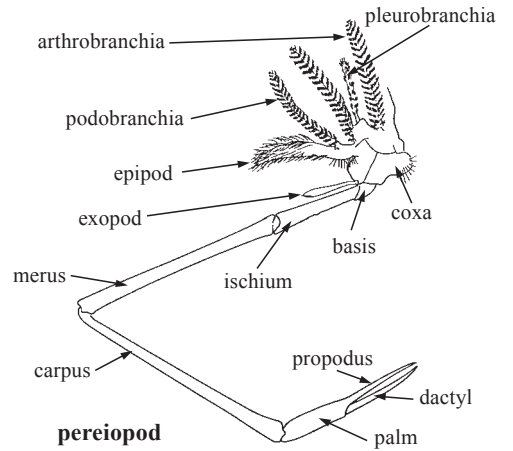
**antennule**



**eye**

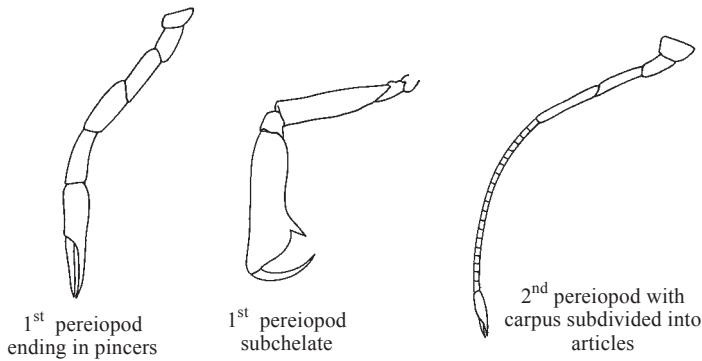


*Aristeidae*   *Penaeidae*   *Solenoceridae*



**pereiopod**

**types of appendices masculinae on endopods of second pair of pleopods**



**schematic illustration of pereiopods**

## GENERAL REMARKS

The shrimps constitute a large group of crustaceans varying in size from microscopic to about 35 cm long. The body is almost always laterally compressed, the rostrum usually compressed and toothed, and the abdomen long, longer than the carapace or head. The antennules, or first pair of feelers, in most species bear a small scale or spine, the stylocerite, at their bases. The antennal scales of the second pair of feelers, the antennae, are generally large and plate-like. The pereopods or legs are usually slender, but in some, a single leg or pair of legs may be stout and some pereopods end in pincers. The pleopods or abdominal appendages used for swimming, are well developed and, most often present on all 5 anterior abdominal segments.

Shrimps are widely distributed, occurring in marine, brackish, and fresh waters from the equator to the polar regions. Although the majority of the marine species occupy shallow or moderately deep water, some are found at depths of nearly 5 700 m; however, most of the commercial shrimps are taken on the continental shelves at depths of less than 100 m. In Area 31 only 3 shrimp species are trawled commercially in depths greater than 300 m; *Aristaeomorpha foliacea*, *Aristaeopsis edwardsiana*, and *Pleoticus robustus*. Many shrimps are pelagic but the majority by far are benthic, living on a large variety of bottoms such as rock, mud, peat, sand, fragments of shells, or mixtures of these materials. In addition, some frequent coral reefs, and a few species live in sponges and other invertebrates.

In most shrimps, the sexes are separate but certain species, such as *Pandalus borealis*, commonly first undergo a male phase and later are transformed into females. The paired reproductive organs are situated on each side and just below the heart: in the females the ovaries (which may extend posteriorly along the entire length of the abdomen) are connected by oviducts to openings on the basal article of the third pair of pereopods. To the male, the sperm ducts lead from the testes to terminal ampoules which open on or adjacent to the basal article (coxa) of the last pair of pereopods.

In some penaeidean shrimps the females possess sperm receptacles on the ventral side of the last thoracic segments (between the last pairs of pereopods), where the males deposit the sacs carrying the sperm, whereas in others the females exhibit protuberances and grooves for the attachment of such sacs. Either genital modification is called the thelycum, and there the sperm remain until the eggs are released. In the males there is a petasma formed by the longitudinally folded endopods of the first pair of pleopods. Most male shrimps bear an appendix masculina, a lappet borne on the endopod of the second pair of pleopods, the presence or absence of which constitutes a ready means for distinguishing males from females. In many shrimps an appendix interna (slender rod or blade) occurs adjacent to the appendix masculina; among carideans such a structure is also present on the third through the fifth pleopods of both sexes.

In the stenopodidean and caridean shrimps the female carries the eggs after extrusion, masses of them being fastened to the pleopods where they remain until they hatch at a relatively advanced larval stage or as juveniles. In contrast, in the penaeideans the eggs are not retained by the female, but released directly into the water, and the larvae undergo an extensive metamorphosis, the first part of a complex life cycle, which may require both oceanic and brackish water. For example, the members of the genera *Penaeus* and *Farfantepenaeus*, the most valuable commercial shrimps, spawn offshore at depths of about 10 to 80 m. Eggs hatch within a few hours, releasing very small, simple larvae, the nauplii, the first of usually 11 larval stages, which includes nauplii, 3 protozoae, and 3 mysis. The larvae are planktonic and are carried by currents towards shore where they arrive as postlarvae; this occurs about 3 weeks after hatching when the animals are about 6 to 14 mm long, and shrimp-like in appearance. The postlarvae invade inshore brackish waters, abandon their planktonic way of life, and become bottom dwellers, living in shallow littoral areas. In these rich nursery grounds they grow rapidly, develop into juveniles, and, as size increases, move gradually back toward the mouths of bays or estuaries where they become subadults. Soon the shrimp migrate offshore, continue growing, and finally, as adults, reach the spawning grounds, where the mature females spawn and the cycle is repeated; most shrimps in these grounds are less than a year old. Penaeidean shrimps are very prolific, for example, a single female of *Litopenaeus setiferus*, one of the principal commercial species in Area 31, may produce as many as 500 000 eggs. Carideans, in contrast, produce a much smaller number correlated with the fact that the females carry their eggs until hatching.

Only slightly more than 350 species are of economic interest, and of these about 100 comprise most of the annual world shrimp catches. A number of countries heavily depend on shrimp exports as a source of foreign currency income. Most of the commercial shrimp species belong to the 5 penaeidean families Aristeidae, Penaeidae, Sicyoniidae, Solenoceridae, and Sergestidae - and 3 caridean ones - Pandalidae, Crangonidae, and Palaemonidae. The penaeideans are exploited mainly in tropical and subtropical waters, the members of Pandalidae and Crangonidae in temperate seas, and those of Palaemonidae in brackish waters from the tropic to the temperate zones. Another caridean family, Hippolytidae, contains one species of economic interest in the Western Central Atlantic.

From 1984 to 1998 the shrimp catch (penaeidean) reported from Area 31 totaled 2 602 426 t (French Guiana: 46 642 t; Guyana: 94 967 t; Honduras: 36 129 t; Mexico: 540 864 t; Nicaragua: 23 572 t; Suriname: 8 134 t; USA: 1 722 545 t; Venezuela: 129 573 t).

Shrimp or prawn? Holthuis (1980) summarized the usage of the words 'shrimp' and 'prawn' in the English-speaking world. The use of these 2 words is quite confusing, even within a single region. It is felt that the use of 'shrimp' and 'prawn' interchangeably in this guide would only add to the confusion; the name 'shrimp' is preferred instead. This is because the English FAO names for the species treated in this guide, all but *Nematopalaemon schmitti*, are based upon the word 'shrimp' (e.g., northern brown shrimp, redspotted shrimp, rock shrimp, and so on). The English FAO name for *N. schmitti* is 'white belly prawn'.

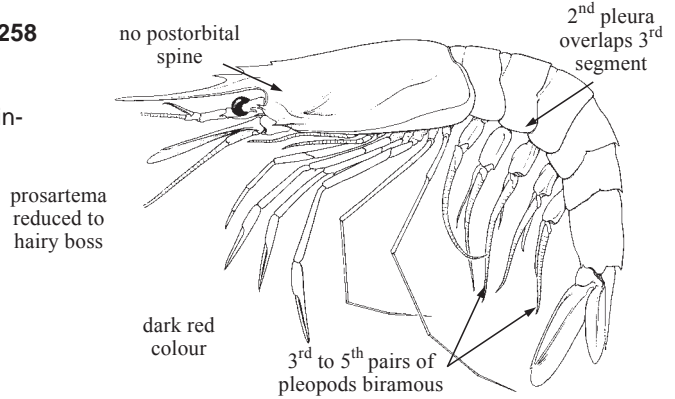
**GUIDE TO THE FAMILIES OF INTEREST TO FISHERIES OCCURRING IN THE AREA**

**ARISTEIDAE**

p. 258

**Aristeid shrimps**

This family includes 2 species of economic interest in the area, both from deep water.

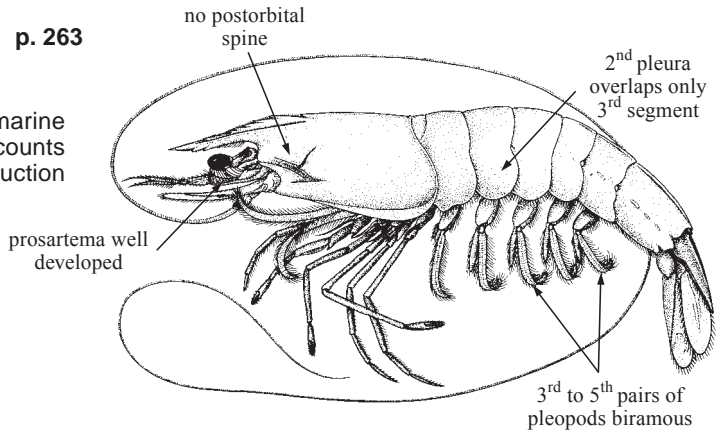


**PENAEIDAE**

p. 263

**Penaeid shrimps**

This family includes the most valuable marine commercial species of shrimp and accounts for at least 95% of the total shrimp production from Area 31.

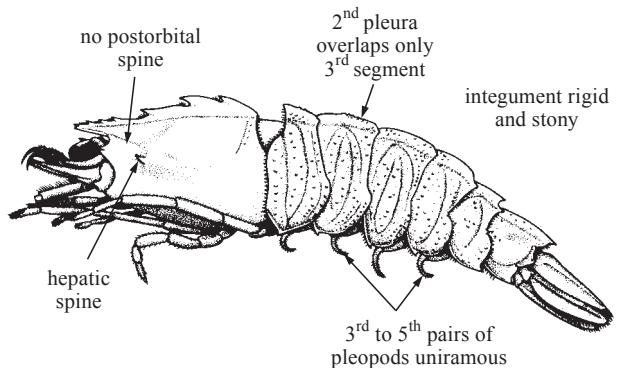


**SICYONIIDAE**

p. 279

**Rock shrimps**

One genus, *Sicyonia* H. Milne Edwards, 1830, and 43 species, all marine, have been recognized in this family; 2 species occurring in the area are of economic interest, *Sicyonia brevirostris* and *Sicyonia typica*.

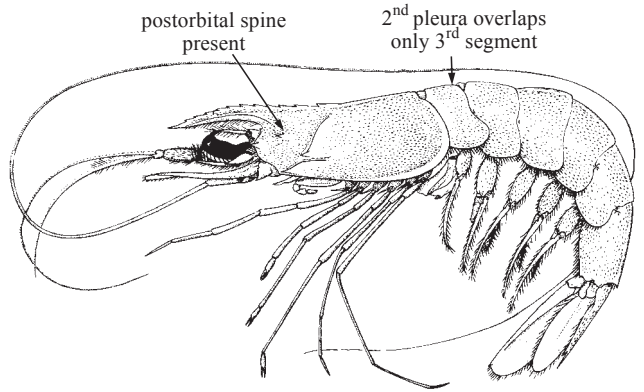


**SOLENOCERIDAE**

p. 284

**Solenocerid shrimps**

This family includes only marine representatives. Only 1 species occurring in the area is abundant and big enough to be of economic interest.

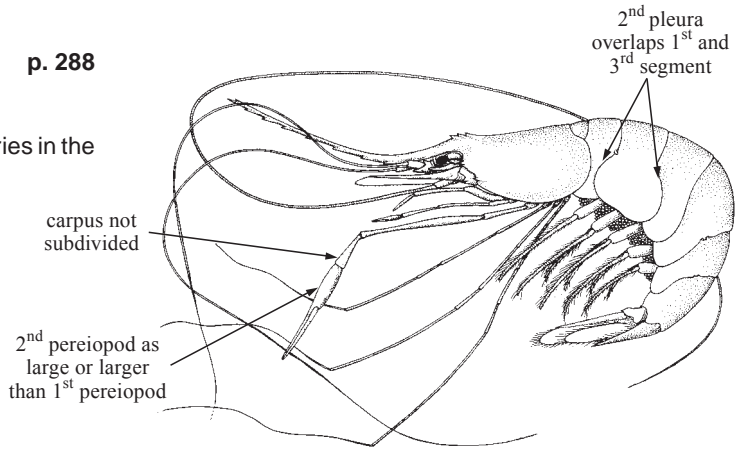


**PALAEEMONIDAE**

p. 288

**Palaemonid shrimps**

A single species of interest to fisheries in the area: *Nematopalaemon schmitti*.

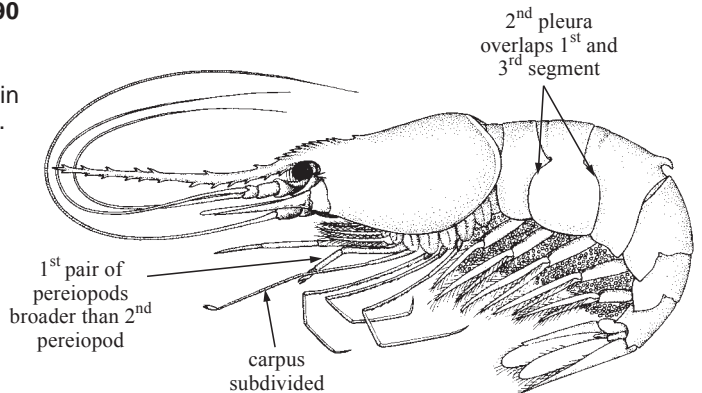


**HIPPOLYTIDAE**

p. 290

**Cock shrimps**


A single species of interest to fisheries in the area: *Exhippolyasmata oplophoroides*.







**KEY TO THE FAMILIES OF INTEREST TO FISHERIES OCCURRING IN THE AREA**

(Penaeidae adapted from Pérez Farfante and Kensley, 1997)

- 1a.** Pleura of second abdominal segment not overlapping those of first and third segments (Suborder Dendrobranchiata) . . . . . → 2
- 1b.** Pleura of second abdominal segment overlapping those of first and third segments (Suborder Pleocyemata) . . . . . → 5
- 2a.** Postorbital spine present . . . . . **Solenoceridae**
- 2b.** Postorbital spine absent . . . . . → 3
- 3a.** Integument rigid and stony; third to fifth pleopods uniramous, lacking endopods . . . . . **Sicyoniidae**
- 3b.** Integument never stony; third to fifth pleopods biramous; more than 2 rostral/postrostral teeth . . . . . → 4
- 4a.** Prosartema well developed . . . . . **Penaeidae**
- 4b.** Prosartema reduced to setose boss . . . . . **Aristeidae**
- 5a.** First pair of pereopods broader than second pair; carpus of second pair divided into several articles. . . . . **Hippolytidae**
- 5b.** First pair of pereopods more slender than second pair or at most as broad; carpus of second pair undivided . . . . . **Palaemonidae**

**LIST OF FAMILIES OF INTEREST TO FISHERIES OCCURRING IN THE AREA**The symbol  is given for those families which are treated further in this contribution.**Suborder DENDROBRANCHIATA****Superfamily PENAEOIDEA**

-  ARISTEIDAE
-  PENAEIDAE
-  SICYONIIDAE
-  SOLENOCERIDAE

**Suborder PLEOCYEMATA****Infraorder CARIDEA****Superfamily PALAEMONOIDEA**

-  PALAEMONIDAE

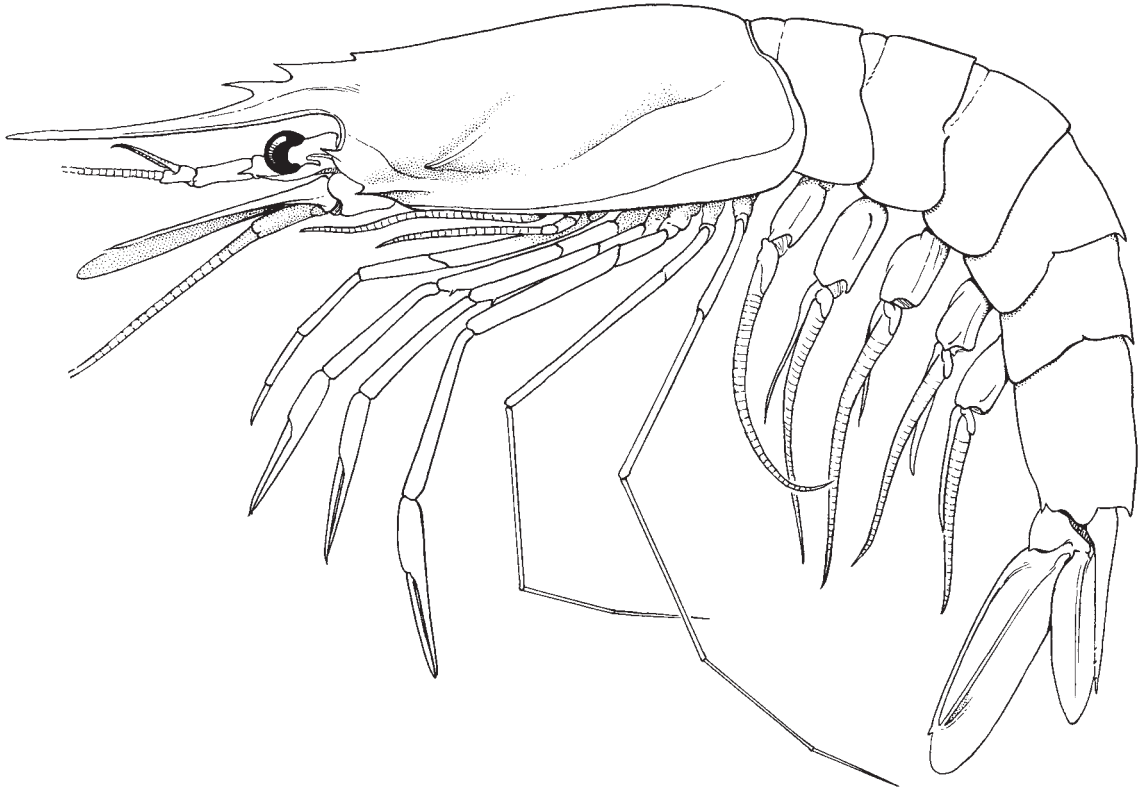
**Superfamily ALPHEOPIDEA**

-  HIPPOLYTIDAE

**ARISTEIDAE**

**Aristeid shrimps**

**Diagnostic characters:** Rostrum usually elongate in females, sexually dimorphic in several genera, being elongate in females and juvenile males, short in adult males; usually with only 3 dorsal rostral/postrostral teeth (more only in *Aristaeomorpha*); lacking ventral teeth. Carapace lacking postorbital and pterygostomian spines; cervical and postcervical grooves sometimes present, most often reaching dorsal midline, or almost absent and visible only laterally. Two well-developed arthrobranches on penultimate thoracic segment.



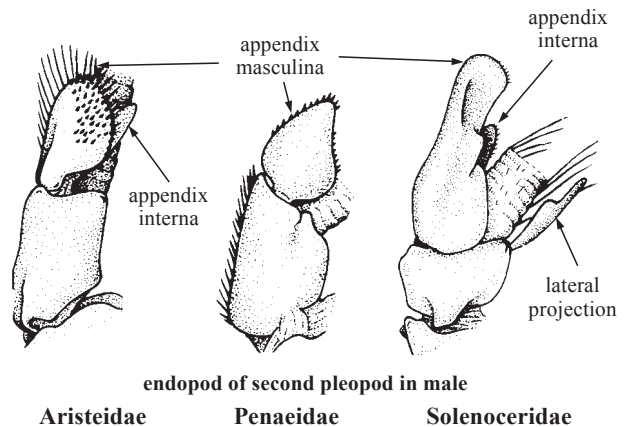
**Habitat, biology, and fisheries:** The species in this family usually inhabit deep waters. Some of them are actively fished because of their large size and high commercial value.

**Remarks:** This family includes 2 species of economic interest in the area, both from deep water.

**Similar families occurring in the area**

**Solenoceridae:** postorbital spines present on carapace; endopods of second pair of pleopods (in males) with an appendix masculina, and appendix interna and a lateral projection; telson with a fixed spine on each side of tip.

**Penaeidae:** eyestalks without tubercles on inner margins; cervical grooves short, ending well below dorsal midline of carapace; endopods of appendix masculina only; a single, well-developed arthrobranch on base of penultimate thoracic segment (concealed under the carapace).



endopod of second pleopod in male

Aristeidae

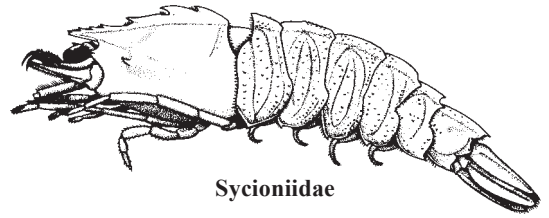
Penaeidae

Solenoceridae

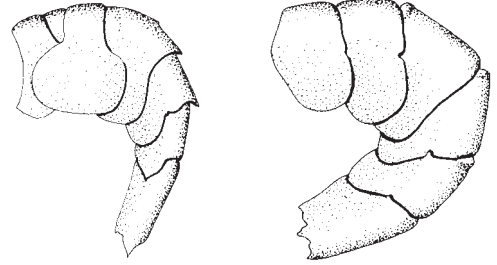


Sicyoniidae: body thick, stony in appearance, integument calcified; cervical grooves faint or absent; abdomen with deep grooves and numerous tubercles; third and fourth pairs of pleopods single-branched, endopods of second pair of pleopods (in males) with an appendix masculina only; a single, well-developed arthrobranch on penultimate throacic segment.

Caridean shrimps: pleura of second abdominal segment overlapping those of first and third segments; no pincers on third pair of pereopods.



Sicyoniidae



abdomen

Caridea

Penaeidae


**Key to the genera of Aristeidae occurring in the area**

(from Pérez Farfante and Kensley, 1997)

- 1a. More than 3 rostral/postrostral teeth present . . . . . *Aristaeomorpha*
- 1b. Three rostral/postrostral teeth present . . . . . → 2
  
- 2a. Postantennal spine present . . . . . *Parahepomadus*
- 2b. Postantennal spine absent . . . . . → 3
  
- 3a. Hepatic spine present . . . . . *Hepomadus*
- 3b. Hepatic spine absent . . . . . → 4
  
- 4a. Exopods absent from first to fifth pereopods. . . . . → 5
- 4b. Exopods present on first to fifth pereopods . . . . . → 7
  
- 5a. Meral spine lacking on first and second pereopods; scaphocerite in male modified, distally elongate . . . . . *Aristeopsis*
- 5b. Distal movable meral spine present on first and second pereopods; scaphocerite in male not modified . . . . . → 6
  
- 6a. Postcervical sulcus present . . . . . *Pseudaristeus*
- 6b. Postcervical sulcus absent . . . . . *Aristeus*
  
- 7a. Third to sixth abdominal somites dorsally carinate; epipod on fourth pereopod rudimentary . . . . . *Hemipenaeus*
- 7b. Fourth to sixth abdominal somites dorsally carinate; epipod on fourth pereopod large . . . . . → 8
  
- 8a. Carapace ridges and carinae weak; podobranchia on third pereopod rudimentary; ventral antennular flagellum in male modified; dactyl of third maxilliped in male modified . . . . . *Austropenaeus*
- 8b. Carapace with ridges and carinae moderately strong to strong; podobranchia on third pereopod large; ventral antennular flagellum in male not modified; dactyl of third maxilliped in male not modified . . . . . *Plesiopenaeus*

### List of species occurring in the area

The symbol  is given when species accounts are included.

 *Aristaeomorpha foliacea* (Risso, 1827).

 *Aristaeopsis edwardsiana* (Johnson, 1867).

*Aristeus antillensis* A. Milne Edwards and Bouvier, 1909.

*Hemipenaeus carpenteri* Wood-Mason, 1891.

*Hepomadus tener* Smith, 1884.

*Plesiopenaeus armatus* (Bate, 1881).

*Plesiopenaeus coruscans* (Wood-Mason, 1891).

### References

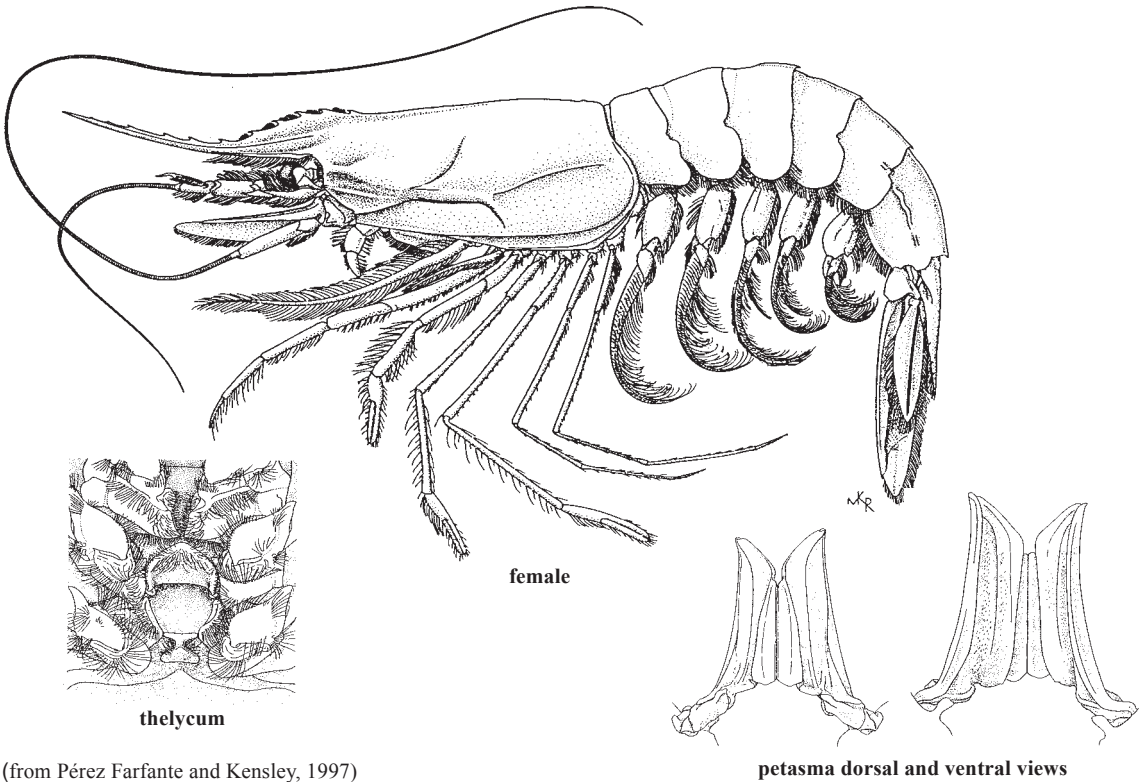
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*Aristaeomorpha foliacea* (Risso, 1827)

ARS

**Frequent synonyms / misidentifications:** None / None.

**FAO names:** En - Giant red shrimp; Fr - Gambon rouge; Sp - Gamba española.



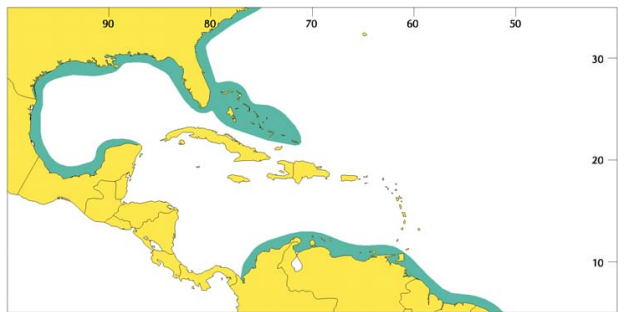
(from Pérez Farfante and Kensley, 1997)

**Diagnostic characters:** Integument pubescent. **Rostrum** elongate in females and juvenile males, reaching well beyond scaphocerite; short in adult males, **bearing 3 to 7 dorsal teeth along its entire length, followed by 2 postrostral teeth**. First and second abdominal somites dorsally rounded, third to sixth somites dorsally carinate. Telson bearing 4 pairs of movable lateral spines in posterior half. **Colour:** dark red.

**Size:** Maximum length: females, 225 mm; males, 170 mm.

**Habitat, biology, and fisheries:** Marine deep waters from 250 to 1 300 m; bottom mud. This species is obtained off the Mediterranean coasts of Spain, France, Italy, Algeria, and Israel; in the western Atlantic it is considered of commercial interest only in the southern part of Area 31 (Venezuela). There are no separate statistics for this species. Caught with deep sea commercial trawlers. Marketed fresh or frozen.

**Distribution:** Western Atlantic: South of Massachusetts to the Straits of Florida, Gulf of Mexico, Caribbean Sea, Venezuela, and southeastern Brazil. Eastern Atlantic: Bay of Biscay to western Sahara; Azores; Madeira; Canary Islands; Mediterranean; off east coast of South Africa. Indo-West Pacific: Mozambique; East Africa; Madagascar; Réunion; Maldive Islands; Sri Lanka; Indonesia; Philippines; Taiwan Province of China; Japan; Western Australia; New South Wales; Victoria; New Caledonia; New Zealand; Wallis and Futuna Islands; and Fiji.

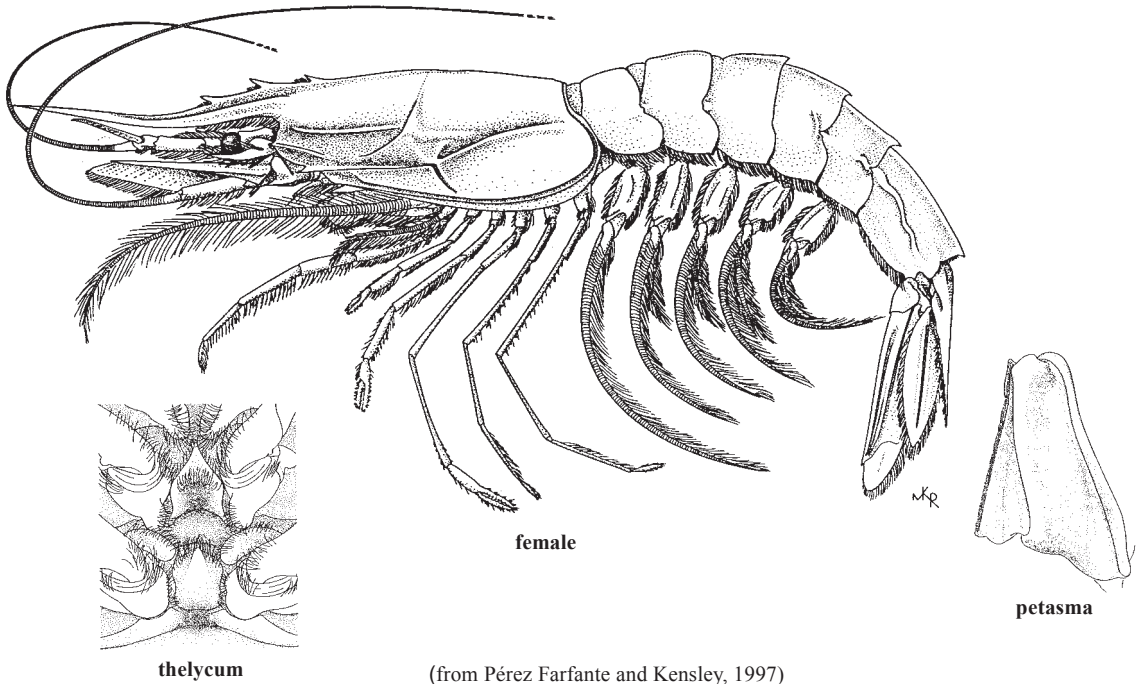


*Aristaeopsis edwardsiana* (Johnson, 1867)

SSH

**Frequent synonyms / misidentifications:** *Plesiopeneus edwardsianus* (Johnson, 1867) / None.

**FAO names:** **En** - Scarlet shrimp; **Fr** - Gambon écarlate; **Sp** - Gamba carabinero.



(from Pérez Farfante and Kensley, 1997)

**Diagnostic characters:** Integument glabrous. **Rostrum** moderately elongate in females and juvenile males, reaching beyond apex of scaphocerite; somewhat shorter in adult males, **bearing 2 basal teeth followed by a single postrostral tooth**. First abdominal somite dorsally rounded; second somite with barely discernible rounded middorsal carina in posterior half; third to sixth somites with sharp carina, ending posteriorly in short spine. **Colour:** dark red.

**Size:** Maximum length: females, 334 mm; males, 193 mm.

**Habitat, biology, and fisheries:** Marine deep waters from 274 to 1 850 m, most frequently found between 400 and 900 m; mud bottoms. This species is fished commercially in the eastern Atlantic (Senegal, Guinea, Congo, and Angola); in the western Atlantic it has been considered of commercial interest only in the southern part of Area 31 (French Guyana); production is small and entirely exported to Spain. There are no separate statistics for this species. Caught with deep sea commercial trawlers. Marketed frozen.

**Distribution:** Western Atlantic: Grand Bank (42°42'N) to the Gulf of Mexico, including Bermuda, Caribbean Sea, French Guiana, and Brazil. Eastern Atlantic: from Azores, Madeira, Canary Islands, Portugal, Morocco, western Sahara, to South Africa. Not in the Mediterranean. Indo-West Pacific: east coast of Africa, Madagascar, Arabian Sea, central Indian Ocean, Bay of Bengal, Andaman Sea, Indonesia, Japan, South China Sea, Australia (New South Wales), and Wallis and Futuna Islands.

